In the Name of GOD

Conference proceedings

"The 2nd International and 20th national Conference on Environmental Health and Sustainable Development"

Yazd, 28-30 November 2017

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Professor ship for nuclear medicine at the University of Mainz.
Member of the Executive Board of the "European Health Network

The Conference president's message

Today, it is proposed that more than 75% of deaths are due to non-communicable diseases, worldwide. The environmental risk factors are among the most important predictors for non-communicable diseases which exert their effect direct or indirectly. According to a report by world health organization (WHO), about 19-25 % of the burden of diseases in the Middle East is attributed to environmental risk factors, such as air pollution, water pollution, and other environmental risk factors. Today, one of the most important issues, especially in developing countries, is environmental factors which if properly managed, might prevent several diseases and therefore deaths, each year.

The development and advancement of industries and also urbanization, regardless of the importance of sustainable development, have increased the release of various pollutants in the environment. Thus, in 2015, at the same time with the end of "the Millennium Development Goals", the United Nations has set a new framework for sustainable development on a global scale. The main reason for setting new targets was the important fact that despite the significant impacts of the Millennium Development Goals on the improvement of human life and the commitment of countries to its implementation, millions of people are still suffering from health, economic, and social inequalities. On September 25, 2015, the new UN program called "Sustainable Development Goals" was drafted in which 17 goals, 169 targets, and 230 indicators were considered as the basis for global sustainable development by the year 2030. Among these, several goals, targets, and indicators are represented as the environmental health indicators, such as "Death due to air pollution", " concentration of air pollutants", "Indoor air pollution", " Safe Water", and "Sanitation".

The "National Environmental Health Conference" is held annually by the collaboration of the Iranian Association of Environmental Health (IAEH) and one of the national medical universities. The main objective of this conference is to represent the latest achievements of experts in the field of environmental health. This conference has always been widely welcomed by environmental health practitioners and other scientists concerned with the field of environment and its possible effect on human health.

In November of 2017, "The 2nd International Conference and the 20th National Conference on Environmental Health and Sustainable Development" which is going to be held by Yazd University of Medical Sciences, for the second consecutive year, the international and global aspects of the environmental risk factors are going to be considered, with a focus on the goals of sustainable development defined by the United Nations. At this conference, some of the leading international experts, along with a large number of professionals, as well as prominent scientific and executive figures in the field of environmental health will attend. They will discuss the opportunities, threats, and methods to implement and execute national policies in this field for three days.
I invite all professors, specialists, executive directors, students, and practitioners interested in the environmental health to participate in this conference. I hope we could provide a healthy and jolly environment for ourselves and the next generations.

I'd like to thank each of your for attending our conference and bringing your expertise to our gathering. Throughout this conference, I ask you to stay engaged, keep us proactive and help us shape the future of Environmental Health. My personal respect and thanks goes out to all of you.

Dr. Mohammad Reza Mirjalili Head of Shahid Sadoughi University of Medical Sciences, Yazd

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Environmental
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Activated Carbon Prepared from Haloxylon Tree and Super Adsorption Capability of their Nanoparticles for Phenol Removal

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Abstract

This study was conducted to evaluate the adsorption capability of activated carbon nanoparticles of Haloxylon tree (HTAC) to remove phenol from aqueous solutions. Carbonaceous adsorbents resulted from Haloxylon tree were made through chemical activation method using H_2SO_4 as an activator reagent. In this research were studied the effects of pH, contact time, the initial concentration of phenol and adsorbent dose on phenol's adsorbent. Results indicated that by increasing the pH to 7 adsorption increases and after that it decreases considerably. Optimal condition for maximum adsorption was 95.3% in pH of 7, initial phenol concentration of 50 mg L^{-1}, 2gr L^{-1} adsorbent dose and contact time of 60 minutes. In this study adsorption kinetics followed a pseudo-second-order model and the adsorption experimental data were represented by both the Langmuir and Freundlich isotherm models. The Langmuir isotherm model best fitted the data on the adsorption of phenol, with a high correlation coefficient (R^2 = 0.99). Monolayer adsorption capacity (q_{max}) of HTAC obtained to be 4.357 mg gr^{-1}.

Keywords: Activated carbon, Adsorption, Haloxylon, Phenol.

Application of the Photocatalytic Process of ZnO/TiO2 / UVc for the Degradation of 2, 4-Dichlorophenoxyacetic acid In Aqueous Aolutions

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Abstract

A variety of pesticides are used in weeds control. Discharge of these resistant pllutants residues into drinking water resonrces con have destructive effects on human health and the environment. In recent years, advanced oxidation prossesses have more been considered to removal of herbicides from the environment, particularly the aquatic environment. In this study, samples were prepared by adding different concentrations (10, 20, 30mg/L) of 2, 4-D in deionized water. Samples were exposed to ZnO/TiO_2 and UVc in each step with different catalyst concentration (g / L 1, 2, 3 و 4), pH (2,4, 6, 8, 10) and contact time (60, 120, 180, 240 min) contacts coupled in a batch system. Based on the results, degradation efficiency increases with decrease of herbicide concentrations (2, 4-D) and increase of contact time. The highest degradation efficiency was 96 percent and reached in 10 mg/L of 2, 4-D initial concentration at 240 minutes. The exprimntal data of 2, 4-D degradation by the ZnO/TiO_2 photocatalytic process in presence of UVc light were fitted to the pseudo first order kinetic. The highest effective degradation of herbicide (2, 4-D) by the ZnO/TiO_2 photocatalytic process reach with increasing contact time and decreasing herbicide concentration (2, 4-D) in pH value of 4.

Keywords: Water pollution, herbicide 2,4-dichlorophenoxyacetic acid, Photocatalyst nanoparticles, ZnO/TiO_2

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A Comparative Study of Photo-Degradation of Atrazine in Aquatic Environments Using UV and Fe (III)-Tio2 processes

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Abstract

Atrazine is one of the most widely used triazine herbicide in controlling broadleaf and grassy weeds for many years. Its widespread use in water has caused environmental concern because of frequent detection of atrazine in aquatic systems where this herbicide has been spilled. The aim of this study was to compare the degradation of atrazine in the aquatic environment using UV and Fe (III)-TiO_2 processes. The influence of different parameters including pH at three different levels (3-11), the initial concentration of atrazine at three different levels (0.1-10 mg/L), and reaction time at five different levels (0-120 min), and in the removal of atrazine in the aqueous phase using ultraviolet radiation (1020 $\mu W/cm^2$) or catalyst (5 mg/L) were investigated. Finally, the data was analyzed using SPSS software (version 16). The maximum rate of atrazine removal in the aqueous phase using ultraviolet radiation and Fe (III)-TiO_2 processes occurred in pH=11, atrazine concentration =10 mg/L at 120 minutes and pH=3, atrazine concentration= 0.1 mg/L at 120 minutes, respectively. The results demonstrated that atrazine removal rate increased by increasing reaction time. According to the finding, it can be concluded that the UV and Fe (III)-TiO_2 process is an effective method for reducing atrazine in polluted water resources.

Keyword: Atrazine, atrazine removal, Fe^{+3}-TiO_2 process, ultraviolet radiation

A comparison between adsorption, Fenton, UV-Fenton and sono-Fenton processes using MNPs@C as a magnetic composite for decolorization of contaminated water

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Abstract

A magnetic hybrid composite, MNPs@C, was prepared by using modified co-precipitation chemical method. The adsorptive/catalytic performance of composite was developed in the adsorption and heterogeneous Fenton (e.g., Fenton, UV-Fenton and sono-Fenton) processes for removal of Direct Red 16 (DR16) dye from water media. Effect of operational conditions on dye removal was evaluated by change levels of pH, contact time, adsorbent dose and initial dye and H_2O_2 concentrations. MNPs@C easily and rapidly separated from the aqueous solutions due to good response to external magnetic. Results indicated that the as–synthesized composite possess a high adsorption capacity and also good catalytic activity for the removal of DR16. Kinetic studies indicated that both film- and pore-diffusion affect adsorption mechanisms and it can be well correlated by the pseudo-second-order model. The adsorption isotherms fitted well with Langmuir model and the adsorption of dye onto MNPs@C was an endothermic and spontaneous process. The maximum dye removal efficiency was as high as 98.3%, which was much greater than that of MNPs@C, H_2O_2, Fenton, UV, US, UV/US and US-Fenton. $HO^{\bullet}$ radicals were main responsible for degradation of DR16 molecules during UV/US-Fenton process. The removal efficiency of dye under various systems was in accordance to the following order: UV-Fenton > US-Fenton > Fenton > adsorption. For UV-Fenton system, 94.8 % removed of dye and lost 0.001% of the MNPs@C was observed after 5 times of recycle, which confirm that composite still remained good activity. From an economic point of view, high adsorption capacity, the magnetically separable ability, high reusability and stability and low iron leaching of MNPs@C, making it promising composite and cost-effective for wastewater-contaminated organic dyes. Therefore, MNPs@C can be applied with a greater flexibility for environmental applications and especially adsorption/oxidation processes.

Keywords: Adsorption, Oxidative degradation, Fenton Process, Reactive dye, Magnetite nanoparticles

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A Survey on Temporal Changes of Groundwater Quality in Shiraz by Using Iran Resources Water Quality Index (IRWQI) and Statistical Analysis

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Abstract

One of the important aspects in management and sustainable development of water resources is monitoring water quality and analyzing its trends over the time in the national scale. The aim of the present study was to analyze the temporal changes of drinking water quality being supplied from groundwater resources in Shiraz, Iran. IRWQI (Iran Resources Water Quality Index) and statistical methods including repeated measure test and Post-hoc analysis were applied through a case study from groundwater resources in Shiraz, Iran. The study was conducted in a 5-year period (2011 to 2015) and on 45 drinking water wells. The results showed that IRWQI has been varied from 89.96 (Very Good) to 49.51 (Medium). Moderate to high concentrations of NO_3 and total hardness were detected as the two main quality parameters to be responsible for quality declining. Water quality has been faced both ascending and descending trends in the study period, in the way that from the beginning year until 2013, ascending and since then to 2015, descending pattern has been observed. Statistical analysis showed that a significant change in water quality ($p_{value} < 0.001$) has been occurred over the time. According to the urgency of water quality status and its trends to be clarified in the country and using IRWQI as a newly national WQI (Water Quality Index), using this index merging with suitable statistical methods would accelerate performing the homogeneous schemes of water quality management in Iran.

Keywords: Swimming pool, Index, Health, Multi-criteria decision-making, Shiraz

Ability of the Yeast Saccharomyces Cerevisiae for Removal of Reactive Red 120 from Aqueous Solutions

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Abstract

Synthetic dyes are extensively used in various industries such as textile, leather tanning, plastic, pulp and paper. Since dyes are toxic and even carcinogenic, discharging dye-containing wastewater into the environment poses serious environmental and health problems. Therefore, the purpose of this paper was to evaluate the removal of Reactive Red 120 from aqueous solutions using yeast Saccharomyces cerevisiae.

This research carried out in a laboratory scale. We studied the influence of independent variables such as adsorbent dose (3-10 g/l), initial dye concentration (5-50 mg/l), pH (3-10) and contact time (10-180 min) on removal of Reactive Red 120 in adsorption process. In this study, response surface methodology was selected to optimize and model the process. The residual concentration of Reactive Red 120 in samples was determined by spectrophotometer at a wavelength of 560 nm. The results showed that the maximum removal of Reactive Red 120 efficiency can be achieved at pH 6/5, adsorbent dose 10 g/l, concentration color 27/5mg/l and contact time 95 min. In this condition, removal efficiency was 100%. According to the results of this study Saccharomyces cerevisiae can be considered as asuitable and economical candidate for the removal of Reactive Red 120fromaqueous solutions , with minimal technology.

Key words: Yeast Saccharomyces cerevisiae, Reactive Red 120, Aqueous solution

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Acetaminophen Degradation in Hospital Wastewater Using Electro-Fenton Treatment System; Modeling and Empirical Studies

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Abstract

Acetaminophen ($C_8H_9NO_2$) is an antipyretic pharmaceutical which is easily accessible around the world and in some countries even without medical prescription. It is ranked as one of the top three most heavily used drugs through prescription since about 58-68% of acetaminophen (AC) is excreted from the body when ingested in therapeutic dosage; a considerable concentration of AC is frequently detected in the pharmaceutical and municipal wastewater systems. Response surface methodology (RSM) under central composite design (CCD) category of Design Expert was used to achieve efficient removal of AC. The experiments were applied under 5 levels of various operational parameters. The initial concentration of AC was varied among 1 to 20 $mg.L^{-1}$, pH ranging from 2 to 5; current density ranging from 2 to 10 $mA.cm^{-2}$; H_2O_2 ranging from 40 to 150 $\mu L.L^{-1}$ and reaction time was ranged between 1 to 10 minutes. Degradation yield of 99.5 % was obtained under the optimal experimental conditions, namely 5.75 $mg.L^{-1}$ initial AC concentration, 2.75 pH solution, 122.5 $\mu L.L^{-1}$ H_2O_2, 8 $mA.cm^{-2}$ current density at equilibrium time of 8 min. Using ordinary radical scavengers revealed that degradation as the main mechanism of AC removal in hospital wastewater controlled under hydroxyl free radicals produced through EF process. The obtained results demonstrated a satisfactory correlation between experimental removal efficiency of 98.7% and predicted removal efficiency of 99.5% with the correlation coefficient of 0.9545. Using ordinary radical scavengers demonstrated that hydroxyl radical ($^{\bullet}OH$) was the main oxidant species contributed in degradation of AC under the EF process. The EF process kinetics model successfully fitted to the pseudo first-order kinetic model with rate constants (K_{app}) of 0.6718 min^{-1}.

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Activation of Peroxymonosulfate by TiO2 Supported on Ferroferricoxides@C; A New Insight into Organic Compounds Oxidative Degradation

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Abstract

A heterogeneous photocatalyst, TiO_2-functionalized magnetic activated carbon (T@MPAC), was fabricated as a novel peroxymonosulfate (PMS) activator for improving the oxidative degradation of benzotriazole (BTA) in aqueous media. For characterization of the features of the synthesized catalyst, XRD, FESEM, EDS, BET, TEM, PL and UV-vis DRS techniques were applied. Influence of operating parameters namely solution pH, reaction time and catalyst dosages, PMS and BTA was studied in a batch environment. Potential catalytic, recyclability, durability and quenching studies were performed. The catalytic activity of T@MPAC in the activation of different oxidants also evaluated. Under optimized conditions, the degradation and mineralization rates of BTA were found to be 71.6 and 38.7%, respectively, after the fifth cycles. Results revealed that the initial BTA concentration and reaction time had respectively the highest negative and positive effects on the removal efficiency of BTA. The catalytic activity of T@MPAC on BTA degradation was improved with the suitability in order of PMS >persulfate> ozone > H_2O_2. The trapping experiments confirmed the participation of $^{\bullet}OH$, $SO_4^{\bullet-}$, $O_2^{-}\bullet$ radicals as reactive species in the system. Among the reactive species (i.e. $^{\bullet}OH$, $SO_4^{\bullet-}$, $O_2^{-}\bullet$ and holes) included in T@MPAC/PMS/UV system, $SO_4^{\bullet-}$ radicals had dominant role in controlling the oxidation reaction. Decreasing the degradation rate in the presence of scavenger agents was as IPA > BQ >*t*-BuOH> KI. The catalytic performance dropped in the presence of chloride ions, while it was less affected by phosphate, nitrate and sulfate anions. T@MPAC/PMS/UV system also shows an excellent catalytic performance in the oxidative degradation of organic pollutants in real samples. To conclude, coupling of T@MPAC/UV and PMS can be successfully applied as a novel and effective technique to degrade organic substances in wastewater, due to easy recoverable, high catalytic activity and the cogeneration of different reactive species.

Keywords: Heterogeneous photocatalyst, Benzotriazole, Magnetic composite, Peroxymonosulfate.

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Adsorption and kinetic studies of mercury (II) by dried Scrophularia striata stems from synthetic wastewater

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Abstract

It is important to understand the fate of Hg^{+2} within the wastewater treatment process so as to examine potential treatment options and to ensure compliance with regulatory standards. The adsorption of Hg^{+2} from synthetic wastewater onto dried *Scrophularia striata* stems (DSSS) was investigated. Factors, such as pH of wastewater, adsorbent dosage, the initial concentration of Hg^{+2}, and contact time were analyzed to determine their effects on the adsorption of Hg^{+2} from wastewater. Kinetic and isotherm studies were investigated. The desorption of Hg^{+2} and regeneration of adsorbent were tested. The extent of adsorption of Hg^{+2} was found to be dependent on operating factors. The effluent quality in the lower concentrations was meeting to standards for discharge into water or on land. It was found that the pseudo-first-order kinetic model for Hg^{+2} adsorption fitted very well (R^2=0.99). The Langmuir (R^2=0.98) isotherm provided the best correlation for the adsorption of Hg^{+2}. The desorption of Hg^{+2} with 50 mL of 0.05 M HCl by a batch process in the different concentrations was ranging from 96.2%-98.7%. The spent adsorbent was regenerated and recycled six times. The results show DSSS may be an appropriate adsorbent for adsorption of Hg^{+2} from wastewater.

Keywords: Adsorption, Desorption, Regeneration, *Scrophularia striata*, Wastewater

Adsorptive Removal of Ciprofloxacin from Aqueous Environments by Copper (II) Oxide Nanoparticles

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Abstract

The antibiotics along with the sewage, pharmaceutical industries' waste water, veterinary clinics, and hospital sewages noticeably enter into the water resources and the environment. The objective of this study was to investigate ciprofloxacin (CIP) removal efficiency from aqueous solutions using cupric oxide nanoparticles (CuO-NPs). The effects of pH (3-11), CuO nanoparticles (NPs) dosage (0.01, 0.03, 0.05, 0.07, 0.09, 0.1 g/L), contact time (15, 30, 45, 60, 75, 90, 120 min), and the initial antibiotic concentration (10, 25, 50, 100, 150, 200 mg/L) were assessed on CIP removal efficiency in laboratory. Under optimal conditions of 10 mg/L concentration, pH=7, CuO nanoparticles dosage of 0.1 g/L, and contact time of 60 min, the removal efficiency was 77% and q_m of the CuO-NPs was 105 mg/g. On the basis of the obtained results, it can be concluded that CuO-NPs adsorption process can be used as a novel method for treating wastewater contaminated with drug sources.

Keywords: Nanoparticles, Adsorption, Ciprofloxacin, Isotherm

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An Explanation of the Effect of Magnetism on the Interaction of Arsenic and Iron ions in water by Laplace-Lorentz Force

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Abstract

Recently, attention has been focused on the use of physical methods, such as the application of magnetic fields, to reduce environmental pollutants. The aim of this study was the survey of external magnetic field effects on the arsenic and iron ions reactions. In this study a circular permanent magnet with the magnetic flux density of 10 mT was used. The magnet was placed around the column and the suspensions were passed through the column. The samples at the arsenic concentration of 0.5 and 2 mg/l were reacted with iron filings in doses of 2.5 and 5 g/l at the contact times of 5, 10 and 15 min at the neutral pH and in the experimental condition. Finally, arsenic levels and electrical conductivity was measured. The experiments showed that in the presence of external magnetic field the arsenic removal efficiency of the solutions containing iron oxides was reduced. From the results, it can be concluded that the nucleation, crystallization, agglomeration, dissociation and dissolution of the ions in the process were due to mechanisms such as the Laplace-Lorentz force and the Hall effect.

Keywords: Magnetic flux, Arsenic, Laplace-Lorentz Force, Hall effect

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An Investigation of the Heavy Metals Quality of Drinking Water Reservoir Dam of Yamchi (Ardebil City), Iran

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Abstract

Definition of problem: Heavy metal pollution of water is considered as one of the most important concerns of person.The increase in heavy metals levels in surface water have been mainly attributed to anthropogenic (the petrochemical industry, steel alloys, and fertilizer) and natural (corrosion of household plumbing systems, soil erosion, and volcanic emission) sources. Heavy metals such as cadmium(Cd), chromium(Cr), and mercury(Hg) are very toxic and carcinogenic for the lung (lung and prostate cancers), and result in central nervous system(CNS) toxicity due to bioaccumulating and magnification potential in body human.

Aim of study: The aim of this study was to investigate the concentration of heavy metals in drinking water reservoir dam of Yanji(Ardebil city), Iran and compare with national standard.

Methodology: We examined the heavy metals concentration such as Cd, Cr, and Hg of drinking water reservoir dam of Yamji in Ardebil city during spring season in 2017 by using inductively coupled plasma(3120 and 3125 methods). We compared the results with national standard values of drinking water and draw distribution of heavy metal concentrations in drinking water reservoir dam of Yanji(Ardebil city). For health risk assessment, the average daily dose and hazard quotient (HQ) were computed. All tests were performed at laboratory temperature (20 ˚C), in triplicate(198 test), and the mean data values were reported. We employed the geographical information system(GIS) software package ArcGIS 9.2 for mapping.

Results:The Cd, Cr, and Hg mean range of 17 samples are 11.3±2.23µg/l, 25.7±1.12 µg/l, and 1.2±1.57 µg/l, respectively. Crand Hg in all of samples was not more than national standard values of drinking water. The HQ of Cd, Cr, and Hg are 10.2, 0.1, and 0.04, respectively.

Conclusions: It is concluded that the state authorities to pay more attention in producing Cd problem compared with Cr and Hg. Correlation between heavy metals values with parameters such as humic acid (HA), pH, temperature, turbidity, and spatial situation was statistically significant (P value < 0.05).

Keywords: Drinking water reservoir dam, Hazard quotient (HQ), Heavy metals, inductively coupled plasma, Yanji (Ardebil city)

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Anaerobic Treatment and Biogas Production of Composting Leachate by Hybrid Bioreactors

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Abstract

Compost leachate from the municipal solid wastes that contains high amount of pollution is one of the environmental threats and the production of biogas from the leachate can be used as a new and renewable source of energy which is environmentally friendly and alternative to fossil fuels.In this study, anaerobic biodegradation and biogas production from composting leachate inseries bioreactors Anaerobic Migrating Blanket Reactor (AMBR) – Anaerobic Sequencing Batch Reactor (ASBR) was investigated. At first, the raw Leachate goes through AMBR reactor with the organic loading rate (OLR) of 1.04 -19.65 gCOD/L.d, the hydraulic retention time is 24 hours and the input is COD of 10.43-98.26 g/L. AMBR effluent enters the ASBR reactor which the organic loading rate (OLR) of the reactor is 0.93- 25 gCOD/L.d, hydraulic retention time of 24 hours and input COD of 1.85-25 g/L. To evaluate the performance of AMBR-ASBR system, COD and BOD_5 parameters were measured. The produced Methane and biogas were measured and examined by GC-TCD and gas meter. The best removal efficiency for BOD_5 and COD in AMBR-ASBR reactors were 99.43% and 97.35%, respectively obtained in the loading rate of 3.79 gCOD/L.d, and the maximum amount of biogas production was in OLR of 10.08 gCOD/L.d, = 16.37 liters. The trend of biogas production changes with OLRs showed that the increase in organic loading rate caused increase in the amount of biogas production, but in higher OLRs, with a sudden increase in OLRs, methane production and biogas decreased.

Finally, we can conclude that AMBR-ASBR system has sufficient in compost leachate treatment and biogas production and the performance of the system depends on the amount of OLRs and input volatile solids.

Keywords: Anaerobic treatment, Biogas production, real composting leachate, AMBR-ASBR process.

Application of a New Microbial System to Provide Desalinated Water from Sea Water

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Abstract

Microbial desalination cells (MDCs) can be used to treat wastewater, desalinate saline waters and simultaneously produce electricity in simultaneous desalination and energy recovery in a single reactor. This study was aimed to improve the MDC performance in terms of water desalination and electricity generation. This study has introduced salt water ultrasonic treatment as well as ozone as an electron acceptor in a three-cell MDC and the results achieved in terms of desalination efficiency, and bioelectricity generation were compared with another MDC operated individually without salt water pretreatment and by oxygen. Moreover, the change in morphology on the anode surface created by biofilm formation and microbial community existing in the reactors was investigated by scanning electron microscopy (SEM) technique. The ozone-MDC produced a maximum power density of 4.2 W/m^2 (about 20 times higher than Oxygen-MDC) while at the same time removing about 74% of the salt (61.4% in the oxygen-MDC). The internal resistances of 305 Ω and 71 Ω were measured when the Oxygen and ozone were used as electron acceptors in the MDC, respectively. Micrographs of anode surface before and after the experiments displayed the occupation of microbes on the electrode surface. The results collectively demonstrated that the use of ozone and ultrasound wave based processes enhance the performance of the MDC as either a sole desalination process or a pre-desalination reactor for downstream desalination processes.

Keywords: Microbial desalination cell (MDC); Electricity generation, Sea water

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Application of Box–Behnken Design (BBD) to Optimize Ciprofloxacin Antibiotic Removal from an Aqueous Phase by Fe3O4 Nanoparticles

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Abstract

Global presence of pharmaceuticals products in drinking water supplies and wastewater effluents has raised concerns regarding its potential effects on aquatic life, human health, and antibacterial resistance. This statement implies that there is a high risk for exposed environmental compartments, making it necessary to employ a treatment process that is capable of destroying residual pharmaceuticals compounds such as Ciprofloxacin antibiotic there. Optimization techniques may be used to find the optimal values for variables and input factors and investigate the effect of optimized parameters on response variables. In this study, Box-Behnken Design (BBD) with three variables, namely Ciprofloxacin concentration, particle size and reaction time, were studied to optimize the correlation between these variables and the amount of Ciprofloxacin antibiotic adsorbed from the aqueous phase via Fe_3O_4 nanoparticles. At the first step, Fe_3O_4 nanoparticles were prepared by chemical oxidation co-precipitation method and developed as highly efficient adsorbents. Synthesized nanoparticles were later characterized by Scanning Electron Microscopy (SEM), X-ray diffraction (XRD) and Fourier transform infrared spectra (FTIR). Box–Behnken statistical experimental design and RSM were used to optimize the effect of influencing parameters on Ciprofloxacin removal from an aqueous phase by Fe_3O_4 nanoparticles. Optimum conditions for Ciprofloxacin removal were determined as 35 mg/l concentration for Ciprofloxacin, 2.5 gr of adsorption dosage, reaction time of 30 min, and a solution of pH=7. Experimental values were in a good agreement with predicted ones, with a correlation coefficient of 0.925.

Keywords: Box–Behnken design, Ciprofloxacin antibiotic, removal, Optimization, Fe_3O_4 nanoparticle

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Application of Chemical-Less UVC/VUV process for Enhanced Degradation and Mineralization of Sulfamethoxazole

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Abstract

Sulfamethoxazole (SMX) is amongst sulfonamide antibiotics which is of high priority from the environmental point of view due to high detection frequency in aquatic environment, toxicity, persistence and bioaccumulation. The aim of the study was to evaluate the efficiency of UVC/Vacuum UV as a chemical-less process. Likewise, diagnosis of degradation mechanisms and proposal of pathway were considered. SMX removal was investigated applying UVC/Vacuum UV (254 nm + 185 nm) reactor. The reactor was loaded with 150 mL solution with specific SMX concentration. The effect of operating variables was investigated and kinetic study was carried out. SMX and degradation intermediates were analyzed using HPLC and LC-MS, respectively. Complete SMX removal was achieved in pH = 7, 100 mg/L SMX applying a fluence of 54.9 mJ/cm^2. Besides, continuing the reaction up to 30 min (109.8 mJ/cm^2 fluence) brought about 98.5% mineralization which was endorsed by 83.44% nitrogen release along with 96.58% sulfur release and also presence of carboxylic acids. Modified *pseudo*-first order kinetic model best fitted the SMX degradation. Scavenging tests indicated that hydroxyl radical was definitely the dominant radical species. Amongst the anionic constituents of water, sulfate exhibited the lowest decrease of efficiency. Finally yet importantly, reaction pathway was proposed considering the hydroxyl radical as the main oxidizing agent. Based on the obtained results, it can be concluded that UVC/Vacuum UV process accounts for being a promising advanced photo-oxidation process for SMX degradation. Hydroxylation, bond-cleavage and combined mechanism of cleavage and transformation were proposed as the predominant mechanisms.

Keywords: Advanced Photochemical Oxidation (APO), Vacuum UV, Hydroxyl radical, Mineralization, Transformation products.

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Application of Dissolved Air Flotation Process for Industrial Sludge Thickening: A lab-scale study

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Abstract

With the increase of population density in cities, the volume of industrial and municipal wastewater sludge generation increased (2-doc). Dissolved air flotation (DAF) can widely be used for water and wastewater treatment. The aim of our study was evaluation of some DAF design parameters on biological sludge thickening, which was generated from an industrial wastewater treatment plant (2-doc). This experimental research was carried out as a lab scale study on DAF process in thickening of the biological sludge. The required amount of sludge was withdrawn from Amikabir industrial town wastewater treatment plant in Kashan city, Iran. After determination of optimal recycling rate, pH, coagulant dose, effects of pressure (3, 5, and 7 atmosphere), flotation time (5 and 10 minutes), and coagulant addition were evaluated on the efficiency of DAF process. According to results of this investigation, the optimal pH and dosage of coagulant were obtained as 7.5 and 200 mgL^{-1}, respectively. Maximum process efficiency for reduction of total dissolved solids (TDS), total solids (TS), and turbidity parameters were 61.01, 84.02, and 97 %, respectively. Further, results showed that in contrast to time, coagulant addition and pressure have significant effect on DAF process. DAF process had suitable thickening efficiency on removal of TDS, TS, and turbidity from the biological activated sludge.

Keywords: Flotation, Thickening, Sludge disposal, Industrial wastewater treatment

Application of Electrodisinfection for E.Coli and E. Feacalis Removal from Aqueous Solution and Hospital Secondary Treatment Effluent

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Abstract

Conventional treatment process can not eliminate pathogens up to accepted standards for reuse or discharge on receiving water. This research investigated elimination of *E.Coli* and *E. Feacalis* from aqueous solution and secondary effluent of hospital wastewater treatment plant by electrodisinfection (ED) via direct and alternative current (DC&AC). A batch ED reactor with 2 L volume in which the electrods had 0.726 dm^2 total surface area and 1 cm distence with monoporal arrange was used. The experimental trials were designed based on Taguchi method in which the effects of four variables including *E.Coli* and *E. Feacalis* density (10^5 and 10^6 CFU/ml), electrods composition (Fe & Al), current intensity (0.5, 1 and 1.5 A), contact time (10,20 and 30 min) and two types of currents (AC & DC) were investigated. A power suplly was used and change of AC to DC was done via four diods. Desirable density of bacteria was prepared with Mc Farland method. Data were analysed by Mini Tab and SPSS (Ver. 17 and 16, repectively). DC has higher efficiency than AC. Current intensity and prelimaray density of bacteria had the predominant effects on both AC and DC methods. The electrod composition had significant different effects on bacterial disinfection in which Al had better efficiency than Fe ($p<0.05$). DC, Al electrod, current density of 1.5 A and contact time 30 min can meet Iranian recommended guideline. Direct current with Al electrod is recommended for secondary effluent disinfection.

Keywords: Electrodisinfection, *E. coli*, *E. faecalis*, Direct and alternating current, Wastewater disinfection.

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Application of Fuzzy Ordered Weighting Average Model for Developing New Drinking Water Quality Indices

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Abstract

Water quality indices illustrate the conditions of water quality resources comprehensively. The impact of different opinions and viewpoints of experts as well as the plurality of the involved parameters doubles the significance of the issue. Hence, the aim of this current study was to apply one of the most powerful and well-known Multi Criteria Group Decision Making models based on the principles of fuzzy measure for calculating the weight of the used parameters in development of the specific water quality indices. In this study, Fuzzy Ordered Weighting Average (FOWA) Model was used. This operator has provided the capability of modeling the risk in decision-making through applying the optimistic degree of decision-makers and their power coupled with the use of fuzzy numbers. 29 water quality parameters have been considered in this study. To determine the weight of each parameter, opinions of 25 experts were taken. In order to determine the optimized status for the decision makers' power, the sensitivity analysis has been performed. After determining the final weights, the consensus degree of decision makers and the water quality parameters, have been calculated. All stages of calculations were carried out by using the proprietary software called GFDM. The largest weight with the value of 0.0727 referred to Hg and the least one with the value of 0.0053 referred to temperature. Regarding to the type of consumption, which is for drinking purpose, the weight and parameters' ranking have been consistent with the rate of hygiene impacts of each of them. The greatest consensus degree of decision makers has been equal to 0.9905 and its least has been 0.9669. Among the water quality parameters, SO_4 and Pb with a consensus degree of 0.9949 and 0.9665 have respectively attracted the most and least agreement of the decision-making group. This study indicated that the weight of 29 parameters in determining water quality condition was depended on the opinion and viewpoints of experts largely. Using this operator can be a precise and appropriate strategy for weighting the parameters in order to develop specific and local water quality indices by health or environmental experts as well as researchers.

Keywords: OWA, Fuzzy, Water Quality, Shiraz, Index

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Application of Response Surface Methodology (RSM) to Optimize Coagulation–Flocculation Treatment of Humic Acid using New Al and Fe Coagulants

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Abstract

Humic acid is a major precursor of chlorinated by products (CBPs) and because of the adverse effects on human health, it should be removed from water during the treatment processes. The aim of this study was to determine the optimum conditions for the removal of humic acid in the surface water by polyaluminum ferric chloride (PAFCl) and polyaluminum chloride (PACl) as coagulant. The effects of independent variables, namely 1.6-7 mg/l, pH 5-9, and coagulant dosage 10-50 mg/l were studied on the humic acid removal using PACl (R_1) and PAFCl (R_2). The central composite design (CCD) and response surface methodology (RSM) were used to optimize the operating parameters.

The optimum condition was obtained at TOC of 2.66 mg/l, coagulant dosage of 15.72 mg/l, and pH of 7.84. The removal efficiencies of 97.55% and 98.18% were respectively achieved for PACl and PAFCl at optimal state. The zeta potential analysis showed that charge neutralization was the dominant mechanism for coagulation by both coagulants. The PACl and PAFCl had a good potential for the removal of humic acid in surface water, but from the aluminum residual in treating water point of view, PAFCl had a better performance than PACl.

Keywords: Coagulation, Humic acid, Polyaluminum chloride, Polyaluminum ferric chloride

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Application of Response Surface Methodology for Optimization of Phenol and p-chlorophenol Adsorption on Magnetic Recoverable Carbon

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Abstract

The powdered activated carbon impregnated with Fe_3O_4 magnetic nanoparticles (MNPs) was synthesized by a facile in situ chemical co-precipitation method. The response surface methodology (RSM) with central composite design (CCD) was used to investigate the adsorption properties of phenol and *p*-chlorophenol (PCP) onto as-synthesized composite. The RSM was also applied to study the main and interactive effects of the investigated parameters (pH, adsorbent dosage, contact time, and initial concentration) and to obtain the optimum operating conditions for this novel adsorbent. Magnetite nanoparticles with an average diameter of 30 nm were successfully synthesized and impregnated on the PAC surface (MPAC). Magnetic powdered activated carbon (MPAC) showed an excellent magnetic response to the magnetic field and was easily separated from the solution. Moreover, the RSM model (R^2 >0.98) revealed a satisfactory correlation between the experimental results and predicted values of phenol and PCP adsorption. The novel MPAC in which the synergistic effects of powdered activated carbon, MNPs, and ease of magnetic separation are combined showed a slight adsorptive activity for phenol and PCP compared to the pristine PAC. The identified optimum conditions for adsorption were 6, 118 min, 1.6 g/L, and 200 mg/L for pH, contact time, adsorbent dose, and initial phenol and PCP concentrations, respectively. The adsorption percentages of phenol and PCP by MPAC respectively decreased from 99.7 % and 962 % to 90.1 and 82.5% after five cycles. The adsorption kinetics fitted well with pseudo-second-order model and the adsorption capacity of phenol and PCP on MPAC inferred from the Langmuir model at 20 °C was 123.45 and 120.48 mg/g, respectively. The thermodynamic parameters indicated that the adsorption of phenol and PCP onto modified PAC was an exothermic and spontaneous process.

Keywords: Adsorption, Activated carbon, Phenolic compounds, Magnetic adsorbent

Application of VUV and UVC Radiation for Bacterial Inactivation in Contaminated Water

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Abstract

Supplying safe drinking water is one of the most concerning issues of public health. Microbial characteristics are one of the most important features of drinking water. Therefore, developing new technologies for water disinfection, especially bacterial inactivation is of great importance. This study aimed to investigate the efficacy of VUV radiation for bacterial inactivation. Escherichia coli (E.coli) was selected as the bacteria model for this purpose. A VUV photo-reactor was used for inactivation of E.coli in synthetic contaminated water. In order to make a better comparison, the inactivation of bacteria was also conducted in a UVC photo-reactor. The effects of contact time, pH, number of E.coli in inlet, and hydraulic retention time (HRT) were taken into consideration for bacterial inactivation by VUV and UVC photo-reactors. Efficiencies of both processes were also investigated in case of hospital wastewater treatment plant (HWWTP) effluent. Direct photolysis by UVC was able to inactivate 110×10^8 CFU/mL of E. coli within 1 min completely, while in case of VUV process, 15 s irradiation resulted in complete inactivation. It was also found that the removal efficiencies by VUC and VUV processes were directly influenced by pH of the solution in a way that higher removal rates were achieved at acidic and alkaline pH values, respectively. Operation of the photo-reactors in continuous flow mode revealed that 110×10^8 CFU/mL of E.coli was completely deactivated at HRT value of 3.3 min, while higher HRT values were required using UVC radiation. HWWTP effluent containing 360×10^8 CFU/mL bacteria entered the VUV photo-reactor in continuous flow mode. It was found that at HRT value of 6 min, almost complete deactivation of bacteria was achieved and merely 1900 CFU/mL was found in the VUV effluent. Higher removal efficiency of VUV radiation was due to the generation of ozone and hydroxyl radicals.Based on the results of the present study, it can be concluded that VUV radiation is an efficient and promising method that can deactivate bacteria in contaminated water without any external chemical addition.

Keywords: Advanced photochemical oxidation, Bacteria deactivation, Hydroxyl radical, Ozone, Vacuum UV

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Applications of Barberry Stem Powder (Bsp) As a Low Coast Adsorbent for Removal of Humic Acid from Aqueous Solution

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Abstract

Today, one of the most important pollutants in surface waters is organic-based pollutants. The most common organic pollutants in water resources is humic and fulvic acids. Usually, the presence of organic compounds in the water chlorination creates disinfection byproducts (DBPs) such as trihalomethanes (THMs) and haloacetic acids (HAAs). These compounds are toxic, carcinogenic, and mutagenic. Removal of DBPs precursors from drinking water resources is the most important step for inhibition of DBPs formation. In this regard, the efficiency of barberry stem powder (BSP) was assessed for the removal of Humic Acid (HA) from aqueous solution. This research was conducted in a laboratory scale. The barberry stem powder was characterized by scanning electron microscopy (SEM). Also, the effect of several important parameters such as pH (3-11), contact time (5-120 min), Humic Acid concentration (5-40 mg/L), dosage adsorbent (1-4 g/L), temperature (15-35 °C) on adsorption capacities was examined in batch system. Finally, The isotherms of HA adsorption and adsorption kinetics were investigated. The results showed that pH changes on the removal efficiency were not significantly affected. Therefore neutral pH was selected as optimal pH. The maximum adsorption capacities of HA with BSP under optimized conditions (with pH=7, contact time= 10 min, Humic acid concentration= 40 mg/L, dosage adsorbent=1 g/L and temperature= 15 °C) was 28.7 mg/g. The adsorption process best fitted toboth Langmuir (R^2=0.96) and Freundlich (R^2=0.97) isotherms and pseudo-second-order kinetic model was well suited to explain adsorption kinetics. This study showed that BSP can be used as an effective adsorbent for removal of HA in the aqueous solutions.

Keywords: Barberry stems powder, Humic Acid, Isotherm, Kinetic, Aqueous solution.

Arsenic and Chromium Removal by Nanoscale Zero Valent Iron from Aqueous Solutions

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Abstract

Heavy metals in water resources are important environmental and human health problems. Various methods for removing these pollutions have been considered including the usage of Nanoscale zero-valent iron. The aim of this study was to survey of Arsenic and Chromium removal from aqueous solution by Nanoscale zero-valent iron.The Arsenic and Chromium removal were surveyed using design expert software for different conditions including initial concentration, adsorbent dosage, time and pH. Then, the final heavy metals concentrations were evaluated using Inductivity Coupled Plasma (ICP). Finally, adsorption isotherms were determined based on Langmuir and Freundlich models.The results showed that the Chromium optimum removal was observed at 100 mg/L initial concentration, 5 g/L adsorbent dosage, 30 min contact time and pH = 7. Although the optimum Arsenic removal was occurring at 10 mg/l initial concentration, 5 g/L adsorbent dosage, 30 min contact time and pH = 7. The Chromium and Arsenic removal were followed up Langmuir and Freundlich isotherms, respectively. Based on the results of the present research, Arsenic was removed up to 50 percent of aqueous solutions by Nanoscale zero-valent iron. Therefore, it could be used for removal of this metal from polluted water and wastewater. However, Chromium removal was not commodious with Nanoscale zero-valent iron.

Keywords: Adsorption, Heavy Metals, Nanoscale Zero Valent Iron, Adsorption Isotherm.

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Assessing the Effects of AlkylPhenolic Compounds on Kinetic Parameters in Moving Bed Biofilm Reactor

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Abstract

In the past decade alkylphenols (APs) received special attention because they were on the priority hazardous substances list. The kinetics of a lab-scale moving bed biofilm reactor (MBBR) that was fed with synthetic wastewater containing 4-NonylPhenol (4-NP) and 4-tert-OctylPhenol (4-t-OP) was investigated in this paper. The MBBR reactor was evaluated under different Aps, organic loading rates, and hydraulic retention times (HRT). The substrate removal rate was predicted with First order, Second order, Stover–Kincannon and the Monod substrate removal models. A dispersive liquid–liquid microextraction (DLLME) gas chromatography mass-spectrometry (GC–MS) method was developed for the determination of the pollutants. 4-NP and 4-t-OP pollutants were removed in the different percentages of 87.1% to 99.9% and 83.2% to 99.9%, respectively. Biokinetic parameters like Y, KS, k, μmax and kd that would be favourable to design an MBBR were evaluated. Based on the results, the second-order (Grau), Stover–Kincannon and Monod models were detected as the most suitable for this reactor. These models showed high correlation coefficients of about 99.6%, 99.1% and 92.9%, respectively. Consequently, the mentioned models could be utilized in anticipating the performance and design of MBBR reactors. 4-NP and 4-t-OP compound have inhibitory effect on suspended and attached biomass.

Keywords: 4-NonylPhenol, 4-tert-OctylPhenol, Wastewater, Kinetic coefficient, Moving bed bioreactor, Dispersive liquid-liquid micro extraction

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Assessment the Safety of the Second Water Supply System by Using Water Safety Plan (WSP), Qom, Iran

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Abstract

WSP is an emerging method proposed by WHO to confirm the safety of drinking water distribution systems via a systematic prevention approach relying on risk assessment. This experiment applied WSP on Qom second water distribution network. WSP comprises 12 different steps which covers chapters such as “System Description”, “Hazard Identification and Risk Assessment”. Data obtained from checklists were applied for the steps. The contents of filled checklists were enters into the WSP software namely WSP_QA TOOL. This tool processed information assigning to the different steps, then the output results were presented by tables and histograms. Total score acquired in WSP for Qom-SWDN was 302. Since the total obtainable score which can be consider in WSP is 440, consequently, 68.6% of the total WSP scores was achieved. The scores obtained by steps “catchment”, “treatment”, “distribution” ، and “point of use”, were 67%, 67%, and 64%, 65%,, respectively. Lowest achieved score was 25% which was attributed to the step “Improvement Plan”. Highest score values was 100% and 97% assigning to “the identification of stakeholders” and “Hazard Identification and Risk Assessment”, respectively. The score value of 68.6% from WSP was obtained from Qom-SWDN. It seems that to enhance the coordination for the enforcement of steps, the “Improvement Plan” must be performed along with the whole water safety plan. To improve the current situation, supplying the fund demands for each uncontrolled risk attributed to each improvement program should be considered, ranked, and enforced.

Key word: Water Safety Plan, Water distribution Network, Risk management, Drinking Water, Qom

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Atrazine and Carbon Removal from Wastewater by Anaerobic Biofilter: Modeling and Optimization

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Abstract

The present study aimed to investigate the removal of atrazine and organic carbon from wastewater by an anaerobic biofilter. Response surface methodology (RSM) was used for considerable reduction of operational conditions such as hydraulic retention time and initial atrazine concentration for municipal wastewater treatment process using anaerobic biofilter. A mathematical-statistical model was developed for the second-order response surface through fitting a polynomial function and a central composite design (CCD) in the form of a full factorial design. Central composite design was employed to assess the interactive effects of the two main independent operational parameters on the removal efficiency of target pollutants. The CCD design and response surface methodology were used to investigate the effects of major operating variables and optimization conditions. The predicted values of responses obtained using the response function agreed well with the experimental data. Analysis of variance expressed a high coefficient of determination (R^2> 0.95), which indicates that the model is significant using a desirability function for the highest atrazine (53%) and chemical oxygen demand (69%) removal. It shows that RSM can be a suitable method to optimize the operational parameters of anaerobic biofilter with enhanced removal efficiency and less power consumption.

Keywords: Anaerobic Biofilter, Central Composite Design, Modeling, Optimization, Response Surface Methodology

Biodegradation of Phenol in Refinery Sludge by Microbial Fuel Cell

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Abstract

Wastewater and sludge in the oil refinery plants contains phenols and other toxic substances. Microbial fuel cell can be used for removal of pollutants and generating electricity. The aim of this study was to determine biodegradation of phenol by refinery sludge and producing electricity in dual chambers membrane microbial fuel cell. A dual chamber microbial fuel cell having proton exchange membrane and carbon cloth as anode and cathode was fabricated and operated in the incubator at 30°C for a period of 12 weeks. Experiments were conducted in open and closed circuit mode. Anode was put in anaerobic chamber containing refinery sludge and minimum growth medium. Phenol was added to anode chamber in the concentration range of 50-1000ppm. Refinery sludge was supplied by wastewater treatment plant of Tehran Petroleum Refinery. Cathode was aerobic chamber containing Phosphate buffer. Phenol was analyzed by HPLC and electricity was measured by digital multi meter equipped with data logger. In all examined phenol concentrations, the maximum time to completely degrade of phenol was 96h. Maximum amount of phenol degradation and electricity generation occurred in the first 24h of each run. Phenol degradation rate in closed circuit was higher than open circuit mode. The maximum voltage and power generated were 425mV and 36mWm^{-2}, respectively. Maximum COD removal was 95 percent. It is possible to completely degrade of phenolin refinery sludgeby using a microbial fuel cell, and generate electricity.

Keywords: petroleum refinery sludge, microbial fuel cell, phenol degradation

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Biodegradation of ρ-Cresol from Wastewater Using Anoxic Baffled Reactor

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Abstract

Cresols are phenolic compounds found significantly in industrial wastewaters. To date, different physical, chemical and biological methods are used for removal of this pollutants from wastewater. Among these methods, biological methods are used more than others because of numerous known advantages. The majority of studied biological methods were in aerobic and anaerobic conditions and so far, removal of this pollutant was not studied in anoxic condition. In other hand, so far different organic and inorganic compounds were used as carbon and energy source for anoxic microorganisms, but use of recalcitrant pollutants as sole carbon and energy source is scarce. The purpose of this study was biodegradation of ρ-cresol from wastewater using anoxic baffled reactor (AnBR) by using this pollutant as sole carbon and energy source. The study was conducted on a continuous 6 baffle reactor and the effect of different parameters including HRT, p-Cresol initial concentration and salinity on the reactor efficiency was investigated. The reactor was capable to degrade p-Cresol concentrations of 1000 mg/L along with 2500 mg/L of nitrate with high efficiencies (> 95 %) in HRT of 24 h. When the reactor HRT was decreased to 4 h (OLR of 7.5 kg COD/m^3.d), the reactor efficiencies did not drop significantly, so that p-Cresol volumetric loading rate of 125 g/m3.h and volumetric nitrate removal rate of 1.65 kg N/m3·d were obtained. Also, resistance of the reactor against saline wastewater up to salinity of 20 g/L was remarkable. In the salinity concentration of 20 g/L, p-Cresol was removed completely and COD removal was higher than 80 %.

Keywords: ρ-Cresol, anoxic condition, anoxic baffled reactor, sole carbon and energy source

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Biokinetic Coefficients of a Two-Stage Activated Sludge Process in Pilot-Scale

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Abstract

In order to design or operate wastewater treatment processes, it is essential to determine biokinetic coefficients of the process, i.e. characterize dominant microorganisms. This study aimed to determine the biokinetic coefficient of a pilot-scale two-stage activated sludge process. A pilot-plant two-stage activated sludge process was scaled down from Isfahan north wastewater treatment plant design. This system was operated for 9 months under 4 different MLSS concentration in aeration tanks or 4 phases. In each phase, MLSS value was kept constant to reach a steady state. Sludge retention time (SRT) and substrate utilization rate (U) in each phase were calculated. The values of various biokinetic coefficients were determined using a linear regression approach. The coefficients were maximum specific growth rate (μ_{max}), half-velocity saturation constant (K_S), cell yield (Y), and endogenous decay coefficient (k_d). Also, in order to determine influence of biokinetic parameters on the effluent substrate concentration, a sensitivity analysis was performed. Y, K_d, K_S and μ_{max} of A-stage were 1.34 mg VSS.mg^{-1} sCOD, 0.17 d^{-1}, 8.61 mg.L^{-1} and 2.78 d^{-1}, respectively. In addition, Y, K_d, K_S and μ_{max} of B-stage were 0.74 mg VSS.mg^{-1} sCOD, 0.12 d^{-1}, 3.34 mg.L^{-1} and 71.94 d^{-1}, respectively. All coefficients were in the range of activated sludge coefficients that are mentioned in the literature, except μ_{max} and K_S of the second stage. Sensitivity analysis showed that all coefficients in the first stage were directly proportional to the effluent sCOD concentration. In the second stage, K_d and K_S are directly proportional, but μ_{max} is inversely proportional to the effluent sCOD concentration. The results of this study are effective for optimization of existent treatment plants, or designing more efficient ones.

Keywords: A/B process, biological treatment, yield, decay coefficient

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Biological Nitrogen Removal through the CANON Process Treating Reject Water: Effect of Air Flow Rate and C/N Ratio Parameter

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Abstract

For nitrogen removal in wastewaters with low organic carbon such as reject water, the CANON process is a promising method. This research investigated the effect of important factors for optimization of the CANON process through inhibition of nitrite-oxidizing bacteria (NOB). In the acclimation period, complete ammonium removal and 43.3% total N removal were obtained at hydraulic retention time of 12 h, temperature of 30°C and DO equal to 8 mg/L. The effects of air flow rate (AFR), SRT and C/N were evaluated. Air flow rate was the most important factor for controlling the process, but the effect of SRT was negligible. When AFR was increased from 100 to 500 mL/min, both ammonium removal efficiency (33–43% to 81–83%) and nitrite accumulation (nitritation, 40 mgN/L to 100–120 mgN/L) were increased, but with increasing AFR to 1000 mL/min only ammonium removal efficiency was increased and because of better condition (high DO) for NOBs, nitritation was decreased. C/N had an effect like AFR of 1000 and only increased ammonium removal efficiency and total N removal. With increasing AFR and C/N, both OUR and AUR were increased, but SVI was decreased.

Keywords: CANON process; AUR; air flow rate; BNR

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Biosorption of Fluoride from Aqueous Solution onto *Syzygium Cumini*: Evaluation of Biosorption Kinetics and Isotherms

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Abstract

In the present study, the biosorption capability of the *Syzygium Cumin*i in removal of fluoride (F) from aqueous phase was evaluated. Biosorption was studied in a series of batch experiments at room temperature. The effects of experimental factors including contact time (5–120 min), biosorbent dose (1–25 g/L), and initial F concentration level (3–12 mg/L) were determined. The highest removal biosorption was observed at 90 min contact time, 5 g/L biosorbent dose, and initial F concentration level of 5 mg/L (99.69% F removal). Langmuir model was better fitted than Freundlich model that showed homogeneous biosorption surface and the possibility of monolayer biosorption of F by biosorbent. The biosorption kinetics was controlled by the Pseudo-first-order model. It was concluded that the *Syzygium Cumini* can be used as an effective, cheap and environmental friendly biosorbent for F removal from aqueous phases.

Keywords: Biosorption, Flouride, Freundlich model, Persian Gulf, Pseudo-second-order kinetic, *Syzygium Cumini*

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Cancer Risk Assessment of Nitrate Exposure in Drinking Water Tehran

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Abstract

Nitrate is one of the most important contaminant that is very important as public health. The aim of this study was to investigate the cancer risk assessment of nitrate exposure in Tehran drinking water. Nitrate concentrations in Tehran drinking water supplies were obtained from peer-reviewed publications. Monte Carlo stimulations and mathematical models were used to determine the excess cancer risk. Risk level for assessing the carcinogen risk was 10^{-5} (1 per 100000 persons). Excess cancer risk related to the drinking watersupplies of Tehran were obtained 2.4×10^{-5} according to the nitrate concentration 87.6 mg/L.Tehran city is in the higher excess cancer risk related to endogenous through drinking water. According to the obtained results Tehranis exposed to additional cancer risk related to nitrosamine that formed by nitrate consumed through drinking water. So some important activities require to decrease nitrate concentration should be considered.

Key words: Cancer risk, Nitrate, Drinking water, Tehran

Carcinogenic Risk Assessment of Exposure to Benzene in municipal Wastewater Treatment Plant: a Case Study in Stabilization Pond

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Abstract

The cancer risk of exposure to benzene via inhalation in stabilization pond during the municipal wastewater treatment process was assessed. Due to favorable environmental conditions in anaerobic wastewater treatment plants, organic matter decomposition can lead to producing of compounds such as mercaptans, skatole, benzene, hydrogen sulfide, etc. According to IRAC guidelines, benzene has been classified as a carcinogen compound.This study was a cross-sectional research performed in 4 seasons in 2016. Air samples were collected over several sampling points and in 4 geographical directions. A charcoal adsorption tube connected to a low volume pump with a flow rate 20 ml/min in 15 minutes was used for air sampling. Ultrasonic assistant micro extraction method with carbon dioxide solvent was used for extraction of benzene. Finally, analysis was done by gas chromatography equipped flame ionization detector (GC-FID). To assess the potential adverse effects of benzene on health, excess cancer risk for lifetime (ELCR) exposure to benzene was estimated using calculation lifetime average daily dose and the cancer slope factor.The mean annualconcentrations of benzene were determined 23.48 mg/m^3 in pumping station and 36.09 mg/m^3 in anaerobic lagoon station. In addition benzene concentration was determined 0.085, 0, 0.000026 and 0.288 mg/m^3 around radios 1 kilometer in north, south, east, and west geographical direction of the stabilization pond, respectively. The estimated ELCR for exposure to benzene ranged from 2E-7 to 3.69E-2, with an average of 7.03E-3 that was higher than the acceptable risk level of 1.0E−5. The obtained results suggested a potential health risk for exposure to benzene in municipal wastewater treatment plants, especially around pumping stationsand anaerobic lagoons. It emphasized that risk management approaches should be taken to reduce exposures to benzene, especially for workers and settlements around stabilization ponds.

Keywords: Risk Assessment, Benzene, Wastewater treatment plants

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Catalytic degradation of tetracycline by AC@Fe3O4 as a heterogeneous persulfate activator by sulfate radical-based oxidation

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Abstract

Fenton-like catalytic degradation of tetracycline (TC) was studied by using ferro-ferric oxide (Fe_3O_4) nanoparticles coated on activated carbon (AC@Fe_3O_4) which acts as a peroxidase mimetic and persulfate (PS) as a green oxidant. Adsorption and degradation experiments were carried out in a batch system as functions of pH, PS, catalyst and TC concentrations. Kinetic and pathway of TC degradation by AC@Fe_3O_4/PS system was also investigated. A great deal of improvements in degradation efficiency of TC was observed when both AC@Fe_3O_4 and PS were added into TC solution. Also, from the mechanism study we found out that TC was degraded mainly through oxidation with $SO_4^{-\bullet}$ radicals generated by Fe_3O_4 activated persulfate. AC@Fe_3O_4 catalyst could easily adsorb TC and PS molecule, and subsequently, initiate the oxidation reactions both in solution and on the catalyst surface. Meanwhile, PS, catalyst and TC concentration had significant effects on the degradation efficiency of TC. The optimal condition for maximum degradation of TC with PS activated by AC@Fe_3O_4 was pH 3.0, 0.4 g/L catalyst, 40 mM PS. The degradation efficiency of TC declined slightly from 99.8% in the first cycle to 93.2 % after five cycles of Fenton reaction. The values of Average oxidation state (AOS) and carbon oxidation state (COS) were remarkably increased after the AC@Fe_3O_4/PS treatment, suggesting that the biodegradability was also improved. The leaching of iron from the catalyst was determined to be < 0.2 g/L, indicating that AC@Fe_3O_4 had a good long-term stability. Under the optimum conditions, the removal efficiency of TC and total organic carbon (TOC) were 99.8 and 50.6 %, respectively. AC@Fe_3O_4 retained its activity and degradation efficiency remained even after five concessive cycles of use. Finally, our results revealed that AC@Fe_3O_4 activated PS oxidation can be applied as an effective means for TC removal from aqueous solution, since it is highly efficient as well as providing a good biodegradability for effluents.

Keywords: Sulfate radicals, Catalytic degradation, Magnetic catalyst, Heterogeneous Fenton, Tetracycline

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Characterization of Bioflocculant produced by Extracellular Polymeric Substances (EPS) of Enterobacter Aerogenes Isolated from Waste Water Treatment Plant

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Abstract

Today, chemical and synthetic organic polymers are used in water and wastewater treatment industry. These materials are very expensive and pollute the environment by toxic effect. The present study aimed to extract the extracellular polymeric substances (EPS) of bacteria isolated from activated sludge as a biopolymer and evaluate the characteristics of bioflocculant. Initially, the bioflocculant-producing bacteria were isolated from Sari sewage treatment plant. The bacterium with the highest level of flocculation activity was chosen by standard culture methods. Then, extraction and partial purification of the bioflocculant were performed. In this regard, functional groups, particle size, zeta potential, and thermal stability of the biopolymer were measured and the effect of pH and bioflocculant doses were tested. High EPS producing strain Enterobacter aerogenes was isolated from sludge samples. The purified bioflocculant was cation-depended and maximum flocculation for 50mL suspension 5 Kaolin gr/L was obtained in 4 mg/L bioflocculant (in the presence of 1 $CaCl_2$ gr/L). In addition, this bioflocculant had the capability of high performance in a wide range of pH levels. This bioflocculant had a high thermal stability and its flocculation activity was maintained for an hour after 100 °C with 90% efficiency. Chemical analysis showed that the bioflocculant comprised of 10.7% carbohydrate and 9.3% protein. Presence of hydroxyl groups, amine, and carboxyl groups was confirmed by FTIR spectroscopy. This study showed that the bioflocculant produced by the Enterobacter aerogenes strain could be a proper option for flocculation process in water and wastewater treatment.

Keywords: Extracellular polymeric substances (EPS), Bioflocculant, Enterobacter aerogenes, Flocculation activity

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Chemical Precipitation in Removal of Cr, Cu, and Total Hardness and its Effect on Sulfate and EC in Ahvaz Water Treatment Plant

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Abstract

Heavy metals including chromium and copper enter into the soil and water resources and affect human health through a variety of industrial wastewater. Today, pollution caused by heavy metals such as Trivalent chromium and copper has become one of the most serious crises because of hard biodegradable and resistance is the environment. Softening with lime, a technology acceptable for the removal of arsenic, barium, beryllium, chromium^{+3}, mercury, nickel, and Radionuclide is, therefore, lime and soda ash as a method of chemical removal of heavy metals such as chromium and copper is considered. Given that chromium 6 in acid deposition and removal of this study, removal of chromium^{+3} and copper^{+2} with two Materials of lime and sodium carbonate (Soda Ash) was studied. Because the chromium^{+3} does not have the ability to remove chromium 6 under alkaline conditions, jar tests, using limes to compare the efficiencies of removal chromium^{+3} and copper^{+2}, separately or in the presence of sodium at the same time he was done. Effect of pH and dosage of softening agents, lime and sodium carbonate (Soda Ash) initial concentrations of metals were studied. The results showed that Adsorption process lime and sodium carbonate (Soda Ash) effective removal of chromium and copper. The use of lime, Bridging between particles, the most active sequestration mechanism for the removal of Cr^{+3} and copper^{+2}, as well as chemical precipitation had a special role in the removal of copper by lime. The dosage amounts and softener compounds with higher pH may promote the formation of Sediments hydroxide. The results, pH 10 and pH optimum as the softening process by lime and sodium carbonate (Soda Ash) for the removal of chromium+ 3 and copper^{+2}, respectively. The optimum pH for the removal of both chromium and copper by lime and sodium carbonate (Soda Ash) 10, respectively. The initial concentrations of metals with the efficiencies of removal, was Reverse associated. In addition, in optimal conditions and optimal dosing using lime, chromium^{+3}removal efficiencies of Cu^{+2}and 87/9% respectively 50% and 99.5% with lime and soda with his 99/35% respectively. After Reduce hardness making the chloride, fluoride, nitrate and nitrite, potassium bicarbonate and carbon dioxide released unchanged and the amount is zero. Carbonate 3% and Sodium 69% but increased by increasing the amount of (Soda Ash) is this analysis. In other parameters such as sulfate (48%) and electrical conductivity (46%) decreasing trend is observed. This study suggests that the process of lime and soda as a method of chemical removal of heavy metals such as chromium and copper, could Cr $^{+3}$ and Cu $^{+2}$ to a considerable amount eliminate the amount of metal cations and anions to the following limits reduced drinking water standards and water quality, according to Schoeller diagram of Category inappropriate to promote an acceptable level.

Key words: Chromium, Copper, Sequestration, Lime, Soda ash, Hardness, Ahvaz water treatment.

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Comparing the Horizontal Roughing Filter (HRF) and Coagulant-Added HRF (dHRF) to Upgrade the Quality of Aerated Lagoon Effluent

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Abstract

Aerated lagoons are usually engaged with high TSS concentration in the effluent. This work was aimed to apply direct horizontal roughing filter (dHRF) as a post-filtration unit for the removal of TSS from the effluent of aerated lagoon. A pilot scale of HRF was constructed according to the Wegelin's design criteria suggested by WHO . The filter dimensions were 0.4 , 0.3, and 4 m for width, height, and length, respectively. The size of gravels were decreased gradually from the inlet (20mm) toward the outlet (2mm) zone. The filter was operated in two modes comprising pristine HRF and direct HRF (dHRF). The first was based on using simple HRF and the latter was relied on the continuous addition of poly aluminum chloride (PAC) into the inlet line of HRF. The inlet continuous flow of aerated lagoon effluent was adjusted in three hydraulic rates including 0.5, 1, and 1.5 m^3/m^2.h for each operation mode (HRF/dHRF). 360 samples were taken from the filter in both the operation modes (HRF/dHRF), including 30 paired samples taken from the inlet and outlet zones during 10 days (3 paired samples per each day) for each hydraulic rate. The average removal efficiencies assigning to the hydraulic rates; 0.5, 1, and 1.5 m^3/m^2.h for the HRF were 57, 36.9, and 26.5%, respectively and for those of dHRF were 86.8, 58.3, and 42.5%, respectively. The average TSS concentration attributed to the outlet of dHRF in 0.5 m^3/m^2.h was 19 mg/L. The kruskal valis analysis showed the significant differences between the removal efficiencies assigning to the hydraulic rates for each of the filtration modes (HRF/dHRF) separately. The mann-withney analysis, applying to compare the HRF and dHRF outlet TSS concentrations in each hydraulic rate, reports the significant differences between hydraulic rates 0.5, 1, and 1.5 m^3/m^2.h. HRF is a simple-constructed and easy-operated system revealing as a reliable alternative to enhance the quality of turbid waters. This work introduces a modified HRF assisted by coagulant agent for the post treatment of aerated lagoon effluent.

Keywords: horizontal roughing filter, hydraulic rate, aerated lagoon, poly aluminum chloride

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Comparative Study of Electrode Materials to Remove Dodecylbenzene sulfonate by Electrochemical Bipolar

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Abstract

In recent years, the inefficiency of conventional wastewater treatment processes has led to the presence of a wide range of surfactants in water environments. These compounds are harmful to humans and cause changes in the ecosystem. Therefore, wastewater treatment before discharging into the environment should be considered. The purpose of this study was to investigate the electrochemical method for removing Sodium Dodecyl Sulfate (SDS) from aqueous solutions using different electrodes whit bipolar arrangement. In electrochemical system with bipolar connection electrodes (BP-P), Titanium (Ti) was anode and the stainless-steel (Ss) and Aluminum (Al) were cathodes. The D.C source was used as a power supply to the system. The studied variables include Current densities: (1.5, 2.5, 3.5, 4, and 5) mA/cm^2, contact time (10, 20, 30, 40, 60, 90) min, pH (3, 7, 9). NaCl used for support electrolyte (0.1, 0.2,0.3,0.4,0.5)g/L. The results showed that the best arrangement and bipolar connection electrodes (BP-P), for removal of anionic surfactant in wastewater were: In the initial pH range of 7.0, the reaction time 60 minutes, the Current densities 125.3 mA / cm^2, the initial concentration of SDS 100 mg / L, and the concentration of NaCl was 0.2 g / L, SS / SS / SS / SS / SS bipolar arrangement. In such a situation, the concentration of SDS in the effluent reached less than 2 mg / L. The amount of SDS removal in SS / SS / SS / SS, SS / AL / AL / SS, Al / Al / Al / Al, and TI / SS / SS / SS / SS electrodes was 99.7%, 93.44%, 92.85% and 45.8% respectively.

The results in this paper showed Ti/Ss/Ss/Ss/Ss connection electrodes have a very good performance for removing low amounts of SDS sewage.

Key words: electrode materials - dodecylbenzene sulfonate – bipolar

Comparing VUV and VUV/Fe^{2+} processes for Decomposition of Cloxacillin Antibiotic: Degradation Rate and Pathways, Mineralization and By-product Analysis

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Abstract

The effect of Fe^{2+} was evaluated on degradation of cloxacillin (CLX) in the VUV photoreactor and the effect of reaction parameters were optimized for maximum efficiency. The rate of CLX degradation in the VUV photoreactor considerably improved at the presence of a low concentration of Fe^{2+}. The reaction with ȮH generated from water homolysis and photooxidation of water molecules by VUV photons as well as from photoFenton reaction was the main mechanism of CLX degradation in the VUV/Fe^{2+} process. The maximum CLX degradation observed at the acidic solution pH. Over 80% of 50 mg/L CLX was mineralized in the VUV/Fe^{2+} process within 60 min under optimum conditions. Over 99% of 50 mg/L CLX was degraded at a hydraulic retention time of 5 min in the continuous flow VUV/Fe^{2+} process. Intermediates formed during the degradation was analyzed by LC-MS technique, and the results indicated that C–N, C–S and C–Cl bonds were completely decomposed and the simple aliphatic substances were the main organic by-products of CLX degradation. In addition, VUV/Fe^{2+} process was more energy-effective than the VUV process. Accordingly, VUV/Fe^{2+} process is a technically efficient and energy-effective for high rate degradation and mineralization of such emerging water contaminants as antibiotics.

Keywords: Water emerging contaminants, Cloxacillin antibiotic, Vacuum UV light, Photo-Fenton process, Degradation pathways.

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Comparison & Prediction of water quality of Dez River using neural networks and neuro-fuzzy model (Case study: Dezful & Bamdezh stations)

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Abstract

Rivers are the most important and common sources of drinking water supply, agriculture and industry. These resources are due to the passage of the different beds and direct relationship with its surrounding environment have high quality fluctuations. Hence forecasting the quality of stream flow that is a non-deterministic, random and impressible phenomenon of some normal and abnormal factors, plays an important role in the quality management of water resources. Due to deficiencies in the statistical data we can use of the results of simulation models to detect noise, correction or completion of data.

To accomplish this, the concentration of total dissolved solids (TDS) and electrical conductivity (EC) gauging station DEZ rivers, for predicting and simulating the salinity changes were evaluated. In Prediction models, By maintaining continuous-time delayed inputs monthly total dissolved solids is used to estimate salinity and Due to the dispensability of maintaining continuous-time and decreasing modeling error of simulation models, random combination of total anions and cations are used as input to the model. In this study, artificial neural networks and neuro-fuzzy intelligent algorithms for modeling time series are used.

Results showed that the same performance of both methods with reasonable accuracy are in the modeling of qualified parameters of the basin Research. Considering the constant and optimal values of the variables of the network of tolerance, the network error values in the training and validation stages in the neuro-fuzzy model are less than the neural network.

In the end, according to the obtained results, the neuro-fuzzy model, in comparison with Artificial Neural Network has less uncertainty in the output values. So that within a certain range of most models, indicates better performance in the output values. So that within a certain range of most models, indicates better performance.

Keywords: DEZ River, pollution, simulation, Artificial Neural Network, Neuro-fuzzy

Concentrations of Heavy Metals (Mercury, Arsenic, Chromium, Copper, lead, Cadmium and Zinc) in Drinking Water Networks of Hamadan Province in 2016

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Abstract

Drinking water should be free of any chemical and microbial contaminants. One of the important aspects of drinking water pollution is presence of heavy metals that can be hazardous for consumer's health. Since, heavy metals can enter to water sources through environmental pollutants as well as the corrosion of pipe materials; this study was carried out to determine the concentration of heavy metals in urban and rural drinking water networks of Hamadan province in 2016. This study was a descriptive cross-sectional study. In order to study the concentration of heavy metals of mercury, arsenic, chromium, copper, lead, cadmium and zinc in drinking water sources in urban and rural areas of the province, a total of 60 samples from water distribution networks of urban and rural areas was taken based on standard methods, of which 38 rural samples and 22 urban samples. After transferring the samples to the laboratory, the elements were measured by polarography method and by polarography instrument in accordance with existing guidelines and standards and the results were analyzed using Excel software. The average concentration of heavy metals of mercury, arsenic, chromium (total), copper, lead, cadmium, and zinc in all samples was 0.565, 6.733, 2.045, 11.637, 2.636, 0.031, and 282.596 micrograms per liter respectively. The concentrations of chromium, copper, cadmium and zinc in all samples were much lower than the maximum allowed in the national standard and WHO quid lines. Only 1.67% of samples were contaminated with mercury, 3.33% were contaminated with lead and 8.33% samples (5 rural samples) were contaminated with arsenic. The results showed that the average concentration of heavy metals measured in all samples of Hamadan province was lower than the maximum allowed in the national and international standards. Apart from the worrying state of arsenic amount in samples of a small number of villages, it can be concluded that the status of drinking water networks in Hamadan province is very favorable in terms of heavy metal contamination.

Keywords: heavy metals, drinking water, Hamadan province, polarography

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Daily Fluoride intake Based on Drinking Water Consumption Prepared by Household Desalinators Working by RO process

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Abstract

Access to adequate water and assurance of its safety are the most significant concerns of health authorities. Household desalinators have an important role in providing community drinking water. The aim of this study was to evaluate the daily fluoride intake based on drinking water consumption prepared by household desalinators working by Reverse Osmosis process in Bushehr, Iran. This cross-sectional descriptive study was carried out using random sampling (in different areas of Bushehr). A total number of 40 samples (inlet and outlet waters) were taken from 20 household desalinators working by RO process, between February and March 2016. For sampling, plastic containers were used. All bottles were stored in a dark place at room temperature until the fluoride analysis. Fluoride analysis was made by the standard SPADNS method using a Spectrophotometer (M501 Single Beam Scanning UV/VIS, UK). The fluoride amounts were compared with EPA and WHO guidelines for drinking water. Finally daily fluoride intakes were calculated based on 2 liters daily drinking water consumption and concentration levels of fluoride in outlet waters. The mean concentration levels of fluoride in inlet and outlet waters were 0.47 and 0.18 with a range of 0.32-0.63 and 0-0.47 mg/l respectively. The mean removal percent of fluoride by household desalinators was 63.7 with a range of 2.1-100%. The maximum daily intakes of fluoride based on 2 liters daily drinking water consumption reached 0.36 with a range of 0-0.96 mg/day. Obtained results showed that household desalinators have a high efficiency in removal of fluoride from water.

Keywords: Bushehr; Daily fluoride intake; Household desalinators; Reverse osmosis

Decolorization of Reactive Blue 19 by Photo-Fenton Reaction from Aqueous Solution

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Abstract

Anthraquinone dyes constitute the second largest class of textile dyes after azo dyes, which are extensively used in the textile industry because of their wide variety of color shades, high wet fastness profiles, ease of application, brilliant colors, and minimal energy consumption. The photo-Fenton process (oxygenated water and iron salts (II) combined with ultraviolet radiation) is used to liberate hydroxide radicals as a promising method for treating liquid wastewater. Radicals have very high oxidizing hydroxide and completely eliminate most pollutants, especially organic pollutants.

In this experimental study, photo-Fenton was applied in order to degrade Reactive blue19 dye in aqueous solution. The effect of key parameters such as initial pH (3-5-7-9-11), dye concentration (100-50-30-20-10) hydrogen peroxide concentration (0.6-0.4-0.2-0.1 ml/l), radiation time (30-20-15-10-5 min), the initial Fe concentration (0.04-0.02-0.01-0.004 mg/l), light intensity of UV (60-45-30-15 Amp) was evaluated.

The results showed that the efficiency of dye removal depends on the initial Fe concentration, pH, H_2O_2 concentration and irradiation time. Under optimum conditions (Fe:0.02, H_2O_2:0.43, pH:3, and UV light irradiation time:15 min) the removal efficiency of reactive blue 19 was 100%. pH plays a crucial role in the photo-Fenton process such that removal efficiency increased with decreasing of pH.

according to the result of this study under acidic condition this process is an efficient method for reactive blue 19 removal from aqueous solution.

Keywords: reactive blue19, photo-Fenton, aqueous solution

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Decolorization of Reactive dye by Bentonite Nanoparticels from Aqueous Solutions

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Abstract

Industrial effluents into natural water systems are serious environmental problem. Dyes compounds are the important contaminants that discharge to environment by wastewater industries such as textile, leather, cosmetics, paper, printing and plastic. The effluence of dyes into water resources can pose hazardous effects on the environment and to the human health because of their carcinogenic, mutagenic, allergenic and toxic nature. Thus, the dye wastewaters should be treated before discharge to environment. There are many processes for wastewater treatment of dyes. However, Adsorption widely used to remove of pollutants from waters. In this study, we have demonstrated the efficient removal of reactive dye, reactive yellow 42 (RY42), from aqueous solution by Bentonite nanoparticles. In this research, adsorbent characteristics were analyzed using scanning electron microscope (SEM) technique. The adsorption of RY42 onto Bentonite nanoparticles was investigated in aqueous solution in a batch system. Also, The effects of various experimental parameters, including initial pH (3-11), contact time (2-120 min), initial dye concentration (20-60 mg/L) and dosage of adsorbent (0.2-0.6 g/L) have been researched. Finally, The Freundlich and Langmuir adsorption models were used for the description of the adsorption equilibrium. The results showed that adsorption capacity (qe), decreased from 81 to 3 mg/g when pH of the dye solution increased from 3 to 11. The maximum adsorption capacity was obtained at pH=3, contact time of 15 min, initial dye concentration of 60 mg/L and adsorbent dosage of 0.2 g/L (160 mg/g). The results indicated that the dye uptake process followed Langmuir model. Finally it was concluded that the Bentonite nanoparticles can be used for removing RY42 dye from aqueous solutions.

Keywords: Reactive dye, Bentonite Nanoparticels, Aqueous solutions

Degradation of Diazinon in Groundwater Using Advanced Oxidation process; Kinetics and Modeling

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Abstract

Diazinon as an organophosphate insecticide is used to control foliage and soil pests of many vegetable and ornamental crops. Diazinon has recently been detected in surface and ground waters. Its acute toxicity to aquatic organisms, insects, birds, and mammals is achieved by inhibiting acetylcholinesterase, Hence, these pollutants should certainly be treated. The central composite design was used to enhance the removal efficiency of diazinon by optimizing the experimental conditions under the response surface methodology. The experiments were done under five levels of various operational parameters. The initial concentration of diazinon was varied among 1 to 30 $mg.L^{-1}$, current density range from 1 to 10 $mA.cm^{-2}$, pH range from 3 to 9, H_2O_2 ranging from 20 to 100 $\mu L.L^{-1}$ and reaction time ranging from 2 to 15 minute. The obtained results using electro-Fenton (EF) technique showed that more than 98% of diazinon was destroyed under optimum condition of the initial concentration of diazinon 6.88 $mg.L^{-1}$, pH of 3, 83.78 $\mu L.L^{-1}$ of H_2O_2, 8.18 $mA.cm^{-2}$ of current density, and 10 min of reaction time. The kinetics of the process follows the pseudo first-order model with rate constants of 0.257 min^{-1} (R^2=0.9810). The EF process as an environmentally friendly treatment method was optimized and applied successfully for efficient removal of diazinon pollutant from groundwater samples using response surface methodology in the current work

Keywords: Electro Fenton, Diazinon , Groundwater, Response surface methodology, Kinetics model.

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Degradation of Imidacloprid Pesticide in Aqueous Solution using an Eco-friendly Electrochemical Process

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Abstract

The aim of this study was to evaluate the efficiency of electrochemical degradation process in the removal of Imidacloprid (IM) pesticide from aqueous solutions. Experiments were conducted using a batch glass reactor. The influence of various experimental parameters including initial IM concentration, pH, electrolysis time, current density, and NaCl concentration were assessed. Under optimum conditions determined for the lead and stainless steel electrodes, iron was used as the anode and copper as the cathode. SEM and XRD analyses were used to study the type of materials formed on the electrode surfaces. The results achieved from this investigation showed that pH of 5, current density of 25 mA/cm^2, electrolysis time of 30 min, initial pesticide concentration of 100 mg/L, and NaCl concentration of 10.69 mmol/L are the optimum experimental conditions for achieving maximum IM and COD removal. Accordingly, the maximum IM and COD removal efficiencies of 99.69% and 85.66% were obtained, respectively. Among the investigated electrodes, lead followed by copper, iron, stainless steel, graphite, and aluminum showed the highest efficiency. Based on the results, electrochemical degradation method was found to be a highly-efficient technology in comparison to existing conventional methods.

Keywords: Imidacloprid, Electrochemical degradation, Agriculture wastewater, PbO_2, Stainless steel electrodes

Degradation of Reactive Black 5 Dye Using Attached Growth Anaerobic/ Aerobic Bioreactors

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Abstract

Synthetic dyes, in particular, azo dyes are used by majority of the industries for coloring different materials. Reactive Black 5, is one of the most commonly used materials and dyes in the textile industry. This dye, after dissolving in water and sewage, decomposes into anionic sulfonates and produces black coloring materials in aqueous solutions. There are different methods for removing various coloring materials from wastewater, so that among them, the biological treatment methods due to the natural, environmental friendly and inexpensive methods, mostly appreciated by scientists and researchers. One of the most effective biological treatment methods for removing complex coloring materials such as reactive black 5 is the use of anaerobic and aerobic processes simultaneously. In this study, removal of reactive black 5 was investigated by combined anaerobic and aerobic treatment methods with the attached growth medium. This pilot and laboratory study were investigated by two plexiglass reactor; first: an anaerobic reactor of 10 liters (30 cm * 20 cm * 16 cm) and second: an aerobic reactor of 2.5 liters (20 cm * 15 cm * 8 cm) that filled with plastic media. In this study, the dye concentration in raw sewage and the treated wastewater exited from the anaerobic and aerobic reactors was measured by ultraviolet spectrophotometer model PG instrument. In this study, the hydraulic retention times (HRT) for anaerobic and aerobic reactors were considered as 2.5 days and 5 hours, respectively. The initial concentration of reactive black five, were 50, 100, 150 and 200 mg/l. In this study, dyes removal rate in anaerobic reactor in raw wastewater with concentrations 50mg/l, 100mg/l, 150mg/l and 200 mg/l was determined 81.5%, 81.9%, 77.4% and 75.2%, respectively. These values in aerobic reactor were 87.7%, 83%, 80% and 75.4% respectively. COD removal of raw wastewater with reactive black 5 with concentrations 50mg/l, 100mg/l, 150mg/l and 200mg/l was determined 99.6%, 97.9%, 95.4% and 93.2%, respectively. Results from the treated wastewater showed that anaerobic- aerobic wastewater treatment systems containing plastic media was capable of mineralizing of RB5 dyes with faster than degradation rate as compared to the other biological treatment systems.

Keywords: Reactive black 5, textile wastewater, anaerobic and aerobic processes

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Destructive Adsorption of Tetracycline Antibiotic as Emerging Contaminant from Aqueous Solution using Magnesium Oxide Nanoparticles

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Abstract

In recent years, use of antibiotics as an emerging issue has been increased in the aquatic environment. Among the antibiotics, tetracycline (TTC) is widely administrated for clinical therapy and livestock industry because of its unique properties such as low price, high quality, and broad-spectrum antimicrobial activity. Alkaline earth metal oxides are one of the important natural compounds that play a key role in removal of organic and inorganic pollutants in environment. Nano-sized magnesium oxide (MgO) is an example of very promising materials for application as adsorbents due to their some specific properties such as high reactivity, destructive, and surface adsorption.The sol-gel method was used to synthesize the present nano-MgO. The catalyst characteristics such as SEM, TEM, XRD, XRF, BET, XPS, EDAX, size distribution, and FTIR were analyzed. The effects of solution pH, catalyst dose, initial TTC concentration, and reaction time on the degradation and mineralization of TTC were evaluated. The concentrations of TTC and TOC in the desorbed solution were measured by HPLC (mobile phase solution 80/40 % vol.) and TOC analyzer, respectively. The MgO was a semi-spherical and flaky-shaped particle with a BET surface area of 257.3 m^2/g, an average crystalline size of 23.6 nm, and an average particle size of 13.6 nm containing high density of active surface functional groups. TTC removal evidently depends on pH, so increased from 2 to 5, TTC removal increased from 7.7% to 89.2% and 5.6% to 89.8% for initial TTC concentration of 100 and 200 mg/L, respectively. The desorption test showed that no TTC concentration was detected, so the degradation of TTC could happen. Complete removal of TTC and 86.4% removal of its TOC at 1.2 g/L MgO nanoparticles revealed that MgO is efficient as a treatment method.

Keywords: Antibiotic, Emerging contaminant, Sol-gel, Destructive adsorption

Determination of Influencing Factors on Bacteriological Quality of Bottled Water after Bottling

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Abstract

Microbiological quality of bottled water is a major necessity due to the public worries rising about the quality of tap water. The aim of this cross-sectional study was to investigate the bacteriological quality of bottled water and determine the factors affecting the rate of bacterial contamination. Totally, 400 samples of bottled water belonging to ten different Iranian brands were purchased from different supermarkets in Gorgan, Iran during 2015 to 2016. The bacterial quality of bottled water was determined using Heterotrophic plate count (HPC) method and then biochemical tests were used for identification of bacterial species. Statistical analyses were carried out using SPSS 20 at a confidence level of $P<0.05$.

Our findings showed that more than 84% of the samples had an HPC of over 500 cfu/ml, which were much higher than the recommended microbiological value (HPC<500 cfu/ml) set for drinking water by WHO. The results of biochemical tests also showed that twelve genera of heterotrophic bacteria were isolated, which Bacillus spp. was the predominant genera followed by *Acinetobacter* spp., *Pseudomonas* spp., *Rhodococcus* spp., Micrococcus spp., *Enterobacter* spp., *Flavobacterium* spp., *Corynebacterium* spp., *Stenotrophomonas* spp., Arthrobacter spp., Staphylococcus spp., and *Escherichia coli*. Statistical analysis showed that there was a positive relationship between HPC values and the presence of bacteria genera; besides, the highest rate of HPC in samples (higher than 1000 cfu/ml) and, consequently, the following isolated bacteria were found within the first to third months after bottling. Additionally, the highest and lowest rates of contamination were observed in May and October, correspondingly, suggesting the positive influence of sampling time on the rates of these bacteria. The results indicated that the overall quality of bottled water was in contravention of the microbial safety of drinking water. The findings showed that variations of bacteria level were affected by the production process, transport conditions, keeping conditions during storage and sampling time.

Keywords: Bacteria, Bottled water, HPC, Water contamination

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Determine the Optimum Conditions of UV-Electroproxone Hybrid Process in the Treatment of Landfill Leachate by Design Expert Software, Study of Physical and Chemical Changes in Sludge and Engineering of Energy: A Case Study

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Abstract

Leachate has been proven as high polluted and hazardous source, so treatment of leachate is one of the priorities in environmental engineering and environmental protection practices. UV-Electroproxone process, as an advanced oxidation process, takes advantage of ultraviolet irradiation, direct electrical current and ozone gas and leads to treatment of pollution in both directly and indirectly method. In this study, A reactor of 1-liter volume was applied to study experiments. ADAK instrument used to create electrical current (0.75-1.5 A), POLSA Ozonator, as ozone generator (0.5-1 mg/L). A UV lamp was used with 4 W irradiated power as well. Four electrodes in size 2*20 cm dimension along with material graphene, which connected to anode and cathode were used to direct oxidation process and produce hydrogen in site. In addition, FTIR, SEM, EDAX, and XRD analyses were provided to determine the changes in sludge characterization and energy consumption was calculated. The results derived from the present study showed that efficiency of process in initial concentration of COD (32000 mg/L), in optimum condition of process (pH of 3.15, electrical current of 1A and ozone dosage of 0.75 mg /L.min and Time of 70 minute) was approximately 73 percent. Analysis of variance (ANOVA) revealed that model is significant ($\alpha<0.05$). As well R-sq and R-sq (adj) were 0.89 and 0.85 respectively, indicating accuracy of the model. The results of sludge analysis indicated a wide variation in the physicochemical properties of the sludge, so that cloudy sludge change to needle form and pick of XRD and percent of elements in sludge changed. The amount of energy consumption for unit of removed COD was 7.15 W in minute. Therefore, due to the absence of chemical materials and dangerous residual , production of in situ oxidation radicals, lower-time operation and low-energy consumption is an environmentally friendly process, UV-Electroproxone can be utilized as a suitable method in leachate treatment and solve landfill-relate problems.

Keywords: Landfill leachate, UV-Electroproxone hybrid process, Design Expert software, Environment

Determine the Quality of Water Swimming Pools and Natural Swimming Pools in Chalous city and Comparison with National Standard in 1395

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Abstract

Swimming is one of the most enjoyable sports and entertainment for all people of different ages. The hygiene of swimming pools is very important for the health of swimmers So that the source of water should be suitable physical, chemical and microbial properties. This research was carried out to evaluate the microbial contamination of swimming pools and natural swimming pools in Chalousand comparison with national standards in 1395. The descriptive- sectional study was performed on 6 indoor swimming pools and three natural swimming pools in Chalous city. Seventy two compound samples were randomly collected from a depth of 10-30 cm from the surface of the pool and too36 compound samples of natural swimming pools at depths of 1.5-1.1 meters and 20-30 cm distances from the sea level were collected. Saturation, temperature, residual free chlorine, PH, heterotrophic bacteria, fecal coliforms, and total coliform were analyzed. The results of the study showed that the average residual free chlorine content was 82%, opacity= 90%, PH=95%, temperature= 80%, was in optimal condition. None of the swimming pools have been observed in the heterotrophic bacteria. the heterotrophic bacteria and resistant coliforms have not been observed in all seasons of the year. But in the natural swimming pools, Due to lack of free chlorine and high turbidity and inappropriate temperature there was the heterotroph bacteria less than 200/ml , heat-resistant coliforms Less than 100, and enterococci Less than 40 number have been in100 ml. the amount of one of them is more than international standards. Based on the results of the parameters residual free chlorine, opacity, pH, temperature in all swimming pools is accordance by international standards. But in natural swimming pools, due to poor microbial quality, monitoring, sampling and chlorination should be done during the swimming season.

Keywords: Microbial quality, Swimmingpools, Chalous.

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Drought Effects of Chemical and Physical Properties of Urban and Rural Drinking Water Resources sarab

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Abstract

The importance of controlling the quality of drinking water is not covered by anyone. The need for water monitoring and the provision of sanitary and standards for drinking water will make water quality control more important. The shortage of rainfall on a short-term basis on soil moisture and on long-run scale influences the discharge of rivers, reservoirs of water and groundwater. In recent years, the problem of water supply is a major problem due to drought. This necessitates the constant care of fluctuations in the quality and quantity of water supply sources. The purpose of this study was to investigate the 5-year effects of the recent drought of physicochemical properties of drinking water in rural and towns of Sarab that is located in the southeast of East Azarbaijan. Considering the impact of rainfall on the quality of drinking water in different seasons of spring and summer, winter from 90 to 95, the analysis of the effects of droughts on water drainage of the study area through the results of data collected from the Department of Aerology and Environmental Health Department of the health network of Sarab city regarding rainfall 5 years old and the results of the sampling and the results of the measurement of the electrical conductivity and hardness and alkalinity and nitrate and sodium and chloride-fluoride-optic properties were measured. The results showed that the electrical conductivity of Vogliate and nitrate and sodium increased with increasing rainfall in all seasons. In front of the factors sulfate and potassium fluoride and chloride an increase in precipitation has fallen.

Key words: Drought - Water quality drinking- sarab

Dyes Removal from Real Textile Wastewater by Combined Electrochemical and Photo-catalyst Process in Presence of UV

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Abstract

Textile industries are one of the largest water consuming industries and dyes are the most commonly used chemicals in these industries. Because of their complex and none biodegradable structure, these substances are often toxic, carcinogenic and mutagenic. Therefore, it is necessary before discharging into the environment, consideration of efficient procedure in wastewater treatment of textile industries. The aim of our study was to investigate the efficiency of the combinedelectrochemical and photo-catalyst process in removal of dye from textile wastewater. This experimental study was carried out on the efficacy of combining two electrochemical and photo-catalyst processes in the presence of UV light and granular activated carbon as a catalyst on 81 samples from textile wastewater in Kashan.Two electrodes of aluminum and stainless steel were used at a distance of 1 cm apart with size of 15× 2 cm. Then the effects of factors were evaluated such as pH (2, 4, 6), electrical current density (0.1, 1, 1, 5 mA) and reaction time (15, 30, 60 min) on removal efficiency of the dye. The obtained results demonstrated that the maximum removal efficiency was 86.87% at pH level 6, 1.5 mA of current density and after 60 minutes the reaction. Also, findings were shown that efficiency rate significantly increased with increasing reaction time and electrical intensity, in the presence of activated carbon and UV ($p<۰.۰۵$). In conclusion, our study revealed that thecombination of theElectrochemical and photo-catalyst process has high efficiency in removal dye from textile wastewater due to the presence of several oxidants and their Synergistic effect on radical hydroxyl production.

Keywords: Industrial wastewater, Dye, photo catalyst, Electrochemical

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Effect of Coagulant aid Polyacrylamide Modified with Iron Nanoparticles in Dewatering of Biological Wastewater Treatment Sludge

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Abstract

One of the most concerns in wastewater treatment is the huge amount of produced Sludge in which we need some economic and environmental requirements for managing and properly treating it. In this study, the effect of polyacrylamide polymer –modified with iron nanoparticles- in dewatering of produced sludge from biological treatment of municipal sewage was studied. Preparation and dewatering of sludge by combination of polyacrylamide activated with iron nanoparticles were carried out in laboratory scale in two main steps of pH determining and finding the optimal dose, rapid mix and mixing time of activated coagulator by tests filtration time (TTF), sludge cake moisture content, turbidity and total suspended solids of water resulted from sludge cake filtration, for measuring sludge dewatering capability. Compare to a primary coagulant without any modification, modified coagulant aid with iron nanoparticles in optimum pH 6-7 and concentration of 2 mg/l showed the best efficiency and was more suitable. The levels of TTF, sludge cake moisture, turbidity and total suspended solids of effluent reduced 34, 8.1 %, 43% and 40 %, respectively, in comparison with the control group. High performance of polyacrylamide coagulant aid help enable activated with nanoparticles in this study showed that it can be an appropriate choice for dewatering of municipal sewage sludge.

Keywords: Coagulation, Sludge dewatering, Sludge processing, Polyacrylamide, Wastewater treatment

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Effect of Fe^0 Nanoparticle and Fe^{3+} in UV-LED/TiO_2 Photocatalytic Process for Removal of 2,4 Dichlorophenol from Aqueous solution

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Abstract

2,4 di-chlorophenol is one of the most common and abundant pollutants that is widely found in various industrial effluents. The obvious effect of this organic compound on health and environment enhances its efficiently degrade before the wastewater is discharged into receiving water. Hence, the effect of Fe^0 nanoparticle and Fe^{3+} in the removal of 2,4 dichlorophenol with UV-LED/TiO_2 photocatalytic process from aqueous solution was investigated. In this experimental study, removal of 2,4 DCP using UV-LED/TiO_2 in the present of and Fe^0 and Fe^{3+} in the bench scale reactor was examined. The effects of operational parameters such as pH of solution (3-11), initial concentration of 2,4 DCP (50-200mg/L), the amount of TiO_2 concentration (0.003-0.025mol/L), and the amount of Fe^0 and Fe^{3+} (0.1-1mMol) were evaluated. Final concentration of 2,4 DCP was determined using spectrophotometer DR 5000, at 500 nm. The experimental results indicated that the removal of 2,4 DCP was influenced by different operational parameters. The highest 2,4 DCP removal rate at pH=3 by adding 0.012 mol/L TiO_2 into the solution with an initial concentration of 50mg/L 2,4 DCP was more than 98.32% in 120 min. While in the same condition with adding 1mMol Fe^0 into the solution more than 98.32% of 2,4 DCP was removed in 60 min and with adding 1mMol Fe^{3+} 96.73% of 2,4 DCP was removed in 90 min. So, it can be said that adding Fe^0 in UV-LED/TiO_2 process in optimal conditions can decrease the reaction time with highest 2,4 DCP removal rate and consequently decrease costs. The results indicated that UV-LED/TiO_2 process with Fe^0 nanoparticle can be used as an alternative technology for treatment of various industrial wastewater contained 2,4 DCP.

Keywords: Fe^0 nanoparticle, Fe^{3+}, UV-LED/TiO_2, Photocatalytic process, 2, 4 di-chlorophenol.

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Effect of Internal Recycling Rate on Removal of Phosphate and Ammonia in a Biological Cycling Reactor

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Abstract

High nutrient levels in surface water can lead to negative impacts on water quality such as growing of alga. This study aimed to assess the effect of internal recycling rate on removal of phosphate and ammonia from wastewater. The experiments were performed using biological two stage reactor (anoxic-aerobic) with continuous influent and effluent. The efficiency of nutrients removal was evaluated at Chemical Oxygen Demand (COD) concentration of 600 mg/L, ammonia of 40 mg/L and phosphate of 12 mg/L. Various internal recycling ratios (100%, 150%-200%) were applied to detect nutrients removal performance. Results of this study demonstrated that ammonia, nitrate, nitrite, phosphate and COD effluent concentration in internal recycle 150% were 0.9 mg/L, 8mg/L NO_3-N , 0.13 mg/L NO_2-N ,2 mg/L $PO4^{-3}$and 26 mg/L respectively. Combination of anoxic-aeration short cycles with internal recycle 150% had high efficiency on nutrient removal as well as the internal recycle ratio is an important operation that affectsthe phosphate and nitrate removalefficiency.

Keywords: Internal recycling, Wastewater, Ammonia.

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Effect of pH Modification on Treatment of Wastewater Produced by a Cardboard Factory

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Abstract

Wastewater pH has been identified as one of the important parameters, which influences wastewater treatment efficiency. The aim of this work was to investigate the effects of pH modification with different materials such as HCL, lime, and NaOH on the removal of turbidity and color from wastewater produced by a cardboard factory. In this experimental study, the sample wastewater was provided from one of the cardboard factories located in Yazd, Iran. The wastewater samples were collected by composite sampling. The pH modification was done in various ranges from 5 to 11 by HCL, lime, and NaOH. Coagulation of the samples was performed with poly aluminum chloride (PACl) and magnesium chloride ($MgCl_2$) as the coagulant and a cationic polymer as the coagulant aid. Then, the efficiency of turbidity and color removal was investigated. All experiments were carried out in 1 L beaker by jar test apparatus. Parameters of turbidity and color were determined by Turbidimetry and ADMI methods, respectively. According to the results, the highest efficiencies for turbidity and color removal by coagulant of PACL were obtained in pH=11, which were adjusted by NaOH. The maximum removal efficiency of turbidity and color were 87.28% and 69.46%, respectively. The results showed that pH modification by NaOH had good effect on color and turbidity removal from wastewater produced by cardboard factory. Finally, pH modification with NaOH in coagulation and flocculation can be an effective ways to treat this type of wastewater.

Keywords: PH modification, Coagulation, Cardboard factory, Wastewater treatment

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Effect of Primary Sludge to Waste Activated Sludge Mixing Ratio on Anaerobic Digester Performance (Based on the Experience of Operation of Wastewater Treatment Plant in South of Tehran)

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Abstract

In this research, the effect of mixing ratio between primary sludge (PS) and waste activated sludge (WAS) on anaerobic digester performance was investigated. PS to WAS ratios of 30% PS/70% WAS v/v, 40% PS/60% WAS v/v, 50% PS/50% WAS v/v were assessed for a sludge retention time of 23 d at mesophilic temperature of 36.5°C. The sludge with the mixing ratio of 65/35 v/v produced the highest amount of methane. The kinetics of the digestion process was faster for this mixing ratio. In addition, methane to carbon dioxide ratio for this mixing ratio of 70/30 v/v was found to be the highest. Sludge biodegradability in terms of reduction of volatile solid removal was 27.3%, 23.5% and 18.9% for mixing ratios of (70/30, 60/40, 50/50)v/v, respectively. The sludge sample with greater proportion of WAS showed better dewater ability. In general, mixed sludge with higher proportion of PS has better effects on overall digester performance.

Keywords: Wastewater, Kinetic parameters, Sludge mixing ratio, Wastewater treatment

Effects of Different Solid Biofilm Carriers in Fixed Bed Sequence Batch Reactor by a Simulation Mathematical Model: A comparative study

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Abstract

In this study, two fixed bed sequence batch reactors (FBSBR) were evaluated for the treatment of municipal wastewater. Two numerical independent variables, namely hydraulic retention time (HRT) and influent concentration as well as the type of packing biofilm carriers as the categorical variable were selected to model and optimize the process. Response surface methodology with central composite design (CCD) was used with four levels of HRT (3–12 h) and chemical oxygen demand (COD) influent concentration (500 – 1500 mg/L). A mathematical-statistical model was developed for the second-order response surface through fitting a polynomial function in the form of a full factorial design. Central composite design was also employed to assess the interactive effects of the three main independent operational parameters on the removal efficiency of target pollutants. The CCD design and response surface methodology were used to investigate the effects of major operating variables and optimization conditions. The expected values of responses obtained using the reaction feature agree nicely with the experimental data. In order to analyze the process, four dependent parameters were studied as the process responses. As a result, HRT and packing media type showed important effects on the responses measured in both bioreactors. The FBSBR1 showed better performance than the FBSBR2.

Keywords: Central Composite Design, Fixed Bed Sequence Batch Reactor, Modeling, Optimization, Response Surface Methodology

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Efficiency Assesment of Chitosan Graphene Oxide Composite in Aniline Removal from Aqueous Solutions

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Abstract

Aniline is a toxic compound characterized by high solubility in water (3.5 percent; 35000 mg/l) leading to increased presence risk of aniline in wastewater. The presence of this compound in the blood causes the formation of met hemoglobin and prevent oxygen uptake and plays a key role in chemical asphyxiation, moreover, it has been thought as a carcinogenic risk factor to humans. Therefore, this study aims to synthesizes chitosan graphene oxide and determine the usefulness of using this absorbent to remove aniline from aqueous solutions.Chitosan Graphene Oxide (CGO) which was prepared from graphite powder by adapting the procedure used by Hummer, doped with chitosan and the characterization of CGO were determined by Scanning Electron Microscope (SEM), Fourier Transform Infrared Spectroscopy (FTIR) and X-ray Powder Diffraction (XRD). To optimize the conditions, parameters including adsorbent dosage (g / L 0/2, 0/4, 0/6, 0/8, 1, 1/25،1/5), pH (2, 4, 6, 8, 10), contact time (5, 15, 30, 45, 60, 90, 120 min) and aniline concentrations (mg/L 50, 100, 150, 200, 300) were evaluated in a total of 126 tests. Finally Chitosan Graphene Oxide was used for aniline removal from aqueous solutions.

The results of present study showed that with increase in contact time and absorbent dosage and with decrease in aniline concentration, removal efficiency tend to increase. PH=6, time=30min, absorbent dose=1 g/l and concentration of aniline=50 mg/l were obtained as optimum conditions. Under optimum condition (pH=6, time=30min, absorbent dose=1 g/l and concentration of aniline=50 mg/l) the highest efficiency of aniline removal is %93.14. The adsorption isotherm showed that absorption process correlates well with Langmuir adsorption isotherm (R^2>0.9996). Reaction kinetics complies with Pseudo-second order model with correlation coefficient of (R^2=0.9799). In the study of thermodynamics, negative values of ΔH0 and ΔG0 respectively illustrate that reactions are exothermic and spontaneous. chitosan graphene oxide composite has the ability to remove aniline effectively from aqueous solutions. And also it can be used as an efficient adsorbent for related aqueous solutions.

Keywords: Adsorption, aniline, Chitosan graphene oxide

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Efficiency comparison of Fenton and of O_3-Fenton Processes in Removal of Formaldehyde from Aqueous Solutions Using Response Surface Methodology

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Abstract

Formaldehyde is one of the compounds widely used in various industries; hence, its discharge into the effluent is unavoidable. Exposure to formaldehyde has asignificant health effects. To prevent these issues, treatment of wastewater containing formaldehydeis necessary. The goal of this study was removal efficiency Comparison of Formaldehyde from aqueous solutions by using Fenton and O_3-Fenton processes. This experimental study was performed by Fenton and O_3-Fenton processes. Response surface methodology was applied to determine the effects of independent variables including contact time (2-120 min), initial formaldehyde concentration (100-500 mg/l), pH (3-11), H_2O_2(0.1-1 mole/l) and Fe (20- 50 mg/l) on formaldehyde. The samples were taken from reactor in different time intervals and the residual concentrations of formaldehyde were measured by titration with acid according to the method of ASTM D2194. The results showed that the optimal parameters in the Fenton's oxidation process to remove theformaldehydeinclude pH 5/32, H_2O_2(0/5 mole/l) , Fe^{+2}(34 mg/l), concentrations formaldehyde(215 mg/L) and contact time of 72/5 minutes in which maximum removal efficiency of formaldehyde in ozonation, Fenton and O_3-Fenton processes was found to be 15%, 67.85% and 85.71% respectively. The results showed that the ozone can accelerate degradation of formaldehyde in O_3-Fenton process and increase removal efficiency of formaldehyde, as compared with Fenton processes.

Key words: Formaldehyde, Advance oxidation. Fenton, O_3-Fenton, Response surface Methodolog

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Efficiency of Combined Coagulation and Advanced Oxidation Process in the Removal of Cyanide from Aqueous Solution

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Abstract

Cyanide is a toxic pollutant that is present in some industrial wastewater. This substance poses a serious risk to the environment and human health. This study aimed to assess the combined efficiency of the coagulation and advanced oxidation process in the removal of Cyanide. This empirical research was conducted in the winter of 2016 at the Environmental Health Engineering Research Center. The effect of the combined process of coagulation and advanced oxidation was carried out by checking changes in some variables like pH, contact time, initial concentration of cyanide, coagulant concentration and flow intensity as well as H_2O_2 concentration. Finally the optimum conditions were obtained and performed on the leather industry wastewater sample. All tests were carried out in accordance with the Water and Wastewater Standards. Data analysis was done using SPSS software version 17. The maximum percentage of cyanide removal in the coagulation process with PASIC material (94%) was obtained in concentration of 5 mg /L, treatment time of 60 minutes and a pH of 6, as well as in the Sono-Electro Fenton process it was achieved at a concentration of 2500 mg / L H_2O_2, the contact time of 60 minutes, pH of 3.5, and The flow rate of 10 mA / cm^2. The removal efficiency in the actual sample at optimal conditions was 89%. The results of statistical analysis showed that there was a significant difference in all variables before and after the process ($P<0.05$). The elimination of cyanide by using an integrated coagulation and oxidation process in water and wastewater treatment can be addressed in terms of cost and efficiency.

Keywords: Sono-Electro Fenton, Silica Polyester Aluminum, Cyanide

Efficiency of Electrocoagulation Process in Removal of Reactive Red 3GL from Aqueous Solution: Modeling of kinetics and Isotherm

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Abstract

Decolourization of Reactive Red 3GL (RR3GL) from aqueous solution was studied by electrocoagulation technique using aluminum electrode. Various operating variables were examined for their effects on RR3GL removal. The variables included solution pH (3-11), current density (2-10 $mA.cm^{-2}$), reaction time (3-25 min), initial RR3GL concentration (20-150 $mg.L^{-1}$), and inter-electrode distance (1-5 cm). The maximum removal of RR3GL efficiency was found to be 100% at current density of 7 $mA.cm^{-2}$, initial RR3GL concentration 50 mg.L-1, initial pH 7 and inter-electrode distance 4 cm at 15 min reaction time. Kinetics studies were carried out and the obtained results showed that the pseudo-second-order equation provided the best correlation for the RR3GL removal rate. Equilibrium data fitted well with the Langmuir model in the range of 20–150 $mg.L^{-1}$ and the maximum RR3GL adsorption capacity was found to be 200 $mg.g^{-1}$. Finally, energy consumption and mass consumption were found to be 0.115 $kWh.m^{-3}$ and 0.359 mg per single run (250 mL), respectively in optimum condition. The obtained results revealed that, sweep flocculation as a determinant mechanism controlled the adsorption of RR3GL molecules on aluminum hydroxide precipitates. According to the results electrocoagulation process can be used extensively as a suitable method for removal of RR3GL from aqueous environments.

Keywords: Electrocoagulation process; Reactive Red 3GL; Isotherm; Kinetics; Aqueous solution

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Efficiency of TOC, Turbidity and Feacal Coliform Removal in Double - Layer Filter with Gac and its Comparison with Single-Layer Filter in Bhmanshir Water Treatment

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Abstract

Nowadays, Interest is increasing for modification of conventional rapid sand filters into dual or multi-media filters for production of drinking water. The control of organic matter is an influencing factor in drinking water treatment and distribution. Biologically-active filters are commonly used to treatment surface water containing TOC.Biological water treatment using granular activated carbon (GAC) and anthracite improves water quality by reducing total organic carbon (TOC), colour, nitrogen content, and turbidity. The present study investigated the operation of aerobic biofilm on two pilot biofilters designed to remove turbidity, TOC, Fe, Mn, NO_3^-, NH_4^+ , and Color in water. This research was conducted to investigate the removal of TOC (Total Organic Carbon), Turbidity and Coliform as the indices of measuring organic matter in water in Double-layer filter with anthracite Layer and GACand its comparison with control single-layer filter with conventional Layer during the filtration at the loadings of 7 and 14 m/hr in rapid gravity sand filter in a pilot scale in Abadan water treatment plant. All the experiments were carried out by standard methods and the obtained results were analyzed using statistical tests such as T-test. The results during winter and summer seasons show that the GAC-sand pilot filter at a low hydraulic loading rate (HLR) increased the empty bed contact time (EBCT) and recorded the highest production of heterotrophic bacteria and biofilm, which increased the efficiency of treatment. Breakthrough occurred in the GAC-sand pilot filter at 75 h in winter during low HLR, but occurred sooner for medium and high HLRs at 49 and 26 h, respectively. The runtime for the anthracite-sand pilot filter at high, medium, and low HLRs was 73, 47, and 24 h, respectively. The microorganisms Pseudomonas, Bacillus, and Citrobacter were identified in the GAC-sand filter.

The results of the research showed that the use of anthracite in the Layer of double-layer filters increases the efficiency of organic matter removal (TOC, NTU, FC) compared with single-Layer filters (sand). Therefore, recommended upgrading of single-Layer filters to double-Layer filters.

Keyword: Biofilm; Anthracite; GAC; TOC, NTU, Coliform, Bahmanshir Water treatment.

Elimination Potential of Polycyclic Aromatic Hydrocarbons (PAHs) from Sediment by Oyster "*Pectunculus Glycymeris*" in South Pars Special Economic Zone Coasts

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Abstract

Polycyclic aromatic hydrocarbon (PAHs) comprises of a large group of organic contamination that include two or more aromatic rings. These compounds are released into marine environments through several pathways such as combustion of fossil fuels, oil spills, urban, and industrial sewage. Polycyclic aromatic hydrocarbons have hydrophobic properties and tend to accumulate in sediments and marine organisms in different ratios. Many studies have shown that some of PAHs compounds possess carcinogenic or mutagenic potentials. The aim of this study was introduction of oyster "*pectunculus glycymeris*" as an absorber of PAHs in sediments in South Pars Special Economic Zone coasts. In order to study PAHs accumulation in sediments and to investigate the bivalves *(Pectunculus glycymeris*) as a bio-indicator and their origins in the South Pars Special Economic Zone coasts, samples of sediment and bivalves were taken from five different stations. The samples were collected in aluminum foil, placed in ice, and transferred to laboratory. The samples of sediment and bivalve were homogenized and PAHs compounds were analyzed using GC-MS. The Nakh Taghi station that was affected by diesel fuel leakage from rusting ships showed the highest pollution rate. Stations located in the Assaluyeh were the next most polluted areas. Nayband2 station that was far from Assaluyeh industrial area showed the lowest contamination rate. Generally, PAHs concentration in sediment and bivalve tissue samples from study areas were found to be medium when compared with other areas of the world. The study showed that PAHs in the studied area originated from both petrogenic and pyrogenic sources. In this regard, *Pectunculus glycymeris* can be used as bio-indicator agents for indication of PAHs contamination in the coastal aria of South Pars Special Economic Zone.

Keywords: Polycyclic Aromatic hydrocarbons, PAHs, Pectunculus glycymeris, South Pars Special Economic Zone

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Enhanced Photocatalytic Activity of Fe_3O_4-WO_3-APTES for Azo Dye Removal from Aqueous Solutions in Presence of Visible Irradiation

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Abstract

Nowadays**,** various industries like textile, paper, leather, plastic and so forth produced large quantites of different dyes. Among several azo dyes, Reactive Black 5 is widely used in the textile industries because of its simple dying procedure and good stability during washing process. It is resistant to biodegradable and has very toxic, mutagenic, and carcinogenic properties. Development of highly active photocatalysts for treatment of dye-laden wastewaters is vital. Therefore, the photocatalytic removal of the azo dye Reactive Black 5 was investigated by Fe_3O_4-WO_3-3 aminopropyltriethoxysilane (APTES) nanoparticles in presence of visible light. Fe_3O_4-WO_3-APTES nanoparticles were synthesized via a facile co-precipitation method. The photocatalyst was characterized by XRD, FT-IR, SEM, EDX, VSM, UV-Vis and pH_{pzc} techniques. The effects of some operational parameters such as solution pH, nanocatalyst dosage, initial RB5 concentration, H_2O_2 concentration, purging of different gases and type of organic compounds on the removal efficiency were studied by the Fe_3O_4-WO_3-APTES nanoparticles as the photocatalyst. Maximum phtocatalytic activity was obtained at pH 3. The Photocatalytic removal of RB5 increased with increasing H_2O_2 concentration up to 5 mM. The removal efficiency declined in the presence of different purge gases and all types of organic compounds. First-order rate constant (k_{obs}) decreased from 0.027 to 0.0022 min^{-1} and electrical energy per order (E_{Eo}) increased from 21.3333 to 261.8182 $kWh.m^{-3}$ with increasing RB5 concentration from 10 to 100 $mg.L^{-1}$, respectively. The efficiency of the LED/Fe_3O_4-WO_3-APTES process for RB5 removal was approximately 89.9%, which was more effective than the LED/Fe_3O_4-WO_3 process (60.72%). Also, photocatalytic activity decreased after five successive cycles. Fe_3O_4-WO_3-APTES nanocomposite, in the presence of visible light irradiation, as an effective and environmentally friendly material, can be used for the removal of RB5 dye from aqueous solutions.

Keywords: Photocatalysis, Reactive Black 5, Fe_3O_4-WO_3-APTES, Visible light.

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Enzymatic Biodegradation of Petroleum Hydrocarbons by the In-situ Peroxidase Enzyme in Rotating Bed Bioreactor from Contaminated Wastewater

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Abstract

Petroleum wastewater consists of diverse types of hydrocarbons with different structural and chemical properties. Discharging of total petroleum hydrocarbons (TPH) to the water reservoir and environment lead to serious problem for human and aquatic life. This study aimed to evaluate the ability of the rotating bed bioreactor (RBB) in biodegradation of TPH with in-situ peroxidase production using H_2O_2 injection. The influence of media filling ratio and TPH loading rate on TPH removal efficiency and enzymatic activity (peroxidase and dehydrogenase) was investigated. Also, biosurfactant (rhamnolipid and surfactin) production during different operation phases was determined. The results showed complete TPH removal was observed in TPH loading rate 6-12 kg/m^3.d without the addition of polyurethane foam (PUF) media. In H_2O_2/TPH ratio 0.35, with increasing TPH loading rate from 18 to 30 kg/m^3.d, TPH removal efficiencies decreased and for enhancing removal efficiency, media filling ratio was increased from 25 to 75%. Optimal media filling ratio was attained 50% in TPH loading rate 30 kg/m^3.d. The total biomass concentration in optimal filling ratio was 18.89 g/L. Peroxidase activity determined during different TPH loading rate (30-60 kg TPH/m^3.d) and the results showed thatby increasing TPH loading rate peroxidase activity from 564.81 to 704.55 U/$g_{biomass}$, dehydrogenase activity in the same situation increased from 28.26 to 112 µTF/$g_{biomass}$.d. Due to hydrophobic nature of TPH compounds, with increasing TPH loading rate, rhamnolipid and surfactin production enhanced. Accordingly, the RBB is an efficient and viable technology for the treatment of hydrocarbon-laden streams.

Keywords: Petroleum wastewater, Rotating bed reactor, Enzymatic activity, Biosurfactants.

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Estimation and Provincial Mapping of Water Poverty Index (WPI) for Iran

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Abstract

Any society with low social and economic adaptive capacities will not be able to face the situation which is named "water poverty". Water poverty can be expressed by incorporating different dimensions of water issues in a holistic measure known as Water Poverty Index (WPI). WPI intends to provide a strategic approach for understanding the complexities associated with water issues combining social, economic, physical and environmental aspects. Five major key components namely resources; R, access; A, capacity; C, use; U and environment; E are included in WPI. This study details the use of WPI for the conceptualization of water policies in Iran. To point out the degree to which water crisis impacts Iranian population, the WPI index was estimated for Iran at provincial level. WPI key components for 31 provinces of Iran were found out through search in related national reports and country yearbooks. Each of components was standardized so that the value of WPI fell between 0 and 100. The estimated WPI for Iran is 40.80±2.63 and among 31 provinces, Gilan and Yazd provinces got the highest (63.60) and the lowest (28.51) values of WPI, respectively. The estimated scores for R, A, C, U and E for the country found to be 24.04±1.31, 5.37±0.37, 5.85±0.06, 2.91±0.24 and 2.60±0.14, respectively. As a conclusion, 41%, 55% and 4% of Iran's population fall in "*poor*", "*good*" and "*rich*" categories of WPI, respectively. WPI could be a robust index to support water policy makers to determine most important priorities in water sector and properly use of the nation's water resources.

Keywords: Water Poverty Index, Iran, Provincial mapping

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Evaluate the Efficiency and Effectiveness of Magnesium Oxide Nanoparticles in Removal of Reactive Blue19 from Aqueous Solutions: Kinetic and Thermodynamics Studies

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Abstract

The widespread use of dyes has led to some environmental problems like pollution problems in form of color wastewater and entering of color effluent into receiving waters. This study aimed to determine the efficiency and effectiveness of magnesium oxide nanoparticles in removal of reactive blue 19 from aqueous solutions. In this experimental study, the effect of variables that have much effect on the efficiency of dye removal from synthetic wastewater was studied and survived effect of The parameters: pH (3 – 11), reaction time (20 – 150 min), adsorbent dose (0.3 – 2.3g/L) and initial dye concentration (50 – 200mg/L). The results showed that by increasing contact time, adsorbent concentration and color decreasing, removal efficiency increased, as the most efficiency of dye removal was obtained at pH= 3, adsorbent amount 1.5 g, dye concentration 90 mg/l , and contact time of 60 minute (81%). reactive blue 19 adsorption kinetics magnesium oxide nanoparticles follows pseudo-second-order model. The efficiency more than 80% prepared absorbent in the removal of dyes from aqueous was shown that it can be used as adsorbent effective in treatment processes. So use this technique to remove colored contaminants from aqueous solutions have been proposed.

Keywords: nanoparticles, magnesium oxide, reactive blue 19, Thermodynamic, Kinetic

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Evaluating the Efficiency of Gilan Province Native Duckweed in Removing Lead from Aqueous Solutions

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Abstract

Heavy metals pollution is an existing and developing problem in the world. Lead, copper, cadmium and nickel are among the most common pollutants found in industrial sewage. The main purpose of this research was to determine the efficiency of Gilan Province native Duckweed in removing lead from aquatic environments. In addition, the inhibitory effect of lead on plant growth was investigated. This study was conducted in Rasht in spring. This is an applied-fundamental research based on empirical studies. In this study, lead solutions were made at concentrations of 5, 10 and 25 mg / l. Duckweed weighing 0.2, 0.4 and 0.8 g were added to containers containing 100 milliliters of the solution. After the contact time of 5, 10 and 15 days, the amount of heavy metals remaining in the solution was measured by the ICP device, ICP-OES model. Additionally, the weight of Duckweed was measured after these periods. The results showed that the maximum removal of lead occurred at the contact time of 10 days and is slightly reduced after 10 days. Also, with the increase in the weight of the Duckweed, the removal efficiency of lead increases, and by increasing the lead concentration, the removal efficiency decreases.

The highest lead removal efficiency was 87.83% and the lowest efficiency was 69.06%. This study showed that lead reduces or stops the growth of Duckweed. These effects depend on the concentration of lead, which inhibits plant growth at concentrations of 5 and 10 mg and at a concentration of 25 mg / L, it reduces plant growth. The removal of lead using Gilan Province native Duckweed is possible. Suitable retention time, lead concentration, and initial weight of Duckweed were the most effective factors in the removal rate.

Keywords: Aqueous solutions, Duckweed, Gilan, lead

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Evaluation and Implementation of Wastewater Reuse Management of Wastewater Treatment Plant Using AHP-TOPSIS in the West of Ahvaz

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Abstract

Improper management of unconventional waters for reuse is caused environmental problems and health risks, costs and economic and social problems. The aim of this study was to Evaluation and Implementation of Wastewater Reuse Management of Wastewater Treatment Plant Using AHP-TOPSIS in the west of Ahvaz. To achieve this objective health standards, environmental, economic, social and technical for to prioritize the reuse of wastewater from the application point in agriculture, green space, discharge into the river and fish ponds were studied. For this purpose, using the Delphi method, research results of other scholars and specialists, norms and standards, was determined criteria and sub criteria influence on managerial decision making. Then with the analysis of physico-chemical and sanitary parameters wastewater during the first 6 months of year 1395 and harvest evidence during the last 3 years and using the multi-criteria decision model AHP-TOPSIS,first the criteria weights using AHP method and rating of effluent was determined using TOPSIS method. Results indicate that the wastewater treatment plant to discharge into the river with the highest CL(Relative closeness an option to the ideal solution) the first priority equal to 0.693, using for agricultural purposes with CL equal 0.433 in the second priority and used to green space with CL equal 0.432 in third priority and used in fish ponds with CL equal 0.311 in the last priority is the maximum limitation of use and the most important limit causing factor the quality wastewater from treatment plant in various applications, health characteristics, some heavy metals, sodium, chloride, ammonia, TDS, In terms of economic, training costs and monitor and facilities (with increasing distance) and subsequently protection and control, In terms of social, rejection of the public and those in charge, distance from populated places and technically is required, confidence of quality and quantity function and the degree of purification treatment and suggested that the promotion of advanced systems and methods for disinfection of wastewater compatible with environment(and less expensive) and implement environmental, health and management(in the absence of treatment plant upgrades) overcome problems and use be practical the wastewater in agriculture, green space and the fish farming.

Keywords: Wastewater Treatment plant, Reuse, Unconventional Water, AHP-TOPSIS

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Evaluation of Talar Water Quality and Leachate its Effects with NSFWQI

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Abstract

The availability of good quality water is necessary for preventing diseases and improving quality of life. Rivers are considered as the main sources of water supply for drinking and industrial use. Today, rivers' pollution is the most important problem in the world, especially in developing countries. The aim of this study was to evaluate the qualty of Lake Talar by NSFWQI as the water quality Index. Six sampling sites were selected in different parts of the lake in three seasons of the year (spring, summer, and autumn). Three sites were located before the arrival of leachate to the river at upstream and three sites were posited after the arrival of leachate to the river at downstream.Water quality index was determined based on the values obtained according to standard method for nine factors including dissolved oxygen (DO), Fecal Coliform, BOD, pH, water temperature (^{o}C), Phosphate, Nitrate, Total Suspended Solid (TSS), and turbidity. The results of this study showed that the mean values of WQI in upstream sites were 59, 56, and 54 (moderate NSFWQI) and were 50, 53, and 49 at downstream sites (bad class of NSFWQI). Total solids, turbidity, nitrate, temperature, and fecal coliforms were the most affecting parameters. Although the water quality of the river was suitable for agriculture, it should be treated for drinking purpose.

Key word: Talar River, Leachate, Water Quality Index, Quality Parameters, NSFWQI

Evaluation of Electrocoagulation/Flotation Process in Removal of Reactive Black 5 dye from Aqueous Solutions

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Abstract

Nowadays, one of the environmental pollutants that are used widely is artificial dyes or Colored effluents that are originate from industries such as textiles, leather and paper. In this study, the treatability contaminated effluents with reactive black 5 was investigated in a lab scale batch experimental reactor using electrocoagulation/flotation process equipped with aluminum electrodes. In this study, an electrocoagulation / flotation reactor at the laboratory scale in volume of nearly 1 liter; which is equipped with 4 aluminum electrodes on the size of 200*20*2 mm; was prepared. Finally the effects of operational parameters like initial pH, current density, contact time, initial dye concentrations and flotation were evaluated. The results of this study indicated that the highest rate of dye removal was observed in natural pH of the solutions, 12.71 mA/Cm^2 current density and 100 mg/L initial dye concentration at 30 min contact time. In these conditions, up to 81% of dye was removed. Electrocoagulation/flotation processes could be a suitable process using aluminum electrodes for dye removal from aqueous solutions.

Keywords: Electrocoagulation/flotation, Removal, RB5

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Evaluation of Iranian Oak (Quercus Branti) Performance as Natural Coagulant in Water Treatment process by Response Surface Methodology

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Abstract

Oak due to present tannin in self-molecular structure is used as natural coagulant to remove turbidity during water treatment process. The purpose of this study was to determine the efficiency removal turbidity from water by Iranian oak extract and Poly Aluminum Chloride (PACl) in optimal condition.In this laboratory study, water samples containing synthetic turbidity were prepared using kaolin in range 20-250 NTU. The Iranian oak extract was prepared by maceration method using ethanol 96%. The optimal concentration of oak extract and PACl was determined in different conditions of initial turbidity and pH using Jar test. The remaining turbidity in samples was measured by turbidity meter HACH 2100. The Total Organic Carbon (TOC) in water samples was measured before and after coagulation process based of standard method 5310-C. The Response Surface Methodology was used to determine the number of laboratory tests and statistical test.The optimal concentration of oak extract and PACl was 62.0 and 52.6 mg/l, respectively. Following the increase of initial turbidity and pH in samples water, enhanced of efficiency removal turbidity by oak extract and PACl. The efficiency removal turbidity by oak extract and PACl were 63.5% and 66.5%, respectively. Concomitant use of oak extract and PACl increased the efficiency removal turbidity (85.0%) and decreased concentration of TOC (42.3%) in water samples. Oak extract efficiency alone was not enough to removal turbidity and it is suggested to be used as a coagulant aid.

This study showed that oak extract efficiency alone was not sufficient for removal turbidity and it is suggested to be used as a coagulant aid. The oak extract and PACl have acceptable performance in removing turbidity from water.

Keywords: Iranian oak, tannin, Natural coagulant, Poly Aluminum Chloride, Response Surface Methodology

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Evaluation of Physico-Chemical and Microbial Quality of Drinking Water During a 3-Year-Period in Delfan City, Lorestan, Iran

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Abstract

The safety and accessibility of drinking water are major concerns throughout the world, especially in developing countries. Health risks may arise from consumption of water contaminated with pathogens and water with higher values of physico-chemical contamination than the standard limits. In this study the microbial and physico-chemical quality of drinking water of Delfan city in Lorestan, Iran were investigated during 2014 to 2016. Drinking water of Delfan city is supplied from improved wells in urban areas and springs, semi-improved and non-improved wells in rural areas. In order to perform this study the results of microbial and physico-chemical quality of drinking water of Delfan city were achieved from the Health Center. The received data were analyzed by Microsoft Excel 2010 and SPSS software (ver.20) and compared with the standard values set by the World Health Organization (WHO) and institute of standards and industrial research of Iran (ISIRI). The result showed that 3.3% of the urban and 16.2 % of rural drinking water samples had high total coliforms counts (>100 MPN/100mL) and there was a significant difference between microbial pollution in urban and rural areas ($P<0.001$), however, all the measured physico-chemical parameters were within the drinking water standards of WHO and ISIRI except for residual chlorine and F^-. The concentration of residual chlorine in some analyzed samples was zero or less than the minimum level (0.5mg/L) stipulated by both the ISIRI and WHO. Also the F^- concentration of all samples except for one of them were less than ISIRI standard value (0.7-1.2 mg/L), and some of them had F^- value less than standard level of WHO (0.5-1.5 mg/L). Drinking water of Delfan city, especially rural areas is contaminated by bacteria that endangers public health. It may be due to lack of enough chlorination of water. High microbial contamination of rural drinking water is probably due to none or semi-improved water sources. Therefore, promoting sanitation of drinking water and improvement of wells is necessary. Low fluoride values of Delfan drinking water is another serious problem, because low fluoride concentration of the consumed water, results in dental caries and health problems.

Keywords: Drinking water, microbial quality, physico-chemical quality, Delfan city

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Evaluation of Removal of Reactive Orange 16 dye Using Psylliumbio Sorbent

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Abstract

The bio sorption process using natural materials has found widespread applications than to their inexpensiveness, availability, and reusability.The aim of this research is to investigate the efficiency of psyllium seed powder in removal of Reactive Orange 16 dye.The impacts of various influential parameters such initial pH, contact time, adsorbent dose, temperature and dye concentration were evaluated using a batch biosorption method.Data analysis was conducted by SPSS 19.The removal efficiency of Reactive dye 16 using the natural adsorbent psyllium was obtained to be 94% in optimal conditions (pH=4, contact time=40 min, and adsorbent dose=2 gL^{-1}).Biosorption equilibrium experiments indicated that the best fit was achieved with Langmuir isotherm model. Maximum adsorption capacity was found to be 206.6 mg g^{-1} at 303 K. Kinetic analysis revealed that adsorption experimental data was best fitted by pseudo-second order model. Free energy of adsorption (ΔG_0), enthalpy (ΔH_0), and entropy (ΔS_0) changes were calculated to predict the nature of adsorption. Thermodynamic evaluation indicating that a spontaneous process occurred. Inexpensive, locally available and effective materials could be used for dye removal in wastewater treatment processes.Undoubtedlylow-cost adsorbent benefits for commercial purposes in the future.

Keywords: psyllium, biosorbent, reactive dye, Isotherm, kinetic, Thermodynamic

Evaluation of the efficiency of Bi-Metallic Magnetized Chitosan Nanocomposite in the Removal of Fluoride from Drinking Water

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Abstract

Fluoride is one of essential minerals in natural waters and prevents tooth decay, in standard values. If fluoride levels are higher than standard values, some diseases such as Alzheimer's syndrome, bone fragility, thyroid dysfunction and sterility will occur. Therefore, the purpose of this study was to investigate the efficiency of bi-metallic magnetic chitosan nanocomposite in removing excess fluorine from drinking water. Bi-metallic magnetic chitosan nanocomposite was synthesized based on co-precipitation method a response surface model based on central composite design was used. Various parameters such as temperature (20, 35 and 40 ° C), pH (4-۸), adsorption concentration (2-20 g / l), contact time (2 to 90 minutes), initial concentration of fluorine (5-50 Mg / L) .For data analysis, SPSS and Design Expert software was used. Results showed that the adsorption efficiency was increased by increasing contact time, the initial concentration of fluoride ion, and adsorbent dose. The maximum removal efficiency of fluoride by bi-metallic magnetized chitosan nanocomposite adsorbent was reached to 98.37% in pH=7, contact time of 50 min, and fluoride concentration of 30mg/L. bi-metallic magnetized chitosan nanocomposite was a suitable bio-sorbent for the removal of fluoride from drinking water

Keywords: Fluoride, bi-metallic magnetized chitosan nanocomposite, Adsorption, Drinking Water

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Evaluation of the Efficiency of Purolite A200 Anionic Resinin Removing Acid Red 18 dye from Aqueous Solutions by RSM

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Abstract

Azo dyes are one of the synthetic dyes that are used in many textileindustries Adsorption is one of the most effective techniques for removal ofdye-contaminated wastewater. In this work, the efficiency of Purolite A200 anionic resin as an adsorbent for removal of Acid Red 18 (azo-dye)from aqueous solution was determined. The parameters affecting the adsorptionprocess such as contact time, pH, adsorbent dosage, and initial dyeconcentration were studied. Response surface methodology (RSM) was employed to model and optimize the effect of process variables, including initial dye concentration (5-100 mg/L), solution pH, optimized manually adjusted (pH =7), adsorbent dose (1-5 g/L), and contact time (5-60 min) on the percentage of dye removal as the response. Experimental results have shown by increasing the adsorbent dosage(from 1.81 to 4.19 g), the rate of dye removal was increased(from 81 to 97.5%), as well as by increasing the contact time (from 16 to 48 min), the rate of dye removal was increased(from 74 to 98%) but the rate of dye removal by increasing the concentration, only 2% increased, which is independent of concentration in the range was studied. The optimum levels of independent variables for the removal of Acid Red 18 dye were time 41 min, initial concentration of 48 mg/L, adsorbent dose of 4.08 g/L, and pH of 7 .Under optimal conditions, the predicted removal percent of the model was 80.65% for Acid Red 18 dye. model with R^2_{Adj}values of higher than 0.93for Acid Red 18 dye .The results showed that all of the independent variables exhibited a significant effect on Acid Red 18 dyeremoval ,exceptof concentration. The results have shown that Purolite A200 anionic exchangeresincan be used as an effective process for the removal of Acid Red 18 dye from aqueous solution.

Keywords: Acid Red 18, Adsorption ,RSM, R^2_{Adj}

Evaluation of Wastewater Treatment and Disposal of Hospitals in the Mashhad City (2015)

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Abstract

Cities development and growthing population and expansion of industries will increase the importance of environmental pollution. Wastewater is one of the factors of pollution of the environment that should be recyled by collection, treatment and return again to the water cycle in nature. Hospital waste is classified according to source. It is resulting from municipal source. The aim of this study was to determine the conditions of treatment and disposal of wastewater in hospitals of Mashhad in 2015.This cross - sectional study was conducted in government hospitals of Mashhad. In this study, 9 of hospitals were studied in Mashhad. Information and variables related to wastewater management were studied with observation, interview and were analyzed using questionnaire consisted of 11 questions, Exell software and the results were presented with charts and tables.The results showed that financial problems played a role in the hospital's inactivity of about 50%. The raw sewage source of the hospital's treatment plant was 14.29% using an absorbent well and sewage collection network and 28.57% using septic tank. In general, among hospitals surveyed, hospitals that did not have a sewage treatment system and wastewater collection status were inappropriate compared to other hospitals. And the hospital where the active sludge treatment system was normal and the sewage collection status was reported to be higher. In general, inappropriate management and lack of adequate funding are the main causes of the health problems of hospitals. Due to adequate budget estimates and regular monitoring, sanitary wastewater treatment problems can be addressed.

Keywords: Hospital Wastewater, Mashhad, Wastewater Treatment, Disinfection

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Evaluation of Water Quality used in Hemodialysis Devices in Dehaghan Hospital, 2016

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Abstract

Kidney patients in each dialysis cycle are exposed to extremely large volume of water, which is in direct contact with the patient's blood. Hence, occurrence of any type of contamination in the used water can be very toxic to patients. Thus, quality of water plays an important role in patients' well-being. The aim of this study was to evaluated the quality of water used for hemodialysis in Dehaghan hospital. This cross-sectional descriptive study was conducted on water quality used for hemodialysis in Dehaghan hospital during Jan.-Dec 2016. During the study a total of 12 water samples were taken from the raw water and inlet of hemodialysis instrument. Collected water samples were analysed for Heterotrophic plate count, residual chlorine, pH, calcium, potassium, sodium, magnesium, sulfate, chloride, total dissolved solid (TDS), total hardness(TH), and EC according to the standard methods for water and wastewater examination. The results were analyzed using spss v.16 software. The findings of this research showed that the mean concentration of residual chlorine, calcium, potassium, sodium, magnesium, sulfate, and chloride were 0.0, 1.6, 0.3, 2.6, 1.6, and 9.7 mg/L, respectively. In addition, concentration of other chemical elements did not exceed the standard level in any cases. Moreover, no microbial contamination was observed in the samples analyzed. The results of this research showed that all water quality parameters in hemodialysis ward of Dehaghan Hospital were compatible with AAMI (Association for the Advancement of Medical Instrumentation), water quality Standards, and no health risk threatens the kidney patients.

Key word: Hemodialysis, Patient, Dehaghan hospital, Reverse osmosis

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Evaluation the Efficiency of Magnetic-Metallic Chitosan Nanocomposite Adsorbent for the Removal of Nitrate and Phosphate from Aqueous Solutions

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Abstract

Drinking water resources contain different concentrations of anions and cations. Some of those ions may cause diseases or contribute to poor water quality. Nitrates and phosphates have been considered as the qualitative parameters in water and this could lead to the formation of diseases at concentrations over the allowable limit. This study aimed to evaluate the effectiveness of chitosan nanocomposite magneticmetallic absorbent for the removal of nitrates and phosphates from aqueous solutions.Magnetic chitosan-metallic nanocomposite adsorbent was synthesized based on co-precipitation/cross-linking method. Samples with different concentrations of nitrates and phosphates were prepared and the effects of parameters such as pH, contact time, concentration, absorbent concentration were examined. The SEM, XRD, FTIR and TEM analyses were conducted to determine the characteristics of the adsorbent. Results showed that the maximum removal efficiency of nitrates (98/70%)at 50 mg/L-N nitrate, pH of 5, retention time of90 min and5 g/L adsorbent. In addition the maximum removal efficiency of phosphates (99/53%)from water samples was obtained at phosphates 100 mg/L-P, pH 4, retention time 90 min and 5 g/L adsorbent. Based on the findings the adsorption of nitrates and phosphates was best fitted with Langmuir isotherm and pseudo-second order kinetic model. Adsorption of nitrates and phosphates from drinking water by magnetic chitosan-metallic nanocomposite adsorbent is considered as a novel,highly efficient, cost-effective andenvironmentally favorable treatment process.

Keywords:Magnetic Chitosan-Metallic Nanocomposite, Adsorption, Nitrate, Phosphate

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Exploring the Advanced Oxidation/Reduction processes in the VUV Photoreactor for Dechlorination and Mineralization of Trichloroacetic Acid: Parametric Experiments, Degradation Pathway and Bioassessment

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Abstract

The present study reports degradation, dehalogenation and mineralization of trichloroacetic acid (TCAA) exploring advanced oxidation/reduction processes (AORPs) in a chemical-less VUV reactor. The performance of VUV process was almost independent of solution pH. The complete degradation and dechlorination of TCAA up to initial concentration of 50 mg/L achieved in the VUV process at a neutral solution pH within a relatively short reaction time of 30 min. The observed first-order degradation rate of TCAA increased from 2.35 to 12.20 mg/L.min with the increase of initial concentration from 1 to 100 mg/L. The major water anions did not considerably influenced the decomposition of TCAA. The hydroxyl radical and hydrated aqueous electrons simultaneously contributed in degradation and dechlorination of TCAA in the VUV process. Around 87% of TCAA (10 mg/L) was mineralized in the VUV process with 30 min. The degradation intermediates determined using LC/MS were found to be simple non-chlorinated substances mainly formic and acetic acids. A low energy was consumed in VUV to attain the efficient decomposition of TCAA. The VUV process was efficiently operated in continuous-flow mode for degradation, dechlorination and mineralization of TCAA. Therefore, the VUV photoreactor is an emerging and feasible chemicalless AORP which can be efficiently operated in continuous-flow regime for high-rate decomposition and mineralization of halogenated organic compounds.

Keywords: Halogenated organic compounds, Chloroacetic acids, Mineralization, Advanced oxidation process and advanced reduction process (AORP), Vacuum ultraviolet.

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Factors Influencing Dye Removal from real Textile Wastewater by Catalytic Ozonation Process via MgO in the Presence of Persulfate using Fractional Factorial Design

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Abstract

This study aimed to examine the overall feasibility of using nano-magnesium oxide ozone as catalyst in ozonation process for decolorization and mineralization of a real textile wastewater in the presence of persulfate .This experimental study was conducted on a laboratory scale reactor with a semi-batch mode, four factors persulfate concentration, ozone flow rate, reaction time, and catalytic dose were investigated in dye and COD in an optimal state of textile wastewater.To obtain optimization test, design expert with fractional factorial method at three-level factorial (3^{k-p}) was used with a high resolution. Minitab17 and Statistica 10 software were used to analyze the obtained data. The results indicated that the contact time of 15 min (Pvalue = 0.006) and a dose of catalyst 0.5g/L (Pvalue =0.029) had the main effect on the response variable (% color removal) and the interaction of these parameters was also significant (Pvalue =0.025). Optimum conditions for testing based on the analysis of variance on dye removal and in the fitted model obtained at reaction time 15 min, ozone flow rate 2 L/min, the dose of persulfate 1.5 mm mole and dose of catalyst 0.5 g/L. Optimum efficiency removal for dye and COD of textile wastewater were 96% and 75%, respectively.The results of this study indicate that fractional factorial design is a useful tool for screening a large number of variables and reducing the number of experiments . The use of nano-magnesium oxide with ozone in presence of persulfate has a synergistic effect and the buffering property in dye removal and increase color removal and mineralization intensity textile wastewater and also pH adjustment is no need .

Keywords: Fractional factorial design, Persulfate, Textile wastewater

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Feasibility of reuse the Bushehr wastewater treatment plant sewage in urban green space irrigation (Case study: *Festuca*)

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Abstract

Grass is considered the world's most important coverage plant and many parks in the country's urban areas have been covered with this plant. This is despite the fact that today as freshwater resources become scarcer, wastewater use is a major incentive option for conserving and expanding available water supplies; and given that the water demand of this plant is high, the use of non-conventional water resources is highly taken into consideration. The purpose of the study was to study of the *Festuca* grass species irrigation with domestic water and sewage of Bushehr wastewater treatment plant. For this purpose, to evaluate the microbial and plant growth characteristics, a randomized complete block statistical design with two treatments including irrigation with wastewater treatment plant effluent and irrigation with normal water (tap water) in the form of sprinkler irrigation with three replications was conducted. The grass was cultivated in Bushehr city for 2 months. At the end of the test, to check the bacteriological quality, the soil samples from a depth of 0-5 cm of soil and plant samples from old and new leaves of the plant were collected. Morphological parameters were evaluated every 15 days. Results of these study showed the number of total coliform and fecal coliform bacteria in soil treated with sewage was higher than that of the soil treated with domestic water. Also, bacterial contamination in plant components treated with water and wastewater was the same and both treatments had a high level of contamination. The chemical quality of treatment plant effluent was consistent with the standards of the Environmental Protection Agency in most of the examined parameters from the aspect of its application in agriculture; and it was somewhat favorable. In irrigation with sewage, the growth and morphological levels of lawn was significantly higher than those watering with tap water. Generally splinter irrigation with sewage treatment can increase the chance of plants getting infected and enhanced the microbial bacteria. So, disinfection and continuously monitoring of effluent and improvement of wastewater treatment plant is strongly recommended.

Keywords: Wastewater, irrigation, Coliform, *Festuca* grass.

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Fe^{2+}/Persulfate/ Clinoptilolite, Catalytic Oxidative Treatment, as a Cost Effective Process to Purify Diisocyanate unit Wastewater from Karoon Petrochemical Company in Industrial Scale

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Absract

The waste water from diisocyanate unit of Karoon Petrochemical Company/Iran wastewater contains aromatic and hazardous compounds such as Diaminotoluenes, Mononitrotoluene, Dinitro-toluene, Nitro-phenol, and Nitro-cresol. Persulfate and Ferrous Sulfate can produce sulfate radicals with strong standard oxidation potential. Clinoptilolite is a natural adsorbent that can cause Catalytic oxidative treatment with sulfate radicals. The objective of this study was to evaluate the Fe2+/Persulfate/ Clinoptilolite, Catalytic oxidative treatment efficiency, and treatment cost of petrochemical aromatic wastewater in the industrial scale. Further, the results were compared with those of Fenton, performed on Karoon Petrochemical Company treatment plant regularly. Influence of variables such as type of activator for sulfate radical formation and persulfate, ferrous sulfate, zeolite dosages, pH, oxidation times, and wastewater temperature were investigated. Type and amount of aromatic compound as well as COD and TSS removal efficiencies in treating effluent were determined. The COD, TSS, and organic removal efficiency in Catalytic oxidative treatment processes were 93.04%, 95%, and 100%, respectively. The COD removal rate in sulfate radical was 79% and in regular fenton in plant site was 70-80%. The catalytic processes utilizing Fe2+/Persulfate/ Clinoptilolite show the best COD and other parameter removal efficiency. Although the fenton process had relatively high removal efficiency, the overall costs were higher than sulfate radical relatively. The cost of chemicals for Fenton performed on Karoon Petrochemical Company treatment plant was 3,500,000 $ /year but for catalytic processes was 30,000 $ /year in industrial scale. The catalytic processes utilizing Fe2+/Persulfate/ Clinoptilolite as a Suitable technical and economical process replaced Fenton process in Karoon Petrochemical Company/Iran full scale wastewater treatment plant successfully.

Keyword: Sulfate radical, petrochemical, Catalytic oxidative

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Fluoride Concentrations in some Bottled Water in Iran

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Abstract

Nowadays, the use of bottled water has considerably increased due to different reasons. Today, the amount of fluorine in the diet is little, however, its absorption is determined by in drinking water. The purpose of this study was to evaluate the amount of fluorine in some bottled water consumed in the cities of Iran This cross-sectional descriptive study was conducted to determine the amount of fluorine in some bottled waters consumed in Iran in 2017. In this study, 10 samples from several plants producing different amounts of fluorine were tested**.** The results showed that the minimum and maximum fluoride content in bottled water were 0.03 and 0.85, respectively. All samples had fluoride less than the standard and a statistically significant relationship was observed between them. Considering the results of the study, there was a significant difference between the fluoride content of the bottled water and the average fluoride content based on the maximum average air temperature of the central cities of Iran and the standards of WHO and Iran. The amount of fluoride in 10 different brands of bottled water consumed in Iran was less than the national standard and the world. Therefore, a growing consumption of bottled water can be a serious threat for healthy teeth, especially in the growing age.

Keywords: Fluoride, Bottled water, Temperature, Iran

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Health Risk Assessment of Nitrate and Nitrite in Bottled Waters in Isfahan

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Abstract

Bottled water pollution with nitrate and nitrite cause health risk. Nitrate and nitrite effect on health of children and adults, as they are more susceptible to serious health conditions due to the change in their body size and chemical conditions of the body. The aim of this study was to determine of health risk assessment of nitrate and nitrite in bottled waters in Isfahan's market. 21 samples of bottled water were purchased from market place and were analyzed for nitrate and nitrite. Determination of nitrate was as cadmium reduction method and for nitrite was as diazotization method with DR-5000. The measured concentration of nitrate and nitrite were compared with the labeling data and codex guideline values. Statistical analysis on data was performed with the SPSS 22. The health risk was assessed through chronic daily intake (CDI) and hazard index (HI). The mean concentrations and standard deviations for nitrate and nitrite were 1.42 ± 0.55 and 0.02 ± 0.015 mg/l, respectively. The nitrate concentrations have a statistically significant difference with labeling values and there was no labeling value for nitrite on the samples. The amounts of CDI for nitrate and nitrite were 0.00015 and 0.00033 mg/kg/day, respectively and their related HI was same and below 1. According to the results of this study, nitrate and nitrite levels in the surveyed bottled waters were not hazardous in terms of public health. The label values not provide reliable data for consumer. The health risk of bottled water consumers from nitrate and nitrite exposure in Isfahan were in the acceptable range.

Keywords: Bottled Water, Health Risk Assessment, Nitrate, Nitrite

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Health Risks Associated with Heavy Metals in the Drinking Water of Sabzevar, Khorasan Razavi

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Abstract

Lack of sufficient surface water resources in the Sabzevar city has made underground water as the only source of water supply in the city, so determining its quality has a great importance. This study aimed to measure the levels of ten trace elements in the samples of tap water and their associated risk assessment in these samples. Samples were analyzed using ICP-OES for detecting the amounts of heavy metals. Furthermore, assessing the risk caused by ingestion of heavy metals through drinking water was performed using the health risk indicators such as CDI and HRI. The mean of heavy metals includes BDL, BDL, BDL for Cr, Al, B, Ba, Cu, Zn, Ni, Cd, Pb, Co concentration were 41, 9.38, 363.46, 7.07, 15.8, 40, 2.52 respectively. Furthermore, the mean of CDI values includes Ni, Al, Cu, Ba, Zn, Cr, B in adults were 0.07,0.274,0.438, 0.596, 1.11, 1.138, and 10.096 ,furthermore these parameters in children were reported 0.077, 0.301, 0.438, 0.656, 1.223, 1.253, 11.115 respectively. The mean of HRI values of Cr, Zn, Ni, Ba, Cu, B, Al in adults were 0.00075, 0.003, 0.003, 0.008, 0.011, 0.0504 respectively, NC for as well as these values in children were 0.00083, 0.003, 0.004, 0.009, 0.013, 0.055 respectively. None of the heavy metals were found beyond the permissible limits set by WHO and ISIRI no.1053. With respect to the health risk assessment in which the HRI were obtained lower than 1 for all the elements, the water used for human consumption in the study area was safe.

Keywords: Heavy metals, Daily intake, Health risk, Tap water

High Efficient Degradation of Cefixime Using UV/TiO_2 Photocatalytic process: A Comparison between Photocatalytic and Photolytic

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Abstract

The existence of pharmaceuticals in aquatic ecosystem, their persistence and possible effects on living organisms and inefficient systems in removal of these compounds from water and wastewater have made a growing concern. In this work, the UV/TiO_2 photocatalytic degradation of Cefixime was investigated so as to identify if this method was efficient for removal of Cefixime or not. The degradation of Cefixime was also evaluated under UV and the efficiency of degradation was compared with the UV/TiO_2 photocatalytic decomposition. The experimental parameters such as primary concentration of Cefixime, catalyst dosage, solution pH and time were assessed and optimized. The photocatalytic analysis was based on residual Cefixime identification by HPLC. The chromatographic conditions were comprised of a reversed-phase C18 column with mobile phase consisting of 45:55 v/v mixture of Acetonitrile: water.The optimum removal efficiency for Cefixime was obtained after 60 min (90.98%) when 1 mg/L TiO_2 was used at pH=3. The increase of catalyst concentration from 1 to 70 mg/L led to a decrease in degradation efficiency.

According to the results, UV/TiO_2 process could be a promising technique for the removal of Cefixime with good efficiency in a relatively short reaction time.

Keywords: Cefixime, Removal, HPLC, Photocatalytic.

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Hospital water: A Potential Route for Transmission of *Acinetobacter baumannii*

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Abstract

Nosocomial infections have become increasingly a major health concern in many hospitals worldwide. *Acinetobacter baumannii*has emerged as the most problematic hospital acquired pathogen around the world. Biofilm formation allows this gram-negative agentto persist in hospital water systems for extended periods, which has been associated with nosocomial infections such as meningitis, blood and urinary tract infections. The aim of this study was to investigate the frequency of*A. baumannii* colonization of hospital taps by PCR assay. A total of 33 water samples were collected in sterilized 500-mL glass bottles from 11 hospitals of Isfahan University of medical sciences, and analyzed for the presence of *A. baumannii*, by specific primer sets of bla OXA-51 gene. Water samples were taken from tap water outlets at three different points of each hospital. The PCR assayrevealed 18% (6 of 33) of the water samples were positive for *A. baumannii*, and 50% (3 0f 6) of positive samples were associated with shower samples. Identification of contaminated sources could be a key priority in waterborne nosocomial infections. Given the importance of monitoring hospital water systems for the presence of *A. baumannii*, PCR assay was used in the study provides simple, rapid, and reliable identification of this microorganism in hospital water systems, which could eliminate the infections of this pathogen through the implementation of immediate control measures.

Keywords: *Acinetobacter baumannii*, hospital water, nosocomial infection

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Household Water Desalination Packages in Qom; Monitoring the Microbial Quality of Produced Water

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Abstract

Qom and the other cities located in central part of Iran are historically engaged with high TDS content of their local drinking water resources. During recent decades, the household water desalination packages (HWDP) based on membrane filtration was applied as a resort to enhance the quality of drinking water. This work investigates the microbial quality of water desalinated by HWDPs which were used by Qom families. 40 paired samples were taken from 40 distinct homes where the HWDP was served as the only drinking water source. Each paired sample was consisted of one sample taken from inlet line and the other which was taken from outlet line of HWDP, simultaneously. A questionnaire was also filled to find out the items regarding the residual chlorine (mg/L), pH, and turbidity (NTU) of water samples, the operation pressure (kPa), the service time, and the date of purchasing HWDP. The heterotrophic plate count (HPC) and the total fungi were measured in water samples according to the Standard Methods. The concentration of residual chlorine in the outlet samples of all investigated HWDPs were zero. The average concentration of residual chlorine in the inlet samples of HWDPs were 0.35 mg/L. The Wilcoxon test showed that the average of HPC values counted in samples taken from the outlet of HWDPs (116.5 cfu/100ml) were significantly more than those measured in the inlet of HWDPs (101.1 cfu/100ml). The average pH of inlet and outlet flows of HWDPs was 7.6 and 7, respectively. Also, the differences between average values of pH in the inlet and outlet of HWDPs are significant. The growing of fungi colonies were not detected both in the inlet and outlet samples of HWDPs. Results showed that the growth of heterotrophic bacteria was occurred in the storage tanks and/or the outlet pipes of HWDPs which can be attributed to the elimination of chlorine by the membrane filter. It seems that consuming unprotected drinking water produced by HWDPs may threaten the public health, so that the health authorities should emphasis these critical points to prevent the waterborne diseases.

Keywords: household water desalination packages, heterotrophic plate count, drinking water, disinfection

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Hybrid System of Catalytic Ozonation Process using Fe3O4/SiO2/TiO2 Nanoparticles in Removal of Ceftriaxone from Aquatic Solutions

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Abstract

Conventional operating systems in wastewater treatment are not capable of removing antibiotics, making increases in drug resistance for human body and pathogenic agents in environment. This study aimed to investigate the treatability of a hybrid catalytic ozonation process using Fe_3O_4@SiO_2@TiO_2 nanoparticles in removal of Ceftriaxon, as an antibiotic, from aquatic solution in a bench-scale experiment. Magnetized nanoparticles of Fe_3O_4@SiO_2@TiO_2 were synthesized according to sol-gel method. The characteristics of the resulting product were analyzed with EDX, XRD, and SEM. The effect of influencing parameters, including contact time (0-60 min), pH (3-11), catalyst dosage (0.2-2.5 g/L), and initial concentration levels of ceftriaxone (10-100 mg/L) on removal of ceftriaxone was examined with response surface method (RSM) and Box-Benhken, which was then analyzed with one-way ANOVA. The residual concentration of ceftriaxone was determined with HPLC. In addition, the experiments of mineralization and recovery were studied. In the present study, the optimum conditions were specified as follows: pH= 11, catalyst dosage= 2.5 mg/L, initial concentration of ceftriaxone= 10mg/L, and contact time= 60 min. The synthetic of study was fitted to first-order synthetic. The mineralization efficiency (85.7%) and recovery (5.2%) were determined after 6 times of desorption after the experiments. Considering the results obtained from the present study, the hybrid catalytic ozonation process using Fe_3O_4@SiO_2@TiO_2 nanoparticles is of high capability to remove ceftriaxone from aquatic solutions.

Keywords: Hybrid system, Ceftriaxone, Catalytic Ozonation

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Importance of Hormones Monitoring and their Removal in Conventional Wastewater Treatment Systems: a review study

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Abstract

Micro pollutants have become one of the most important environmental concerns around the world. These natural and synthetic compounds have been called Endocrine Disrupting Chemicals (EDCs) due to their interference with the normal function of the endocrine system in humans and animals. They include natural and synthetic hormones and their metabolites, surfactant, insecticide, as well as some pharmaceuticals and health care products. Because of these compounds' effects, importance of their monitoring in Iran is perceived like other countries. This paper was carried out on the basis of studies accomplished from 2000 to 2017 and also the ones published in databases such as Google Scholar, Elsevier, Scopus, Science direct, Magiran, and SID. The keywords used in this study included hormone removal, micro pollutant removal, removal hormones from wastewater, sex hormones removal, steroidal hormones, hormone removal from wastewater, and removal efficiency of micro pollutants. Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) statement was used for selecting articles. Sexual reproduction of fish exposed to estrogenic compounds was changed. Phytoestrogens exist on a certain strain of clover that caused severe infertility in sheep grazing on them. Some studies have reported that a decrease in men's sperm and women's breast cancer are caused by exposure to estrogenic compounds. According to the current study, further studies are needed to determine the entry routes of steroid hormones into aquatic environment, the detection techniques and measurements, as well as the best removal method in Iran.

Keywords: EDCs, Gonadal Steroid Hormones, Wastewater Treatment

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Innovations and Advances on Septic Tanks Systems: A Systematic Review of Experimental Studies

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Abstract

Clean water and sanitation as one of the Sustainable Development Goals (SDGs) refers to the ensure availability and the sustainable management of water and sanitation for all humans. Accordingly, improvement of water quality has been targeted by to reduce pollution and the proportion of untreated wastewater by 2030. The conventional septic tanks (CSTs) have not an effective performance due to the released many emerging pollutants into domestic sewage. This study aims to survey the studies that have been conducted to improve the effectiveness and performance of CSTs. We conducted PRISMA protocol to find the latest modifications of septic tank systems in the previous studies that indexed in (ISI, SCOPUS, PubMed and ISC) in Persian or English language during 2007-2017. Inclusion criteria were studies that had been conducted on domestic wastewater and pilot scale. Exclusion criteria were review and theoretical article, books and pre-treatment wastewater. We found that innovation septic tanks systems have been derived from major changes in the hydraulic flow regime, application of granular growth platforms and sludge recirculation in the conventional systems. The results showed that the average of the removal efficiency of BOD, COD and TSS in the conventional septic tanks were 45%, 30% and 50 % but also, the average of the removal efficiency of BOD, COD and TSS in the innovation septic tanks were 80%, 78% and 84%, respectively. By modifying all functionality in the CSTs, we can make gains in performance. Innovation septic tanks have high ability to remove the pollutants from domestic wastewater. As a consequence, the use of this new systems must be considered in economic aspects in various communities.

Keywords: Sustainable Development, Wastewater, Sanitation, Septic Tanks

Investigating of Nano Cellulose as Coagulant aid with Polymer Aluminum Chloride (PAC) for Pb and Ni Removal from Industrial Wastewater Effluent

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Abstract

The process of coagulation and flocculation water treatment is a special place. So many studies on the optimal type of coagulant to remove the factors such as heavy metals. Accordingly, this study examines the performance of coagulants poly aluminum chloride (PAC) with nanocellulosic's nickel and lead removal. The process of coagulation and flocculation in water purification has a special place. So much research has been done on the type of optimum coagulant to remove factors such as heavy metals. Accordingly, the present study investigates the efficiency of coagulant (PAC) of poly (aluminum chloride) with nano Cellulose in the removal of nickel and lead.This research was carried out on a laboratory scale using Jar test .The parameters studied included optimum pH, mixing percentage Optimum optimum sedimentation time and optimum lead and nickel doses were used to remove.

Using aluminum and nanocellulose polychloride, increasing the pH value up to 9, the removal rate of nickel and lead increased significantly and In larger amounts, the increase in pH does not have an effect on the removal efficiency, and the best mixing ratio Aluminum polychloride and coagulant aid for nanocellulose To remove nickel and lead from contaminated wastewater from these metals, the ratio of 50 mg / l PAC to 5 mg / L nanocellulose was obtained. It was also determined that using nanocellulose The amount of coagulant decreases, and the removal efficiency is higher. If coagulant is used with nano, the removal of metals is possible at a higher rate, that is, in the absence of coagulant conditions, the highest efficiency at a concentration of 5 mg / l of metal However, under the conditions of using nanocellulose, the amount of uptake of up to 10 mg / l of metal has increased. Finally, it was found that the coagulation time had no significant effect on the removal efficiency of nickel and lead at a time greater than 30 minutes.

So this compound coagulant(Nanocellulose), in lowest dose and consequently chemical cost decrease , was selected as suitable coagulant in Pb and Ni removal of industrial Waste water effluent.

Keywords: Nanocellulosic, heavy metals, poly aluminum chloride, Industerial Waste water

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Investigating the Concentrations of Minerals in Urban Water Supply Resources and Rural Water Distribution Networks in Amol, Iran. 2016

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Abstract

Although water is a source of life, any additional of minerals in water, which is in conflict with the standards, lead to problems for the consumers. In this Cross-sectional study, in 2016 in Amol, Mazandaran Province, 23 samples of urban active water supplies and 14 samples of rural water distribution networks were taken . According to the standard method, sampling was carried out and the samples were analyzed by Polarographic method at the water&wastewater lab of UMSHA for measuring concentration of Hg, As, Cd, Pb, Cr, Zn, Mn & Cu and finally data were analyzed by using Excel and spss software using quantitative descriptive statistics and the results were compared with national standards, EPA and WHO. Analysis of results of 23 samples in urban showed the Maximum concentration of Hg(0.59) ,Cd(0.62), Pb(4.51), Cr(7.45) , Zn(125.43), Mn(125.83), Cu(51.02)ppb. Just in one sample, the As concentration was 3.65 ppb. In addition among 14 samples of rural, the results showed the maximum concentration of Hg(0.79),Cd(0.611), Pb(9.89), Cr(3.41), Zn (3957.09), Mn(24.5), Cu(31.74). The results showed that although in all 37 samples of water, the concentration of all 8 substances was lower than the national & international standards, the concentration of Pb in four rural samples was close to MCL and in a rural sample, Zn was higher than Maximum desirable value. In urban water sample Mn concentration was less than MCL and slightly higher than the maximum desirable. Therefore to ensure water quality (as well as 2 urban wells that are inactive during sampling) annually monitoring and analyzing of water is recommended.

Key words: Minerals, Drinking water, Amol. Mazandaran.

Investigating the Factors Affecting Natural Organic Matter in the Water Transfer Line from Droodzan Dam to the Distribution System of Drinking Water in Shiraz. Spring 2017

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Abstract

Natural Organic Matter (NOM) is defined as a mixture of complex organic compounds that are widely present in natural waters. These compounds, in addition to producing effects such as color, odor, filters clogging and increased chlorine intake are also considered as the main precursors for the production of trihalomethanes. This study has investigated the amount of natural organic matter in samples were taken from 10 points in the water transfer route from Doroodzan dam, after treatment in Koh Sabz treatment plant and delivery point to the drinking water distribution network at shiraz in spring, meanwhile these compounds was measured by Spectrophotometer (DR5000). Natural organic matter had a high amount at the point of enter to the system, but after entering the treatment plant and passed through the paths, the values are reduced nevertheless only in the pressure reducing reservoir organic matter are increased dramatically. The amount of organic matter is heavily influenced by chlorine so that increasing the amount of these compounds at the points after the pressure reducing reservoir (due to lack of chlorination in the reservoir followed by the growth of organic matter augmentation factors such as algae) and reducing the amount of these compounds in other points that was Chlorinated by chlorine, has shown the high chlorine effect on these substances. Increasing the length of the route and, consequently, increasing the retention time had impacted on the reduction of NOM. regarding to the lack of pH changes at different points, this factor did not have much effect on the amounts of organic matter.

Key words: natural organic matter, water transfer line, Trihalomethanes, UV_{254}

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Investigating the Performance of Cyclic Activated Sludge Integrated with Rotating Bed Bioreactor for Enhanced Anoxic Biodegradation of Phenol in Wastewater

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Abstract

Phenolic compounds are commonly detected in industrial wastewaters from industries such as petrochemicals, pharmaceutical, textiles, and paints which are threatening the environment. In the present study a novel Cyclic activated sludge integrated with rotating bed (CASIR) bioreactor was developed for phenol oxidation in synthetic wastewater. The effects of phenol loading rate, mixed liquor suspended solids (MLSS) concentration, media filling ratio, hydraulic retention time (HRT), and salinity were investigated for phenol degradation and COD removal. For investigating the above-mentioned parameters, the bioreactor was operated for 410 days and residual phenol, nitrate, and COD were measured daily. Variation of dehydrogenase activity of suspended biomass and attached film was also monitored within the bioreactor operation. Almost 90% biodegradation of 800 mg/L phenol and 78% COD removal was reached at an HRT value of 24 h. Addition of media to the bioreactor to form active attached biofilm led to the increase of tolerance of bioreactor on organic loading shocks. It was found that increasing the salinity of wastewater did not affect the performance of the bioreactor. However, there was a slight reduction in removal efficiencies and dehydrogenase activity of biomass and biofilm at higher NaCl concentrations. Investigating dehydrogenase activity proved that attached biofilm is more responsible in phenol degradation compared with suspended biomass. A mixture of bacteria capable of phenol biodegradation including *Pseudomonas resinovorans*, *Stenotrophomona smaltophila* and *Bacillus cereus* were identified in the bioreactor. Accordingly, cyclic activated sludge integrated with rotating bed is an efficient and promising process for anoxic biodegradation of phenolic compounds and COD from wastewater.

Keywords: Cyclic activated sludge, Dehydrogenase activity, Phenol, Salinity

Investigating the Removal of COD and TKN by the Process of Anaerobic Co- digestion of Mashhad's landfill leachate and Cow Dung

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Abstract

waste leachate contains hazardous organic compounds as wel as nitrogen compounds; the treatment of these pollutants in the environment, is a global problem. These pollutants, through the penetration of groundwater, cause serious environmental problems. Therefore, leachate treatment is essential with suitable and appropriate methods. Anaerobic digestion is one of the most cost-effective methods of contaminated wastewater treatment. In this study, we aimed to evaluate the efficiency of an anaerobic digester in simultaneous removal of chemical oxygen demand (COD) and TKN from landfill leachate During the process of anaerobic co-digestion landfill leachate and fresh cow dung. In this study, landfill leachate of Mashhad and manure was mixing in 3/1, 1/1 and 1/3 ratios, this Mixtures were exposed to the same conditions and environment temperature, under anaerobic digestion. COD and TKN were measured at the beginning and the end of the process. In the control sample, COD was decreased about 5% and the reduction of TKN was 9.09% while in the mixes of 3/1, 1/1, and 1/3 Ratio, COD reduction was about 65%, 75%, 70% respectively, and TKN Respectively decreased 33.26, 82.16, 84.73% in the 3/1, 1/1 and 1/3 Ratio. The results of this study indicated that the method is an efficient and economical method for removing COD and TKN of waste leachate because it's not only considered as an affordable environmentally with decreasing disposal risks of waste leachate in environment, it will also generate economic benefits from methane production.

Keywords: Waste leachate, landfill, anaerobic digestion, TKN, COD

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Investigation and Evaluation of Fluoride Volume of Groundwater Resources in Larestan City Using Geographic Information System in 2015

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Abstract

Fluoride is one of the essential elements for living organisms. Groundwater is one of the sources of this micro nutrient. High levels of fluoride have a significant negative effect on human health. This study aimed to investigate and evaluate the amount of fluoride in underground water resources of Larestan city and was carried out using the GIS in 2015. In this descriptive cross-sectional study, fluoride concentration of 41 underground water sources in Larestan in 2015 was received and analyzed by SPSS software version 20 and compared to standards of the World Health Organization (WHO) and the Iranian National Standard. In addition the local variations in fluoride concentrations in the Larestan city water resources were specified using the use of the geographic information system software.The mean concentration of fluoride in the studied sources was 1.67 mg / L, and the maximum and minimum fluoride concentrations were 3.58 and 0.3 mg / L, respectively. In general, fluoride concentration was higher than the limit in 21 underground water sources (51.22%), and in 18 sources (43.9%), the fluoride concentration was allowed in the range and only in 2 sources (4.88%), the fluoride concentration were below the permitted range. According to the zoning map, in the western part of the city, the fluoride content in the most of resources was within the permitted range. According to the findings of this study, fluoride levels are not permitted in most groundwater resources and there is a serious concern regarding the concentration of fluoride in drinking water and consequently in general health.

Keywords: Fluoride level, Groundwater resources, Larestan, GIS

Investigation Efficiency of Almond Green Hull Fe_3O_4 Magnetic Nanoparticle in Removal of Hexavalent Chromium from Aqueous Solution

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Abstract

In recent years, concerns about long-term effects of heavy metals as environmental pollutants have been increased. The hexavalent chromium is one of the heavy metals that is toxic and soluble in water. This study is conducted to remove of hexavalent chromium from aqueous solution by Almond green hull Fe_3O_4 Magnetic Nanoparticle. The adsorbent was prepared in laboratory scale. The effect of pH (2, 4, 6, 8, 10, 12), adsorbent dose (0.1 to 0.8 g/l), contact time (5 to 60 min), temperature (10-50 C°) and initial Cr (VI) concentrations (10- 100 mg/L) were studied in this research. The results of adsorption equilibrium were analyzed according to Langmuir and Freundlich isotherm models. The residual Concentration of Hexavalent Chromium was determined by spectrophotometer (UV/VisibleSP-3000 Plus-Japan) at 540 nm based on standard methods examination for water and wastewater. Results showed that the removal efficiency enhanced with increasing the contact time and temperature. Also the results indicated that due to the limited site on adsorbent surface, the removal efficiency was decreased as initial Cr(VI) concentration increased. Under optimal conditions (Cr concentration: 20 mg/L, time: 60 min, pH=2, adsorbent dose: 0.8 g/L), the efficiency of the removal of Hexavalent chromium reached around 98%. Also when the adsorbent dose was increased, the removal efficiency enhanced in the case of the adsorbent as well. Also Adsorption of Cr(VI) was according to pseudo-second-order kinetic and with relation to coefficient equal to 0.99 that was fitted with Langmuir adsorption model. As a general result of this study, it can be concluded that Almond green hull Fe_3O_4 Magnetic Nanoparticle is able to remove Cr(VI) from aqueous solutions; thus, they can be used as efficient and economical substitutes for existing adsorbents like activated carbon, for the removal of chromium from polluted aqueous solutions.

Keywords: Hexavalent chromium, Magnetic Nanoparticle, Almond green hull, Removal, Kinetic.

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Investigation of Adsorption Performance of Activated Carbon Prepared from Waste Tires for Azo Dye Removal from Aqueous Solutions

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Abstract

The waste tires pose considerable risk to public health and environment and along with fire hazards, they provide good living conditions for mosquitoes, insects, rats etc. Moreover, storage of waste tires requires large amount of space and disposal of these tires is a costly affair. In other hand, dyes are extensively used in textile, paper, printing etc. industries and are one of the major hazardous chemical constituents of the effluents discharged from these industries. These colored effluents are not only obstacle light permeation and may disturb the aquatic ecosystem but also exhibit toxicity towards living organisms. In this study, tire activated carbon (TAC), obtained by the pyrolysis of waste tire to 800 ˚C for 3 hours, is used for the removal of azo dye from aqueous solutions. The morphology and the elemental analysis of the waste tire activated carbon, have been analyzed using SEM and EDX. The SEM results present that TAC texture is quite porous and homogeneous. The analysis EDX clearly shows that TAC is consists of Carbon, Oxygen, Hydrogen, Nitrogen and Sulphur, out of which Carbon is the most dominant element. The results show that at ambient temperature, the maximum adsorption of azo dye onto tire activated carbon took place in the pH 3-5, 4g of adsorbent and the contact time 60 min. Kinetic studies indicated that the adsorption process follow pseudo-second-order kinetic model, indicating a chemical adsorption. The adsorption isotherms were also investigated and Langmuir isotherm have been found suitable for the adsorption of azo dye overtire activated carbon. It was concluded of results that the produced TAC as an adsorbent offer a novel compound for the removing of organic dye from aqueous solutions because of the advantage of their producibility from a cheap source, high adsorption capacity and fast uptake feasibility.

Keywords: Tire activated carbon, Removal, Azo, Isotherm, Kinetic

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Investigation of Biodegradation of Acetaminophen in Contaminated Water Using Fixed Bed Up-Flow Bioreactor

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Abstract

Nowadays, access to safe drinking water is essential to protect human health. With industrial development and population growth, the emerging chemical contaminants including pharmaceutical compounds have entered natural water resources, which their treatment seems to be very important. Hence, in this study, removal of acetaminophen is investigated by using enzymatic biodegradation in a fixed-bed up-flow bioreactor (UFBR). This study was conducted in laboratory scale using synthetic wastewater containing acetaminophen. The UFBR was designed, constructed and operated. Experimental steps including acclimation and enrichment of acetaminophen degrading bacteria were carried out. The effects of operational parameters including concentration of H_2O_2 (0-16 mM) on fixed-bed UFBR efficiency were examined. During the experiments, concentration of acetaminophen was measured by using HPLC. Likewise, the pH value was controlled and set about 7 during the entire process. Acclimation and enrichment phases were conducted during 76 days. The optimal dose of hydrogen peroxide was 14 mM per 100 mg/L of acetaminophen. Using UFBR, complete removal of acetaminophen in various studied concentrations was obtained. Based on the obtained results, it was revealed that the enzymatic biodegradation in a UFBR is a convenient and efficient method for the removal of acetaminophen from the contaminated water.

Keywords: Pharmaceutical compounds, acetaminophen, enzymatic biodegradation, *In-situ* enzyme production, fixed-bed up-flow bioreactor

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Investigation of Functionalized Uio-66 Efficiency with NH_2-Group in Fluoride Adsorption from Aqueous Solutions

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Abstract

Metal-organic frameworks are emerging category of adsorbents that can be used to remove the environmental pollutants. The aim of this study was to evaluate the efficacy of functionalized Uio-66 with amine group in the fluoride adsorption from aqueous solutions. To design the experiments design of experiment software was used. The Central Composite Design model (CCD) was selected for analysis of adsorption data. The main variables were contact time, pH, initial concentration, adsorbent dosage, and annoying anions. Based on BET, the special surface area of the Uio-66-NH_2 was 675 m^2/g. According of FESEM, The average of diameter of Uio-66-NH_2 crystals was 170 ± 15^{nm}. The study findings showed that these adsorbents in a neutral pH could better adsorb fluoride. Under optimum conditions, fluoride adsorption was reported more than 88%. According to CCD, pH variable was the most influential factor in fluoride adsorption. With functionalization of Uio-66, the adsorption capacity of 20% can be increased. Based on EDX analysis, the amount of nitrogen added to the compound was 10%. The results showed that the Uio-66 was aminated for 2.5 mmol per gram. Ultimately, fluoride adsorption capacity increased from 31 to 41.5 mg per gram of absorbent. The best descriptive model for the obtained data was a pseudo-second-order model and Langmuir model for kinetics and isotherms, respectively. The use of these adsorbents in the future can be considered more seriously in the removal of the environmental pollutants.

Keywords: Adsorption, Amine group, Environmental pollutants, Fluoride, Uio-66

Investigation of Induced Biodegradation of Atrazine in Contaminated Water Using Peroxidase Enzyme in Sequencing Batch Reactor

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Abstract

s-triazine is a class of herbicides which includes atrazine, simazine, ametryn, and prometryn. Atrazine is one of the most commonly used s-triazine herbicide. Atrazine is amongst the most persistent pollutants in water resources that is toxic for various living microorganisms. The aim of this study was investigation of atrazine removal using hydrogen peroxide-activated peroxidase enzyme. Atrazine samples were synthetically prepared. Experiments were carried out in 1000 mL sequencing batch reactor (SBR). Initial experimental phases including acclimation and enrichment of atrazine degrading bacteria were conducted. The effects of initial concentration of atrazine (25 - 100 mg/L) were studied. During the experiments, concentration of atrazine was measured using HPLC. Likewise, the pH value was controlled and set about 7 during the entire process.In this study, acclimation period was 45 days and complete removal of atrazine in all tested concentrations was obtained. Based on the obtained results, atrazine degradation using peroxidase enzyme in presence of hydrogen peroxide is a novel and efficient enzymatic method for degradation of this pollutant in aquatic environments.

Keywords: Atrazine, Peroxidase enzyme, Biodegradation, Sequencing batch reactor (SBR).

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Investigation of Moving Bed Biofilm Reactor (MBBR) Performance in Removal Nitrogen Compounds from Municipal Wastewater

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Abstract

Recently, Moving-Bed Biological Reactors have been used progressively for municipal and industrial wastewaters treatment. Sewage is one of the factors causing environmental pollution. Eutrophication phenomenon is one of the negative effects of discharging of sewage into accepting water bodies. Therefore, sewage should be collected and treated in outside the city prior to discharge to the natural water cycle. So, the aim of this study was to remove nitrogen compounds from municipal wastewater using Moving-Bed Biofilm Reactor. This experimental study was carried out on a pilot scale with continuous hydraulic flow. In this study, Kaldnes K3 acne was used as a bed. This acne for three percent filling of 40%, 50%, and 60%, and three time periods of 4, 8 and 12 hours, removal of BOD, COD, comparison of the total nitrogen removal efficiency and hydraulic residence time were investigated in total nitrogen removal with the input organic loading of 300 mg/l. The results showed that under optimal conditions in organic load (BOD_5) 250 mg/l and in the three-hour hydraulic system of 4, 8 and 12 hours, the maximum of removal efficiency was 90.48%, 81.84%, and 59.92%, respectively. Also, optimal load conditions (COD) of 300 mg/l, the maximum of removal efficiency was 91.95%, 95.34% and 93.34%, respectively. At the time of different hydraulic, removal efficiency of COD and COD residuals of the reactor at the inlet organic loading of 300 mg/l to the MBBR system in 40% filling, the removal efficiency was 84.5%, 86.6% and 86.4%, respectively. In 50% filling, in the amounts of 39.92, 31.93 and 35.79 mg/l, the removal efficiency was 83.2%, 84.3% and 84.3%, respectively. At the time of different hydraulic, the removal efficiency of TN and TN residuals of the reactor outlet in the organic loading input of 300 mg/l to the MBBR system in 40% filling in the amounts of 26.7, 6.33 and 6.35 mg/l, total nitrogen outputs were 81.9%, 83.4% and 84.1%, respectively, in 50% filling in the values of 6.5, 5.97 and 6.29 mg/l, respectively, of the total removal efficiency of the nitrogen 84.8%, 85.1% and 84.3%, respectively, and in 60% filling in the amounts of 48.5, 4.95 and 5.27 mg/l outlet organic loading the removal efficiency was 86.8%, 6 / 87% and 86.8%, respectively. According to the results obtained in this study, and the significant removal of COD and TN, The Moving-Bed Biofilm Rector, With Kaldness K3 bed, can be used to remove organic compounds.

Keywords: Bed Biofilm Reactor, Nitrogen Compounds, Municipal Wastewater

Investigation of Nitrate Concentration in Drinking Water of Various Regions in Shiraz City, Iran

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Abstract

Background and Objective: Nowadays, increasing concentrations of nitrite and nitrate compounds in natural waters, especially groundwater resources in large cities, have raised concerns. The aim of this study was to determine the concentration of nitrate in drinking water in different areas of Shiraz and compare it with the WHO standard. Methods: This descriptive cross-sectional study was conducted to determine the concentration of nitrate in drinking water of Shiraz. In this study, 30 points were randomly selected from different regions of Shiraz, and after 3 samplings (total 90 samples); they were tested by the spectrophotometer. Results: The finding indicated that the mean and standard deviation of drinking water nitrate (NO_3) are 18.7 and 16 mg/L respectively and a maximum of 70 mg/L NO_3 and at least 1.5 mg/L. The concentration of nitrate in the Fazilat region during the months of December and January was 50.2 and 70 mg/L NO_3, respectively, and in Sa'di region, 69.6 and 60.6 mg/L NO_3, respectively. Conclusion: Nitrate concentration in some of the samples was more than the WHO and Iran standard for nitrate that is 50 mg/l NO_3. According to our studies, the southern regions of Shiraz have the higher nitrate concentration, which indicates an inappropriate wastewater collection system in these areas.

Keywords: Shiraz, Drinking Water, Nitrate.

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Investigation of nitrate concentration in drinking water wells of Yazd-Ardakan aquifer in 1395

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Abstract

Groundwater is the main source of drinking water in most cities and villages in Iran and their pollution has important effects on human health, industry, agriculture and environment. Nitrate as one of the most common groundwater pollutant threatens public health in Iran. This pollutant enter to underground water from various sources such as fertilizers, pesticides, household and industrial wastewater and landfills. Therefore, the purpose of this study is Investigation of nitrate concentration in drinking water wells in Yazd-Ardakan aquifer in 1395 and its zoning. In order to determine the concentration of nitrate ions, 127 drinking water wells in Yazd-Ardakan aquifer were selected and the concentration of nitrate in samples was determined using the Hach-DR5000 spectrophotometer. Then, zoning of nitration concentration in the Yazd-Ardakan aquifer was obtained in Arc GIS-v10.2 software using Kriging method. In addition, dispersion map of polluting sources as well as land use zoning of Yazd-Ardakan Aquifer was obtained for assessment of nitrate sources. The chemical analysis results show that nitrate concentrations in the southern part of aquifer are more than acceptable quality limit, so that of 127 studied wells, 14 wells have nitrates with a concentration exceeding the standard set by ministry of energy (45 ppm). The highest concentration of nitrate was 88 ppm, in the Mehriz city and the lowest concentration was 3.12 ppm in the vicinity of Ardakan city. Among the studied wells, most of drinking water wells in the city of Mehris are more than standard limit of nitrate concentration and thus, this part of aquifer is contaminated and non-drinkable. The main reasons for pollution of aquifer are in the Mehriz city are nonconformity of drinking wellhead protection area, the type of soil surrounding the wells, high groundwater level, placing drinking water wells within range of the city and in the vicinity of agricultural lands. In addition, the concentration of nitrate in the aquifer in the Yazd city is higher than natural so indicate that it has anthropogenic sources, which can be due to the existence of numerous industries, proximity to the Yazd landfill and also agricultural lands.

Keywords: Nitrate, Aquifer, Zoning, Yazd-Ardakan, GIS

Investigation of Paraben Compounds Removal in Urban Wastewater Treatment Plants: A Review Study

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Abstract

Parabens are esters of para-hydroxybenzoic acid, with an alkyl (methyl, ethyl, propyl, butyl, heptyl or benzyl group), that are commonly used as antimicrobial preservatives in household products, cosmetics, and food processing, and unfortunately, recent studies have revealed their estrogenic activity and carcinogenic potential. In this study, Electronic databases including Web of Science, Ovid, PubMed, Systematic Review, SID, Iran Medex, Scirus, Google Scholar, and Medline were searched using parabens and their metabolites types, removal, review, occurrence, fate and behavior in aqueous, sludge, biosolid, water and wastewater processes as keywords. Articles published with emphasis on survey of parabens in sludge and wastewater treatment from 1985 to 2017 were investigated. A total of 126 studies was found from which 82 were selected that were mainly about fate and behavior of parabens in water & wastewater environments. Several studies have demonstrated that most of parent parabens and their metabolites in aqueous phase were relatively effective removed during conventional sewage treatments in WWTPs, with the average removal rate ranged from 80% to 93% and 28% to 76%, respectively. In the limited studies, some parabens were found in sewage sludge samples at relatively high levels, indicating that some parabens may be removed by sorption and transported to sludge during sewage treatment. However, parabens or their metabolites have been frequently detected in the effluents of wastewater as well as in other aquatic media at nano grams to micrograms per liter. This review can provide an overview for the fate of Parabens in wastewater.

Keywords: Parabens, wastewater, preservatives, p-hydroxybenzoic acid

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Investigation of Parasitic Contamination of Sewage Sludges in the Wastewater Treatment Plant of *Gorgan city*, Northern Iran

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Abstract

One of important potential source of parasitic diseases are waste sludge. This study investigated parasites in sewage sludge of wastewater treatment plant in *Gorgan City*, Iran. This descriptive-analytical study wascarried out on 18 sewage sludge samples collected from wastewater treatment plant of Gorgan within 6 months with three repeatitions per month. Analysis of parasites was done using Bailenger method of counting parasites in chamber of McMaster slides with volume of 0.3 ml. The results showed that majority of parasite eggs in the sewage sludge was related to nematodes. The dominant nematode eggs detected were related to *Ancylostomaduodenale*, *Necatoramericanus* and *Enterobiousvermicolaris*. However, no parasite was found in dried sewage sludge. Considering the amount of parasite eggs in the returned sludge, it is necessary to modify the treatment process. However, it is permissible to use dried sewage sludge as agricultural fertilizer.

Keywords: Parasite eggs, Protozoa, Sewage sludge, Iran

Investigation of Physical, Chemical and Microbial Quality of Water Output from Water Purification Devices in Rural Areas of Larestan in 1395

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Abstract

Due to the increasing population and water shortages as well as the decreasing water quality, available resources and increasing soluble soluble salts and changes in physical, chemical and microbial characteristics have caused a lot of geopolitical and human problems, and technology is expected to meet the needs of this The field will overcome. One of the solutions to deal with the problem of fresh water scarcity is the saline water purification process by sweetening the water or desalination system. In areas of the country where the quality of available drinking water is not suitable, people tend to use reverse osmosis membrane methods. In this paper, the physical, chemical and microbial quality of the supplied water (output) has been studied by these purification devices. The research method was a descriptive cross-sectional study carried out during 6 months of autumn and winter of the year 95 through the sampling of water inlet and outlet from 20 water treatment plants in rural areas of Larestan. A total of 160 samples (80 inlet water samples) and 80 samples of water output were harvested. Samples were tested under standard conditions. Total hardness parameters, electrical conductivity, total soluble solids, turbidity, temperature, PH, fluorine, nitrate, nitrite, Sulfate and microbial parameters were investigated. Then the results and data analysis were analyzed using Excell software. The findings show that in over 95% of the water samples refined by reverse osmosis machines in a row of light water, some samples of microbial harvested before the desalinating devices show contamination. However, no microbial contamination has been detected since all microbial samples have been collected. Chemical samples harvested before the devices have a very high level of solubility, including electrical conductivity, hardness, etc., but after refrigeration, hardness, electrical conductivity, and so on. The results of this study show that the qualitative and physical-microbiological parameters of the output of RO process in rural areas of Larestan province have been determined according to national and international standards. This process has a high potential for the provision of safe drinking water, The water output of the machine with the reverse osmosis process, the most of the quality parameters examined compared to the input water, was reduced by about 99% and the output values were standard.

Keywords: Water Quality - Larestany - Desalinating Water - Reverse Osmosis

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Investigation of the Chemical Quality of the Water Entering and Exiting the Motility Dialysis Apparatus and Comparing it With (AAMI and EPH Standard)

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Abstract

Importance of the subject: One of the common diseases in the country is renal failure, which leads to an undesirable kidney function in detoxification of the blood. Dysfunction of the kidney leads to a decrease in the excretion of properties of substances by the kidneys and the production of lethal substances called uremia. To eliminate the need for dialysis, the water used may have different qualities. In this regard, the chemical quality of the water entering and exiting the martyr Madani dialysis apparatus was investigated.

Materials and Methods: A cross-sectional descriptive study was conducted on the water entering the dialysis machine (effluent treatment plant) of ShahidMadani Hospital using the physiological and chemical laboratory instructions for drinking water analysis of analyzed catalysts and anions of dialysis (3, 4) and fluoride by SpADNS method Opizen 2120+ spectrophotometer was used Results: The results of calculating the caution in the water entering the dialysate of ShaheedMadani Hospital were respectively potassium, sodium, magnesium, calcium, electrical conductivity and pH of 27.5 ± 27.5 and 27.35 and 0/35 respectively And fluoride, chloride, nitrate, nitrite and bicarbonate anions are 42/13 Conclusion: Hemodialysis is a vital process that currently has a large number of patients under treatment in Iran. According to the results and analysis, the results are less than standard values and water is of good quality. Therefore, a total of 23400 liters of liquid will be required throughout the year. For this reason, the net use of water in dialysis is of great importance.

Keywords: Quality, Chemical, Water, Dialysis Device, Martyr Madani

Investigation of the Efficiency of Sequential Batch Reactor Using by Aerobic Method for Reduction of Organic Matter in Methyl tertiary-butyl ether (MTBE) Unit

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Abstract

Methyl tertiary-butyl ether (MTBE) is a petrochemical product. MTBE production processes result in pollution of water resources such as the sea if no proper treatment is done; it causes environmental pollution and adverse effects on living organisms. The purpose of this study was to investigate the biological degradation of MTBE unit effluent by SBR method. In this study, a continuously reactor was used in a cylindrical with a capacity of 6.1 L. Feeding and discharge of the reactor was controlled by a pump. The reactor was equipped with an intake substrate injection tube, wastewater outlet, air outlet, one liter balloon to absorb MTBE escape, tube and milk sampling, an aquarium pump and an evacuation valve. The experiments showed that the microbial mixer was able to decompose a high concentration of methanol up to 250 mg / L and MTBE concentration up to 70 mg/L in a 24-hour cycle. However microbial mixer was not able to decompose the MTBE concentrations higher than 70 mg/L. The microbial mixture can break down the Organic Matter up to concentration of 1350 mg/L (as COD) that included in MTBE unit effluent. MTBE unit effluent in aerobic conditions including methanol and MTBE is biodegradable using the SBR reactor.

Key words: MTBE, Sequential Batch Reactor, oxygen demand, biological mass.

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Investigation of the Phosphorous Removal of Municipal Wastewater Using Chemical Precipitation Process in Ahvaz Wastewater Treatment Plant, Iran

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Abstract

Phosphate removal such as orthophosphate, from municipal wastewater has become an environmental necessity, since the excessive phosphate ion content in municipal wastewater causes water eutrophication. According to environmental protection organization of iran, maximum permissible concentration of residual phosphorus in treated municipal wastewater is $1^{mg}/_{l}$ P. Almost all the phosphorus in natural water and wastewater is in the case phosphate. Phosphorus compounds in wastewater, after of hydrolysis and biodegradation, change to solution orthophosphates. In this research, with compound of poly Aluminium chloride and Bentonite clay as nature coagulant aid and with low chemical cost, bentonite effect in improving poly Aluminium chloride in municipal wastewater treatment has been investigated.

The research is abench scale experimental type. Samples were collected from influent wastewater to primary and effluent of secondary clarifier and then effect of pH and dose of coagulant investigated on orthophosphate removal efficiency. The result show optimal conditions of compound of poly Aluminium chloride and Bentonite for removal of orthophosphate , COD , BOD and TSS in pH= 7 and optimal dose $15.55^{mg}/_{l}$ poly aluminium chloride and $5.55^{mg}/_{l}$ bentonite in influent wastewater to primary clarifier has been obtained respectively 71.83 , 46.1 , 48.9 and 63.5%. Due to in optimal condition, orthophosphate concentration was reached to $1^{mg}/_{l}$. So this compound coagulant, in lowest dose and consequently decreasing chemical cost, was selected as suitable coagulant in orthophosphate removal of effluent of treatment plant.

Keywords: Eutrophication, Orthophosphate Removal, Chemical Precipitation Process, Wastewater Advanced Treatment, Ahvaz West Wastewater Treatment Plant

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Investigation of Three Dimensional Electro Fenton to Removal Acid Orange 10 Dye from the Synthetic Wastewater

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Abstract

Dyes have widely used in industries and they discharged to environment as wastewater. Acid Orange 10 dye is an Azo dye. This dyes have adverse impact on humans and microorganism's However, the removal of this dyes have become environmentally important. Electro Fenton process are a practical way to remove of this dyes. The study aimed to investigate three dimensional of electro Fenton to removal Acid Orange 10 dye from the synthetic wastewater.This study was carried out in laboratory scale with a 100 mg/l initial dye concentration and a volume of 250 ml. This process consists of three-part stainless steel, graphite felt and GAC as anode, cathode, and three particle, respectively. The effect of various parameters such as pH, ferrous ion, current and reaction time has been investigated on remove of dye. The results indicated that the removal efficiency increased by decreasing pH, also with increasing current, time and ferrous ion. The optimum pH, ferrous ion were determined to be 3, 1.6 mM/l respectively. The maximum efficiency at optimum condition was 99.53 % after 60 min. According to the results and high removal efficiency of acid orange 10, the 3D electro Fenton process can be an effective way of removing dye due to compatibility with the environment and economically.

Keywords: Three dimensional electro Fenton, Acid orange 10, GAC, Effluent

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Investigation the Photocatalytic Removal of Cr (VI) Using ZnO Supported on Natural Zeolite Under UV Light Irradiation: A Laboratory Study

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Abstract

Due to high toxicity and non-biodegradability, Hexavalent chromium regarded as extremely serious threat, especially for the human health. In the present study the performance of ZnO/clinoptilolite nanocomposite for Cr (VI) removal was investigated. ZnO/clinoptilolite nanocomposite was successfully synthesized by impregnation method. Various techniques were applied for the nanocomposite characterization, including XRD, FESEM, BET and TEM. Also, effects of diverse key operating parameters such as: reaction time, pH value, initial Cr (VI) concentration and nanocomposite dosage on the removal rate were studied. The XRD pattern confirmed that nanocomposite were properly formed and had a crystalline structure. TEM and FESEM images illustrated a good distribution of ZnO onto zeolite surface in nanometric size. The specific surface area of nanocomposite was estimated to be88.45 (m^2/g) which was greater than ZnO (16 m^2/g) alone. The results demonstrated, the high rate of removal reached 99.3% at the initial Cr (VI) concentration of 5 mg^{-1}, pH of 3and reaction time of 80 min. According to the results, ZnO/clinoptilolite nanocomposite can be used as a convenient photocatalyst to reduce the level of Cr (VI) from the aqueous solution in contaminated resources.

Keywords: Hexavalent chromium, Nanocomposite, Natural zeolite, Zinc oxide

Isolation and Identification of Atrazine Degrading Aerobic Bacteria in Biofilter

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Abstract

Atrazine is a component of S-triazine. Its characteristics make it a pollutant of ecosystems and aquatic environments. Biological processes are of interest because they are cost effective, reliable, and environmentally beneficial. Biofilter reactors are of interest since they can treate wastewater containing biorecalcitrant, inhibitory, and toxic compounds. Identification of the most effective microorganism is necessary for determination of optimum conditions and improvement of operation. The objective of this study was to identify atrazine degrader aerobe bacteria in the submerged aerated biofilter. So, a biofiler was fed with synthetic wastewater containing atrazine at different operational conditions to assess biodegradation of atrazine by a microbial consortium for removal from aquatic environments. One liter of activated sludge was provided from domestic wastewater treatment as a seed of microbe, which was then inoculated with the designed biofilter. Samples were collected after biofilm formation on the solid biofilm carriers and achieved the steady-state condition. Samples were collected by sterile glass container, cultured on enrichment biochemical media, and identified by numerous differential tests. The biochemical methods used for microbial isolation were from Bergey's manual. The variety of bacteria over other microorganisms means that they played a more prominent role in biodegradation. According to the results of differentiated tests and their comparison with Bergey's manual of systematic and determinative bacteriology, the isolates were *Pseudomonas fluoresens* and *Pseudomonas aeruginosa* reported as atrazine degrading bacteria in the previous studies. But *Acinetobacter* was found effective on atrazine biodegradation that was not reported in earlier studied. Atrazine is biodegraded in aerobic condition since all the dominant bacteria are aerobes.

Keywords: Atrazine, Atrazine degrader bacteries, Biodegradation, Biofilter.

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Isotherm and Adsorption Kinetics Study of B-5 Blue Dye from Aquatic Solution Using Absorbent Nano Composite Chitosan Graphene Oxide (CGO)

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Abstract

The dyes are the most important pollutants of textile wastewater containing toxic organic compounds with complex structures that their main problem is that they are non-biodegradable using modern and efficient adsorbent structure can be overcome In this study attempted to synthesize graphene oxide doped with zinc oxide absorbent chitosan nano-structure (GCO) and as adsorbents for the removal of blue B-5 from water solutions were used and it was studied the kinetics of adsorption isotherm In this experimental study in laboratory scale, which was the first step to the synthesis and characterization of absorbent. absorbent CGO nano composite synthesis using specialized tests XRD, FTIR, SEM, EDX was determined and then removed blue B-5 dye experiments was in Batch system.The effects of the initial dye concentration (20, 40, 60 mg / L), contact time (15, 30. 45 min), PH (4, 7 and 9) and adsorbent dosage (0.1 and 0.25 g / L) were studied. Furthermore in order to determine the amount of residual color was used spectrophotometer at a wavelength 600 nm. The results of the characterization tests, confirming the structure CGO synthesis and absorption process took 45 minutes to reach equilibrium. The adsorbent dosage 0.25 gr / L in 30 minutes and the paint pH 4 with concentration 20 mg / L is removed by 96%. Langmuir isotherm, the adsorption process is well described that the R^2 it was 0.99. CGO can be high-efficiency environmental pollutants such as dyes from textile wastewater entering the environment in a short time reduce or destroy.

Keywords: Blue 5-B dye, chitosan graphene oxide, nano-copmosite

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Kinetic Studies on the Removal of Phenol by MBBR from Saline

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Abstract

Phenols are chemical compounds which are included in the high priority of pollutants by Environmental Protection Agency (USEPA). In order to conduct an extensive investigation, several kinetic models for phenol degradation have been evaluated. Kinetic parameters were calculated according to Monod model, Modified Stover- Kincannon model, Hamoda and Haldane models. The effect of initial phenol concentration on the biodegradation rate was studied. The initial concentrations of phenol varied from 0 to 500 mg/l. The value of K_i in saline phenolic wastewater in attached growth system was higher than suspended growth systems that represented a higher phenol inhibition in suspended growth systems. It is observed that the best model fitting the present study are Hamoda model and the Modified Stover-Kincannon model which have highest R^2 value of 0.991 and 1, respectively. This research aimed to study the coefficient kinetic parameters of phenol removal from saline wastewater by MBBR reactor.

Keywords: Saline wastewater, Phenol, MBBR, Kinetic model

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Kinetics and Equilibrium Studies for the Removal of Nickel from Aqueous Solutions by Ion Exchange Resin

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Abstract

Nickel can be considered as a raw material for corrosion-resistant alloys and brass, and for galvanizing steel and iron products. In the present study, AMBERLITE IRN150 resin was used for the removal of Ni(II) from aqueous solution. The main objective of this study was to investigate the equilibrium and kinetic parameters of these ion-exchange resin. Equilibrium and kinetic studies were conducted for the removal of Nickel ion from aqueous solutions in the concentration range 5–50 mg/l at pH 4.5 and dose resin range 0.1-2 mg/g using a cation exchange resin.The equilibrium data have been analyzed using Langmuir, Freundlich ,Temkin and Dubinin–Radushkevich isotherms.The kinetics of sorption of Nickel ion onto AMBERLITE IRN150 was studied by using pseudo-first- and second-order equations and the intraparticle diffusion model equation. AMBERLITE IRN150 shows a remarkable increase in sorption capacity for Ni(II). The Batch ion-exchange process was relatively fast, and it reached equilibrium after about 60 min of contact. The maximum removal of Ni(II) in the pH 4.5 for an Ni(II) concentration of 38 mg/l. The amount of the ion exchange was obtained by using the plots of the Freundlich adsorption isotherm and also was demonstrated to provide the best correlation for the sorption of nickel ion onto AMBERLITE IRN150(R2>%97.7). It was observed that the maximum ion-exchange capacity of 31.57 mg of Ni(II) /g for AMBERLITE IRN150.The ion exchange of Ni(II) on these cation-exchange resin followed second-order reversible kinetic.The recovery or desorption of Ni(II) from a solution containing 38 mg/l Ni(II) by batch process was maximum 88%. up to the 3rd cycle and decreases to 71% in the 4th cycle of regeneration. For a given Ni(II) bearing wastewater, it is possible to design a batch treatment system to remove Ni(II) ion at any pH within the range of 4–5. A batch contractor requires about 60 min contact time to achieve 90% removal from aqueous solution. As a result, AMBERLITE IRN150 resin can be used for reversible uptake of Ni(II) and successfully applied to water and industrial wastewater samples.

Keywords: nickel, Kinetic, isotherm , ion exchange resin

Measurement of Diazinon and Malathion Pesticides Residues in Drinking Water Supplier Surface Water and Groundwater Sources in Kermanshah

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Abstract

Contamination of water resources by pesticides is a major environmental dilemma that threatens public health. The aim of this study was to determine Diazinon and Malathion residues in surface water and groundwater resources in Kermanshah province in 2016. In this cross-sectional study, 50 water supply stations in five geographical area of Kermanshah Province (North, South, East, West, and Center) were selected to determine the concentration of remaining Diazinon and Malathion pesticide. Pesticides were measured using liquid phase extraction by Gas Chromatography/Mass Spectroscopy (GC/ MS). The results were analyzed by SPSS software. Diazinon and Malathion pesticides residues were not found in any of the springs and Qanat sources. Most Residual concentrations of Diazinon and Malathion pesticides, were respectively 1.45±0.2 and 1.01±0.012. The highest and lowest concentrations of total Organophosphate pesticides residues respectively were detected in well source of Central Station and the Upstream source of North Station. Total residual concentration of malathion pesticide in well were below the maximum concentration allowed in the European Union standards. Considering that the total concentrations of Organophosphate pesticides in studied wells exceeds the maximum permissible level of the European Union standards, lack of restrictions on the pesticides usage, lack of regular monitoring on this important water source and lack of Preventive measures, can lead to a serious health threat for water consumers in Kermanshah province.

Keywords: Pesticides, Diazinon and Malathion, surface water, groundwater

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Mercury and Cadmium Concentrations in Sources of Drinking water and Networks in Sari, Iran.2016

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Abstract

Water in addition to the essential minerals for humans, sometimes causes acute and chronic toxic effects to humans due to contamination of materials such as Cd, Hg. This cross-sectional study was done in 2016 in Srai, Mazandaran Province, 32 samples of urban &7 samples of rural water were taken. According to the standard method, sampling was carried out and the samples were analyzed by Polaro graphic method at the water & wastewater lab of UMSHA for Hg & Cd and the data were analyzed using Excel and spss software were analyzed using quantitative descriptive statistics and the results were compared with national standards, EPA and WHO. The results of analysis of 32 samples of urban drinking water showed that the Max concentrate on of Hg (1.32) and Cd (0.37) was in ppb. In 7 samples of rural water, Cd (0.64) was in ppb. No amount of Hg was found according to the detection limit of the measurement method for 18 samples of urban water and in all samples of rural water. At sampling time in Sari, two wells were not investigated due to low water flow due to the pump engine problem. Results from 39 samples showed that Hg and Cd concentrations in all samples were lower than the WHO, 1053 national Iran and EPA standards. By comparing the results of water sampling in 2016 and considering 3 wells supplying water in the city of Sari, which according to officials of the abfar at the time of system sampling, water supply has to be monitored and analyzed in order to ensure the quality of water, especially rural water, annually in order to ensure that, in the event of any contamination.

Keywords: Hg. Cd, Drinking water, Sari, Mazandaran

Microbial and Chemical Quality of Ballast Water in Commercial Ships Entering the Bushehr Port

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Abstract

Approximately 90% of the world's commodities are transferred by international maritime industry transports. One of inadvertent subsequences of this trade is transportation and delivery of organisms and chemical pollutants from one location to another. This transfer is done via ballast water, which is carried by vessels to control draft, stability, and trim. The aim of this study was to survey microbial and chemical quality of ballast water in commercial ships entering the Bushehr port. Ballast water samples were taken from commercial ships entering Bushehr port from different ports around the world. To determine water quality in terms of the numbers of total and fecal coliform bacteria, pseudomonas, and HPC, the standard methods were used. E. coli bacteria were tested by PCR and E.coli O157: H7 strains were tested by PCR and antisera methods. The fluoride concentration was determined by standard methods, while total organic carbon (TOC) and salinity parameters were determined by Shimadzu, TOC v-csh, Japan and Salt meter ES-421, respectively. PH was also measured by a pH meter (Metrohm, Switzerland). EC and TDS parameters were measured using a portable multi parameter (Portable YK- 2001CT). Heavy metals were also obtained through a graphite furnace absorption spectrometer (AAS) method (Varian, Spectr AA 240, Australia). Based on the results, total coliform, fecal coliform, Pseudomonas, and HPC bacteria ranged from 0-500, 0-17, 4-900 MPN/100ml, and 3100-8930 CFU/ml, respectively. Four samples contained E. coli and all samples were negative for E. coli O157:H7. Furthermore, EC, pH, TDS, and F- ranged from 5690-21760 µS/cm, 7.3-8.44, 3790-14510 mg/l, and 1.19-2.82 mg/l, respectively. Furthermore, the concentration level of salinity ranged from 33.2 to 44.98 ppt. The concentration levels of heavy metals including: Co, As, Pb, Cd, Cr, and Ni ranged from 1.49-12.3, 0.11-1.84, 1.68-7.24, 0-8.45, 1.13-6.33, and 11.27-84.5 µg/L, respectively. Due to the economic and ecological severe damage that may arise from transferring contaminants and organisms by ballast water, management of ballast water is necessary for minimize the emissions' risk of these contaminants and organisms.

Keywords: Ballast water, Bushehr, Commercial ships, Microbial and chemical quality

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Modeling of Combined Ultrasonic/Ozonation process in Removal of Ciprofloxacin Antibiotic from Aqueous Solutions using Artificial Neural Network Methodology

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Abstract

The mean use of antibiotics in the word is about 9% while this is about 11% in Iran. 10% of these compounds will change in our body but 90% of that will persist unchanged. Ciprofloxacin has fluorine in its structure that made it more persist to decomposition in the body or in the environment. The artificial neural network (ANN) models were used to decrease cost and time of processes especially in the optimization of laboratory tests in environmental monitoring. There was no study on the investigation of ANN performance on antibiotic removal from aqueous solutions. In this study, the modeling of ciprofloxacin antibiotic removal using ozonation and ultrasound with the artificial neural network was investigated. The input variables were considered to be the concentration of antibiotic (5-25 mg/l), pH (3-10), time (5-60 min), and power (100-300 Win ultrasound process) and the output variable was removal percent of the antibiotic. The optimum response in both processes conducted as a combined process. Data are divided into two categories: training, validation. The data was used in validation and training analysis was randomized. There were 20 runs in ozonation process and 30 runs in ultrasound process, 13 of which were used for training in ozonation and 22 runs for training in ultrasound process and the other datas applicated for validation. Three-layer perceptron network with Levenberg-Marquardt (LM) algorithm is used for training. The results showed that the artificial neural network model with 10 neurons in the hidden layer had the highest correlation with laboratory data (Ozonation: R^2 = 0.998, ultrasound: R^2 = 0.978). Absolute Main Square Error (AARE) in ozonation (AARE=0.005) was less than ultrasound bath (AARE=0.059). The other studies like heavy metals assessment in aqueous solutions also showed very well correlation between laboratory data and artificial neural network model. Therefore, artificial neural network modeling is a strong tool in the prediction of these processes that can reduce the time of these processes and hence the cost of the project.

Keywords: Antibiotic, Ultrasound, Ozonation, Artificial Neural Network.

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Modeling of Simultaneous Removal of Dye and Metal Ion by Sawdust from Aqueous Solution Using Artificial Neural Network (ANN)

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Abstract

The current work deals with the investigation of simultaneous of Basic Red46 (BR46) and Cu (dye and heavy metal) removal efficiency from aqueous solution through adsorption process using a laboratory scale reactor. In this research, a feed-forward artificial neural network (ANN) has been utilized to the prediction of adsorption potential of sawdust in simultaneous removal of a cationic dye and heavy metal ions from aqueous solution. Five Operational variables, concluding initial dye, initial Cu (II), pH, contact time, and adsorbent dosage were selected to investigate their effects on the adsorption study. The application of ANN model for experiments was employed to optimize, create and develop prediction models for dye and Cu (II) adsorption by using sawdust of Melia Azedarach wood. The model and its parameters variation were determined based on the Marquardt–Levenberg learning algorithm and the log sigmoid transfer function (log sig) at hidden layer and a linear transfer function. Analysis based on MSE, RMSE, ARE, AARE, AND R^2 were applied to the evaluated performance of the system. According to this result, in training dataset determination coefficient were obtained 0.99 and 0.98 for dye and metal ion, respectively. There is a good agreement between the simulation results and the experimental data (actual data). The result reveals that artificial neural network model as a promising predicting technique would be effectively used for simulation of dye and metal ion adsorption.

Keywords: Artificial Neural Networks (ANN), Adsorption, Sawdus

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Modification of Red Mud by Acid Treatment and its Application for Process Optimization of Ciprofloxacin Removal from Aqueous Solutions using Central Composite Design

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Abstract

The ciprofloxacin is a fluoroquinolone antibiotic that has been found in soils and aqueous solution due to its vast use in both, human and veterinary health care. Antibiotic residues in the environment have been causing serious problems. Therefore, it seems necessary to remove it from the environment.The aim of this study was conducted to optimize ciprofloxacin removal from aqueous solutions using central composite design in the presence of activated red mud. This research was Experimental-Laboratorial study. Red mud was activated by mixing 20 mL nitric acid and 10 g red mud toward 24 h, then was dry in 150 ^{0}C for 4 h. The effect of process variables including pH of solution, reaction time, dosage ofred mud and initial concentration of ciprofloxacin was studied in connection with removal efficiency. Response surface methodology was used to optimize the process. The residual concentration of ciprofloxacin in samples was determined by spectrophotometer at a wavelength of 271 nm. According to results of the software, optimum condition for the removal of ciprofloxacin was found in pH of 4.75, initial concentration of antibiotics of 8.75 mg/L, adsorbent dose of 8.24 g/L and contact time of 11.75 min. In this condition, removal efficiency was 64%. The results of present work shows that red mud can be used as an effective and cheap adsorbent with fast equilibrium time and high efficiency for wastewater treatment.

Key words: Ciprofloxacin, Aqueous Solutions, Optimization, red mud

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Modeling of a Biofilter for Acetaminophen Removal from Synthetic Wastewater

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Abstract

With increase of population and promotion of community health, use of pharmaceutical compounds, such as acetaminophen has increased. Due to its chemical structure, polarity, activity level, and environmental sustainability, this nonsteroidal anti-inflammatory drug (NSAID) have led to contamination of various ecosystems. Biological methods can mineralize and use acetaminophen as carbon and energy source because they have an enzymatic system. Moreover, biofilters have greatly reduced the treatment costs by their treatment mechanism. The present study aimed to model the aerated biofilter in acetaminophen removal from the aquatic environment at different operation conditions. Experiments were designed and statistical analysis were conducted by design expert (DOE) software. After accumulation and biofilm formation on the solid biofilm carriers, the biofilter was operated based on designed laboratory conditions with two independent numerical variables. Results showed that the maximum efficiency removal of biofilter for the target pollutant was 47.3%. In order to obtain the bioprocess kinetic coefficients, first order, second order (Grau), and modified Stover–Kincannon models were employed. Results of modeling indicated that Stover-Kincannon model has desirable fitness ($R^2 > 0.92$) in loading acetaminophen in this biofilter.

Keywords: Acetaminophen, Biofilter, Modeling, Wastewater

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Nano Fiber Kitin Cellulose as Absorbent for Cd and Cr Removal from Industrial Wastewater and Determination of Kinitics and Isoterm

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Abstract

One of the main environmental pollutants is heavy metals in the industrial effluent that are among the first important group of toxic pollutants due to their polluting intensity. The heavy metals are decomposable and gather in the human body through food chain. Chromium and cadmium are among the heavy metals found in industrial effluent including metal processing, electroplating industries, textile, alloy industry, and composting. This study aimed to use the Nano kitin as a low-cost absorbent to remove chromium and cadmium pollutant from industrial wastewater.The process of chromium and cadmium removal by Nano kitin was studied in terms of PH variation, contact time, absorbent dosage, and cadmium initial concentration.The synthetic wastewater sample including chromium was prepared by adding Petasium Di Chromat to distilled water and concentrations (5, 10, 15, 20, 25 mg/l). Cadmium was also prepared by adding Chloride Cadmium to distilled water and concentrations of 5, 10, 15, 20, and 25 mg/l) were reached. The study results showed that in optimum condition, the removal of cadmium from aqueous solution with concentration of about 25mg/l and 60 min of contact time was about 99% and chromium in this condition was about 96/3%. The experimental data of absorption equilibrium were analyzed according to absorption kinetics models and isotherms absorption Freundlich and Langmiur.The results of experiments determined that the steel Nano Fiber kitin can be used as an effective and low-cost method in removing chromium and cadmium from industrial wastewater.

Key words: kitin ,Cr, Cadmium, Adsorption, Kinetic model, Isotherm model

Nitrogen Doped on ZnO-TiO_2 Composite and Their Performances to Removal Amoxicillin in Aquestic Solution

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Abstract

Amoxicillin is the most common antibiotic used in medicine and veterinary medicine leading to loss of algae photosynthesis mechanism. Conventional wastewater treatment units cannot remove any of pharmaceuticals to μgL⁻and ngL⁻ levels, hence the need for modern methods. The aim of the present work was to study the decomposition of amoxicillin by nano-photocatalytic ZnO-TiO2 in the presence of UVC radiation. This work was a laboratory-experimental study. Characterization of nanoparticles was determined through TEM pattern. The samples with definite concentration of amoxicillin and nanopartical in different operational conditions were exposed to UVC radiation, individually. Amoxicillin concentration was measured using HPLC. The results showed that with increasing reaction time, the removal of amoxicillin increased but by increasing the dose of nanoparticles and concentration the removal rate decreased. The highest removal efficiency rate was 95%. The combination of catalysts is a new method for the removal of amoxicillin. The results showed that the photocatalytic nano-ZnO-TiO2 had a positive effect on amoxicillin degradation.

Keywords: Amoxicillin, Photocatalysts, ZnO-TiO2, Composite, Nanoparticle, Doping.

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Parasites in the Outlet Sludge of Industrial Wastewater Treatment Plant: a case-study in Babolsar, 2015

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Abstract

Discharge of sewage sludge on the lands can improve soil's condition due to its nutrients, but for the presence of microorganisms, parasites can particularly cause a variety of diseases for humans and animals. The aim of this study was to identify parasites in the waste sludge of industrial sewage (case-study in Babolsar city) and compare them with the EPA standards. Sampling was conducted from a sludge sewage treatment plant in one of the industrial towns of Babolsar. Sampling was done from 4 sludge depot during the six months. Nine samples of sludge were taken from depots. McMaster slide was used to identify parasites according to Bailenger methods. The results of this study showed that the average number of helminth eggs in pallets 1, 2, 3, and 4 were 4.4, 17.5, 7.6, and 7.3 per 4 grams dried sludge, respectively. The greatest number of helminth eggs, was associated with Toxocara and Hymenolepis diminuta. The survey showed that the helminth eggs of the sludge are higher than the EPA standards. Since the sludge is industrial, the possibility of parasitic infection caused by people is low; on the other hand, the number of Hymenolepis diminuta and Toxocara is high. As a result, the possibility of secondary pollution due to movement of animals is high.

Keywords: Sludge, Helminth egg, Protozoa, EPA standard, Babolsar

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Performance Evaluation of AOPS (Hydrogen Peroxide and Sodium Persulfate) in Municipal Wastewater Sludge Treatment Contaminated with PAHS

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Abstract

PAHs constitute a large class of highly toxic compounds that formed and released into the environment from various sources. This study aimed to assess the treatability of PAHs from municipal and industrial wastewater sludge using advanced chemical oxidation based on free sulfate radicals by using activation methods with hydrogen peroxide and heat. Various parameters such as pH (3, 5, 7, 9 and 10), the concentration of persulfate (2, 5, 10, 15 and 20 mmol), the ratio of peroxide to persulfate (0.1, 0.2, 0.3 0.5 and 1), sludge temperature (25, 35, 45, 55 °C) and initial concentration of PAHs compounds in the reaction times of 20 days, were considered in a 1-liter Plexiglass flask as a reactor. Samples were extracted using Soxhlet method, and to quantify and qualify PAHs compounds GC-MS machine was used. For determination of actual performance of process in removal of intermediate compounds from oxidation of PAHs, COD test was conducted. The results showed that AOPs can effectively lead to the removal of PAHs compounds in the sludge. Minimum and maximum efficiency was obtained in pH 7 and 11 respectively. However, Changes in persulfate concentration were affected removal efficiency of PAHs from sewage sludge by using AOPs, and after 20 days, minimum and maximum removal were obtained 19.61 and 72.26%, by using pH=11, laboratory temperature in concentrations 2 and 20 mmol/l, respectively. However, the ratio of peroxide to persulfate and the reaction temperature were effective on system performance and removal efficiency, so that peroxide ratio equal 0.3 and reaction temperature equal 45 °C in the best condition about 75 and 87.5% have had removal efficiency, respectively. Optimal condition for PAHs removal by using AOPs process was: pH = 11, persulfate concentration = 15 mmol/l, ratio of peroxide/persulfate = 0.3 and temperature = 45 °C. Finally, it can be concluded that the AOPs is suitable for removal of PAHs from sewage and industrial sludges that can be used as pre or post-treatment in wastewater treatment plants.

Keywords: Sewage sludge, Advanced oxidation, persulfate, PAHs

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Performance Evaluation of Electro-Fenton method for the Removal of Phenol from Aqueous Solutions

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Abstract

Phenol or hydroxybenzene is one of the toxic aromatic hydrocarbons. This combination enters to the environment by disposal of industries effluent. In this study, the removal of phenol by application of iron electrodes and Electro-Fenton process was studied. This experimental study carried out in electrochemical discontinuous reactor and laboratory scale that was equipped with 4 electrodes and a direct current source. In this study, the effect of operating parameters such as primary pH, initial current density, initial phenol concentration and initial concentration of hydrogen peroxide on the phenol removal efficiency were measured. The results showed that the efficiency of Electro-Fenton process is 99.93% in pH 3, initial phenol concentration 100 mg/L, initial concentration of hydrogen peroxide 0.4 mmol/L, current density 0.07 A/dm^2 and time 45 min. Also by increasing initial concentration of hydrogen peroxide from 0.4 to 0.8 mmol/L the removal efficiency decreased to 85%. The findings of this study showed that using of Electro-Fenton process to remove phenol as one of the toxic aromatic hydrocarbons is appropriate.

Keywords: Electro-Fenton, Removal, Phenol

Performance Evaluation of Extended Aeration Process in Wastewater Treatment Contaminated with Cadmium Heavy Metal in Pilot Scale

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Abstract

Nowadays, increasing in industrial and municipal wastewater pollution with toxic metal ions is an environmental challenge. The purpose of this study was to assess the extended aeration process efficiency for cadmium removal. This experimental research investigated the effect of initial concentration of cadmium (3, 5 and 9 mg/l), hydraulic retention time (2, 4, 6 and 8 h), and inlet BOD_5 (100, 150 and 200 mg/l) variation for cadmium removal in extended aeration. The results of this study showed that cadmium removal efficiency was equal to 3 and 5 mg/l, hydraulic retention time was 8 h, and inlet BOD_5 200 mg/l was approximately 96 %. The study showed that the use of extended aeration reactor has high efficiencies for cadmium removal.

Keywords: Extended aeration, Cadmium, Hydraulic retention time, Organic loading

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Performance Evaluation of Point-Of-Use (POU) Drinking Water Treatment Systems in Removal of Heavy Metals and Dissolved Solids from Drinking Water Supply in Tabriz

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Abstract

Globally, application of point-of-use (POU) drinking water treatment units is expanding due to the increasing concern about the adverse health effects of water pollution. The main treatment units of these devices are mostly activated carbon and Nano-filter or reverse osmosis. This study was carried out to evaluate performance effect of the POU units on physical and chemical characteristics of water supply by citizens in Tabriz. The results were then compared with national drinking water standards. A total number of 60 samples were taken from 30 devices and analyzed for physical and chemical parameters especially for heavy metals. According to the findings, the physical and chemical parameters of the treated water were in acceptable level. Concentration of Pb was significantly higher in the systems' input and output. Whereas drinking water has irrelevant role in providing the body mineral requirements, users of these devices should be made aware of the reduced intake of minerals by drinking water. Considering the efficiency of household POU drinking water treatment systems in reducing heavy metals that have health effects on humans, adequate supervision should be provided on the supply of standard and suitable products in the market.

Keywords: point-of-use, Reverse osmosis, Household, Heavy metals, Drinking water supply

Performance of Activated Persulfate by Electrochemical Method with Copper-Copper Electrodes for Removal of Aniline from Aqueous Environments

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Abstract

The use of advanced oxidation processes (AOPs), due to having high performance in degradation of organic compounds is growing. Combined use of electrical current and sulfate free radical creates a synergy effect on removal of pollutant. The aim of this study was to evaluate the performance of activated persulfate by the electrochemical method with copper - copper electrodes for removal of aniline from aqueous. In this experimental study, a batch electrochemical reactor with a useful volume of 250 mL and two copper electrodes with 2×10×50 mm area from the DC source to aniline degradation were used. The influence of parameters such as pH, Voltage (with amper), initial concentration of persulfate, initial concentration of aniline were investigated. In addition, Kinetics of process were investigated. Aniline concentrations were determined by spectrophotometer.The experimental results indicated that the removal of aniline was influenced by different operational parameters. The highest removal rate was obtained at pH =4, V=11.23v, concentration of anions persulfate was 750 mg per liter, initial concentration of aniline was 60 mg/lit in optimum reaction time (25 minute), and 89.94% of aniline removed. It was also found that with an increase of nitrogen gas, efficiency increased and aeration reduced efficiently. The results indicated that the mentioned process in optimal conditions can be used for removal of organic pollutants as well as an alternative technology for treatment of various industrial wastewater contained aniline. This process can be an environmental friendly alternative to conventional treatment units that are not effective in removing these pollutants.

Keywords: Persulfate, Electrochemical, Copper electrodes, Aniline, Aqueous solution.

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Performance of co-application of electrocoagulation and chemical coagulation processes for removal of fluoride from synthetic wastewater; experimental and cost evaluation

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Abstract

Excessive standard concentrations of fluoride in drinking water have some health problems for consumers. Therefore, different methods have been used to remove them. The present study examines the effect of co-application of electrocoagulation with aluminum electrode on reducing fluoride by adding the alum coagulant. This study has been experimentally conducted in a batch system and on a laboratory scale on 138 samples of synthetic wastewater containing fluoride with concentrations of 5, 12/5, and 20 mg / L and the effect of parameters such as run time ,single alum dose, single electric current intensity, and co-application of coagulation-electrocoagulation has been studied. Results showed that in the optimum condition (pH = 6, run time: 15 min), the average percentage of fluoride removal by coagulation process for different initial concentrations was 86/63% and per mg fluoride removal cost was 3800×10^{-6} \$.The average removal percentage of electrocoagulation process was 86/70% and its removal cost per mg was 5×10^{-6}\$. The average percentage of fluoride removal by co-process of coagulation-electrocoagulation was 91/33% and its removal cost per mg was 313×10^{-6} \$. Although the co-application of coagulation-electrocoagulation process with alum has improved the removal performance of fluoride by an average of 4%, it hasn't any advantage economically compared to single electrocoagulation .But it's very high cost effective compared to single coagulation.

Key Words: Fluorides, Electrocoagulation, Coagulation

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Persulfate-Based Advanced Oxidation process Efficiency ($UV/Na_2S_2O_8$) to Remove Metronidazole from Aqueous Solutions

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Abstract

Antibiotics are extensively used to treat illnesses. Metronidazole is an antibiotic of the nitroimidazole's family, which is widely used for the treatment of infectious diseases caused by bacteria and protozoa. This compound characterized by irrefrangible, high solubility in water, toxic, carcinogenic and mutagenic. Advanced oxidation process is an effective method for removal metronidazole from aqueous solutions. The aim of this study was to evaluate the efficacy of advanced oxidation process based on persulfate (UV / $Na_2S_2O_8$) to remove metronidazole from aqueous solutions. Materials and Methods: In this research the effects of variables such as pH, persulfate concentration and contact time were studied by a UV-C lamps with 16 watts of power. In addition, the remaining concentration of metronidazole was measured by UV-Vis spectrophotometer Cecil model CE7400. In this study pH=9, persulfate concentration of 0/7 mmol/l and contact time of 30 minutes were obtained as the optimum conditions. The results showed that the removal of metronidazole by advanced oxidation process based on persulfate (UV / Na2S2O8) follows the first-order kinetic model. Results of this study showed that advanced oxidation process based on persulfate (UV / Na2S2O8) is an effective method for the removal of metronidazole from aqueous solution and it is recommended to be used for the purification of aqueous solutions as an effective and efficient process.

Keywords: Metronidazole, persulfate, UV, aqueous solutions.

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Photocatalytic Efficiency of UV/ZnO in Removal of Gentamicin from Aqueous Solution

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Abstract

The production of sewage and effluent containing pharmaceutical compounds, such as antibiotics, and the entry of these compounds into nature is one of the major environmental threats. Gentamicin is an antibiotic belonging to the aminoglycoside family that is widely used in the treatment of infections caused by gram-negative bacteria due to inhibition of bacterial protein synthesis. The entry of these compounds into the aquatic environment has raised many concerns, particularly in the development of resistant organisms and ecosystem changes. Today, modern nanotechnology-based approaches are employed to overcome such problems. The present study was conducted to investigate the efficiency of UV/ZnO photocatalytic process in removing antibiotic gentamicin from aqueous solution.The present study examined the effects of parameters, including initial gentamicin concentration (20, 60 and 100mg/L), zinc oxide concentration (0, 200, 350 and 500mg/L), contact time (10, 30, 60 and 120 min), pH (5, 6 and 7) and type of radiation (sun and UV-C). The sample size and the number of test procedures were determined to be 576 taking into account the levels of effective variables and through the full factorial. All experiments were carried out in a double-compartment reactor at laboratory temperature using a magnetic stirrer at 150 rpm. Final antibiotic concentration and consequently removal efficiencies were measured using a DR5000 spectrophotometer. Data analysis and charting were done through Design Expert 8 and Excel 2010 software. Laboratory analysis showed that the maximum removal efficiency of gentamicin (92.69%) under UV-C was obtained at pH of 5, contact time of 30 min, ZnO concentration of 200mg/L and initial gentamicin concentration of 20mg/L. In addition, the maximum removal efficiency of gentamicin (84.32%) under sunlight occurred at pH of 6, contact time of 60 min, ZnO concentration of 200mg/L and initial gentamicin concentration of 20 mg/L. The results obtained from this study demonstrated that the photocatalytic UV/ZnO process exposed to UV-C or natural sunlight could be an effective process for removing antibiotic gentamicin from the aqueous solution.

Keywords: Gentamicin, Zinc Oxide nanoparticle, Advanced Oxidation Process, Semiconductor Photocatalysis

Photocatalytic Degradation of Diazinon Using Titanium Dioxide Doped with Iron from the Aqueous Solution

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Abstract

Diazinon is one of organophosphate pesticides which it is classified as a relatively dangerous substance (Class II by World Health Organization). The aim of this study was to determine the efficiency of photocatalytic degradation of diazinon using titanium dioxide (TiO2) nanoparticles doped with iron in the presence of ultraviolet light in aqueous solution. This cross-sectional study was conducted at the laboratory scale in a 2 L reactor. The nanoparticles were synthesized by sol-gel method. The degradation of diazinon was evaluated in various amounts of pH, time, nanoparticles dosage, and the concentration of diazinon. The obtained results were analyzed using Excel2007 and SPSS V.16 software and regression test**.** The results showed that the increasing pH, reducing the concentration of diazinon and increasing contact time can lead to increase the removal efficiency. The optimum pH was obtained to be in neutral range and at the pH=7. In addition, the optimum amount for contact time, nanoparticle dosage and diazinon concentration was found to be 60 min, 100mg/L and 50mg/L, respectively. The maximum removal efficiency was 98.58%. Photo catalytic processes have high capacity in removing of diazinon and can effectively mineralized this compound. Furthermore, the TiO2 nanoparticles are not toxic and they can be used to remove the pollutants in various industries. Thus, doped nanoparticles due to the small amount of nano-materials, low energy consumption and high efficiency can be used as a good alternative to the removal of diazinon

Keywords*:* Diazinon, Photocatalytic Degradation, Doping, Tio_2

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Photocatalytic Reduction of Cr (Vi) from Synthetic, Real Drinking Waters and Electroplating Wastewater by Synthesized Amino-Functionalized Fe3o4-Wo3 Nanoparticles by Visible Light

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Abstract

Environmental contamination through heavy metal ions is becoming a serious worldwide challenge because of toxicity, high mobility, non-degradability and bioaccumulation nature of these ions. Therefore Hexavalent chromium was reduced from synthetic, real drinking waters and real electroplating wastewater by using Fe_3O_4-WO_3-3 aminopropyltriethoxysilane nanoparticles, in the presence of visible light. Fe_3O_4-WO_3-APTES nanoparticles were synthesized via a facile co-precipitation method. The photocatalyst was characterized by XRD, FT-IR, SEM, EDX, VSM, UV-Vis and pH_{pzc} techniques. The effects of some operational parameters such as solution pH, nanocatalyst dosage, initial Cr(VI) concentration, H_2O_2 concentration, purging of different gases and type of organic compounds on the removal efficiency were studied by the Fe_3O_4-WO_3-APTES nanoparticles. FT-IR and SEM techniques proved the effective presence of amino group. Under the optimum conditions: pH= 2, $[Cr(VI)]_0$= 10 $mg.L^{-1}$, citric Acid= 10 $mg.L^{-1}$, nanocatalyst dosage= 6 $g.L^{-1}$, 99.96% Cr(VI) was removed after 300 min. Based on the kinetic models used in this study, it was found that the removal rate followed the first order kinetic model. E_{EO} value for the LED/Fe_3O_4-WO_3-APTES (72 $kWh.m^{-3}$) process revealed that this process not only increased the removal efficiency, but also decreased the cost of electrical energy consumed. Approximately 82.96% of Cr (VI) in a real water sample was removed after 1440 min under the optimal circumstances. Also, full treatment of electroplating wastewater can be reached after 2880 min. Additionally, the photocatalytic activity was maintained even after five successive cycles. Fe_3O_4-WO_3-APTES nanocomposite, in the presence of visible light irradiation, as an effective and environmentally friendly material, can be used for the removal of Cr (VI) metal from aqueous solutions.

Keywords: Cr (VI), Photocatalytic reduction, Synthesis, Fe_3O_4-WO_3-APTES/LED, Treatment.

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Phytoremediation of Petroleum Hydrocarbon in Oil Polluted Water by Chrysopogon Zizanioides (Vetiver grass)

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Abstract

Pollution of water resources by petroleum hydrocarbons is one of the environmental problems. So far no investigation has been carried out on the removal of Total Petroleum Hydrocarbon (TPH) from water by using vetiver grass. The aim of this study was to determine purification of TPH polluted water by using Vetiver grass. Experiments were conducted in the summer, 2015. Three polyethylene containers were connected in series and filled with pebbles and then 12 roots of Vetiver grass were planted in each of them. Another container with the same specifications with no plant was used as control. A 300-liter tank equipped with an electric mixer was used to hold oil contaminated water. Initially, 10 liters of activated sludge of municipal wastewater treatment plant was added to the container to formation biological layer in the pebble bed in containers. TPH polluted water was circulated by separate pumps from case and control containers. Concentration of TPH in water was 200 ppm at the beginning of the experiment and gradually reached to 5000 ppm. After 2 months the plants has grown completely and then circulation was stopped. Then, oil-contaminated water was passed by separate pumps from case and control containers. At each concentration, the hydraulic residence times were changed from 1.25 to 30 hours, and the amount of oil removal was measured. Analysis of TPH in the inlet and outlet water was conducted according to ASTM standard by infrared spectrometry. Bacterial population was estimated in case and control containers by plate count method The removal of TPH at a concentration of 5120 mgL^{-1} was obtained 27.0 and 12.65 % at the hydraulic contact time of 30 and 10 hours respectively. In the same condition, removal of TPH in control containers was only 3.5%. The bacterial population in the case and control containers was 562000 and 178000 CFU/Ml, respectively. pH and Electrical conductivity (EC) of the outlet water in case and control containers both showed decrease compared to the inlet water.The Vetiver plant can be used to treat oil-polluted water.

Keywords: phytoremediation, oil polluted water, vetiver

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Platinum Cytotoxic Drugs in the Municipal Waste Water, Drinking Water; and Health Risk Assessment

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Abstract

Three cancerostatic platinum compounds (CPC) including Cisplatin, Carboplatin and Oxaliplatin are complexes of Pt and classified as probable carcinogenic compounds to humans. This study aimed at performing health risk assessment of Platinum cytotoxic drugs for drinking water by developing a sensitive analytical method in water resource of Qom province in the central part of Iran. Concentrations of platinum drugs were determined including Cisplatin 052±0.2µgL^{-1}, Carboplatin 0.94±0.36µgL^{-1}and 0.27±0.16 µgL^{-1}for Oxaliplatin in influent samples, and 0.24±0.07µgL^{-1} for Cisplatin, 0.28±0.05µgL^{-1}for Carboplatin and 0.11±0.01µgL^{-1}for Oxaliplatin in effluent samples**.** The results about platinum –based compounds concentration in drinking water resources indicated that in the all of the wells water samples related to the groundwater, concentration of platinum-based compounds were lower than the LOQ calculated and the concentration of Cisplatin, Carboplatin and Oxaliplatin across samples in the station of drinking water distribution was < LOD. The obtained MOE is lower than one (MOE<1) for tree groups of children, pregnant women and lactating women related to Cisplatin and Carboplatin determined through exposure to raw and untreated drinking water. It is recommended that further work be conducted in this area particularly environmental fate of metabolites and transformation products.

Keywords: Cisplatin, Carboplatin, Oxaliplatin, Risk Assessment, Qom

Preparation of Bone Char for Fluoride Removal from Water at Definite Conditions by Calcination Methods: Taguchi L8 Orthogonal Array Optimization Mixed Level Design

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Abstract

In this study, the mixed level design experiment and Taguchi orthogonal array design L8 were used to determine the optimal conditions for the production of bone char through calcination methods and ability synthesis bone char in removing fluoride from water. Taguchi's analysis of the signal-to-noise ratio showed that calcifying temperature had a major impact on the preparation of bone charr using a selective process. The optimum temperature for calcifying was 500 ° C. The highest adsorption capacity of the bone char was 10.5 mg / g. The specific surface area and Barrett-Joyner-Halenda bone char were 95 mg / g and 110 mg / g, respectively.

Keywords: Taguchi, Bone char, Mixed level design experiment, Fluoride, Adsorption

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Probabilistic Risk Assessment of Exposure to Nitrate in Drinking Water of Abarkouh, Iran

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Abstract

Several diseases, especially in the infants such as some cancers and blue baby are related to the presence of nitrate in drinking water. The maximum contaminant level (MCL) for nitrate was specified to 50 mg/l by Environmental Protection Agency (EPA) for regulated public water systems. This study aimed to evaluate the concentration of nitrate and its exposure probabilistic risk assessment in drinking water wells of Abarkouh, Iran. The average annual nitrate level in 2016 was studied from 20 wells around Abarkouh; then, health risk assessment (HQ) and sensitivity analysis of effective variables were carried out .Average concentration of nitrate was 27.57± 6.80 mg/l and all measured concentrations were below the maximum standard (50 mg/l) according to the National Standard of Iran (No. 1053). The HQ value for children was more than 1(1.81E0), while it was less than 1for the adults. In calculating of HQ among children population, the most important variable was the concentration of nitrate in drinking water. According to the results, children's health is highly at risk in these areas and some guidelines have been suggested for preventing and controlling nitrate for populations at risk.

Keywords: Water, Nitrates probabilistic risk assessment, Abarkouh

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Remediation of Contaminated Water with Aniline by Persulfate Based Advanced Oxidation Process (UV/SPS/Cu)

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Abstract

Aniline, aromatic amine, is a water soluble, synthetic and toxic organic pollutant which has wide application in producing products such as dyes, herbicides and pesticides. As a result of widespread application and inappropriate treatment, aniline has been ubiquitously detected in water environments. Although many chemical methods have been evaluated to remediate aniline pollution, they have not been widely used as they are not commonly reliable and cost-effective. Therefore, the main aim of this study was evaluation of efficiency of UV/sodium persulfate (SPS)/Cu process in removing aniline from contaminated water . In the present study, the effect of independent variables including aniline concentration (20–150 mg/L), persulfate concentration (0.2-0.9 mMol/L), pH (3-11), copper concentration (0.05-0.15 mMol/L), and reaction time (5-90 min) on the extent of degradation of aniline were studied by Box-Behnken method in the batch reactor with 1 L of operation volume equipped with 16 W UV lamp. The concentration of aniline was measured by high performance liquid chromatography method at the wavelength of 280 nm .With increasing reaction time and reducing aniline initial concentration the efficiency of process increased. In addition, pH equal to 3, persulfate concentration of 0.55 mMol/L, and copper concentration of 0.1 mMol/L were observed as optimum conditions which resulted in more than 99% of aniline removal. The degradation kinetics of process fitted the first order kinetic model. According to the obtained results of present study, UV/SPS/Cu process can be proposed as an efficient and reliable technology for treatment of aniline contaminated water.

Keywords: Aniline, Advanced oxidation, Ultra violet radiations, Persulfate

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Removal of Antibiotic Ciprofloxacin from Aqueous Solutions by Photo-catalytic Degradation and Copper Oxide Nanoparticles

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Abstract

Recently, a lot of studies have been concentrated on the degradation of toxic organic compounds in pharmacy waste water such as ciprofloxacin. The entry of antibiotics and their metabolites in the aquatic solutions concerns many aspects. In this study, we aimed to assess the degradation of ciprofloxacin (CIP), an important class of fluoroquinolone antibiotics, with using CuO nanoparticles photo catalytic process from aqueous solutions. All experiments were undertaken in lab scale and batch reactor, the effects of various parameters such as: pH (3-11), nanoparticle dose (0.01-0.1 g/L), reaction time (15-120 minutes), initial antibiotic concentration (10-200 mg/L) and lamp power (8 watts) were assessed on ciprofloxacin removal efficiency. Antibiotic concentration in output was measured by the spectrophotometer (LUV-100A) at the maximum wave length of 276 nm. Our findings showed that maximum removal of antibiotic efficiency achieved at pH and CuO nanoparticle dose 7 and 0.7 g/lit respectively. In this study, at the optimum reaction time of 60 min, by increasing the concentration of ciprofloxacin the removal efficiency decreased. In this optimal conditions, the removal efficiency was 73%. It can be suggested that CuO nanoparticle photocatalytic process has the potential to remove CIP from aqueous solutions effectively.

Keyword: Antibiotic, Ciprofloxacin, CuO nanoparticle, Photocatalytic degradation

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Removal efficiency of Nickel and Lead from Industrial Wastewater by Using Microbial Desalination Cell

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Abstract

Microbial Desalination Cell (MDC) is a new method of desalination. Its energy is supplied through microbial metabolism of organic materials. In this study, synthetic samples were provided with concentrations of 25, 50, 75, 100 mg/L Ni and Pb. Removal efficiency of each metal was analyzed after 60, 90, 120 min, psychrophilic, mesophilic, thermophilic and 3-4, 4-5, 5-6 mg/L dissolved oxygen. Optimum condition for removing Ni and Pb were achieved in 100 mg/L, 4.5 and 4.6 mg/L dissolved oxygen, respectively, 26°C and 120 min. Nickel and lead were removed from wastewater of Isfahan electroplating industry and steel company. The maximum removal efficiencies of Ni and Pb in real samples were 68.81% and 70.04%. MDC can be considered as a good choice for removing Ni and Pb from industrial wastewater. Due to microorganisms for decomposing organic material in municipal wastewater are available, metals from industrial wastewater can be removed simultaneously.

Keywords: Microbial Desalination Cell, Isfahan Electroplating Wastewater, Isfahan Steel Company Wastewater

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Removal of 2, 4-Dichlorophenol from Aqueous Solution Using Ultrasonic/H_2O_2

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Abstract

The effect of ultrasound/hydrogen peroxide on the removal efficiency of 2,4-dichlorophenol(2,4-DCP) from aqueous solutions was investigated. The effects of solution pH, sonication time and H_2O_2 concentration were examined on process efficiency in2,4-DCP degradation. Ultrasonic treatment at 20 kHz in combination with hydrogen peroxide resulted in increased removal efficiency of 2,4-DCP. The removal efficiency was improved with increasing sonication time, and the maximum efficiency was obtained at pH of 3. According to the obtained results, 74.6% chemical oxygen demand removal was achieved with US/H_2O_2 process after 90 min of reaction time at pH of 3 and H_2O_2 concentration of 0.1 mol/L. The decomposition kinetic data fitted well with the pseudo-first-order kinetic model with a rate constant of 0.025 min.

Keywords: Ultrasonic process, Hydrogen peroxide, 2, 4-dichlorophenol

Removal of Bisphenol A from Aqueous Solutions by Modified-Carbonized Date Pits by ZnO Nano-particles

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Abstract

The adsorption process is a convenient and efficient method for the removal of phenolic compounds. This experimental research investigated the removal of bisphenol A using nano-particles of zinc oxide-modified date pits. Variables examined were initial concentration of bisphenol A, time, pH, and adsorbent concentration. For adsorbing of bisphenol A from aqueous solutions, date pits and date pits modified with nano-particles of zinc oxide were used. Adsorption isotherms and adsorption kinetics were also examined. Both adsorbents were characterized using BET and XRD. Bisphenol A concentrations of samples was determined using UHPLC after the adsorbents were added. Maximum removal efficiency and maximum adsorption capacity of bisphenol A by modified date pits under optimal conditions including of contact time of 120 min, pH 6, concentration of 1.05 mg/L bisphenol A, and an adsorbent amount of 11000 mg/L were 95% and 90.68 mg/g, respectively. The bisphenol A removal efficiency under optimal conditions of wastewater from the campus of Kerman University of Medical Sciences was reported 70%. The adsorption reaction of bisphenol A by date pits followed the Freundlich isotherm and pseudo-second-order models. Modified date pits are a good adsorbent and can be recommended as a coefficient adsorbent for the removal of bisphenol A.

Keywords: Bisphenol A , Date Pit , Nano-particles , Design of experiment

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Removal of Catechol from Aquatic Solution by Using of Adsorption onto Powder Activated Carbon Magnetized with Fe_3O_4 Nanoparticles Response Surface Methodology: Equilibrium and Kinetic Study

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Abstract

The activities of various industries produce a wide range of pollutants and toxic compounds which if discharged into the environment, may have adverse effects on human health and life. Catechol is an example of these compounds that is a cyclic organic compound with high toxicity and resistant to degradation that used in the oil and petrochemical, pharmaceutical and production of pesticides. Therefore, Purpose of This study was removal of catechol Using adsorption Processes with Magnesium powder activated carbon with iron oxide nanoparticles from aqueous solution and Study of isotherm, kinetics and thermodynamics. This study was Basic-Applied. First Magnesium powder activated carbon with iron oxide nanoparticles was synthesized. To determine the characteristics of nanoparticles, tests of XRD and SEM were used. Then effect of parameters such as solution pH (3-11), Contact time (5-90 min), dose of Absorbent (0.3-1.5 gr/L), initial concentration of catechol (20-300 mg/L) and Temperature (25-45 ºC) Based on the Response surface method, Box-Behnken design by Design Expert software were investigated on efficiency of adsorption Processes. The residual concentration of catechol was measured by HPLC at 275 nm. Finally, Freundlich and Langmuir isotherms, absorption kinetics and absorption thermodynamics were studied. The results showed that the synthesized adsorbent has a magnetic property and its surface and physicochemical properties play an important role in absorbing catechol. According to the results, maximum absorption efficiency was obtained at concentration of 20 mg /L, pH 3, contact time 90 minutes, 25 °C and in absorbent dose of 1.5 g/liter. The study of isotherm and kinetics showed that the experimental data of the catechol absorption process correlated to the Langmuir and pseudo-second order models, respectively. Thermodynamic study of the reaction also expresses the Exothermic and Spontaneous process. The results showed that the adsorption Process using Magnesium powder activated carbon with iron oxide nanoparticles in acidic pH have better efficiency. As a result, studied process as an effective, rapid and inexpensive method to removal of catechol from aqueous solutions is proposed that due to the short reaction time is economically affordable.

Keywords: Absorption, Catechol, Magnetic powder activated carbon, Iron oxide nanoparticles, response surface method.

Removal of Cephalexin by Mesopore Sillica Nanoporous Materials using RSM from Aqueous Solution

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Abstract

Too much use of antibiotics and their discharge into the environment lead to adverse effects in the environment. Mesoporous silica such as MCM-41 material is widely used to adsorb contaminants from the aqueous solution. The aim of this study was mesoporous synthesis of MCM-41 and evaluation of its efficiency for removal of cephalexin antibiotic from the aqueous solution. Physical characteristics and structure of synthesized absorbent were analyzed by BET, FTIR, and XRD techniques. The effect of variables such as pH values (11،7،3), dose of MCM-41 (800،500،200 mg/L), initial concentration of cephalexin (100،75،50 mg/L), contact time (90،60،30min), and temperature of process (40،30،20 C) on absorption of cephalexin were studied. In order to achieve the optimal experimental conditions, response surface methodology (RSM) model was used in this study. The results of analyzed data showed that pH, adsorbent dose, initial concentration of cephalexin, contact time, pH, and initial concentration had significant effects on the response variable. Optimum removal condition based on suitable analysis of the variance and model was achieved at reaction time of 90 min, pH= 3, initial concentration of 50 mg/L, and adsorption dose of 600 mg/L. Under these conditions, the removal efficiency of 71.11% was achieved. The results showed that adsorption process with the mesoporous MCM-41 has a high efficiency and can be used for removal of antibiotics from aqueous environments.

Keywords: Cephalexin antibiotic, Adsorption, Mesoporous MCM-41

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Removal of Estrogenic Compounds in Municipal and Hospital Wastewater Treatment Plants in Khozestan

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Abstract

Estrogen is a steroid hormone that enters water sources through urban and hospital waste water and is a serious threat to aquatic organisms, especially fish, and human health. The aim of this study was to evaluate the performance of municipal and hospital waste water treatment, especially biological treatment in removal of estrogenic compounds. Estrogens in aqueous samples were determined by tracking. Fifty six samples were obtained from various locations in Ahwaz municipal wastewater treatment plant and hospital waste water treatment facilities within 8 months. The samples were analyzed using Electrochemiluminescence (ECL). The results were reported in units of ng/L. The average influent and effluent hormone levels in municipal wastewater treatment plant were 58.8 ng/ L and 5.4 ng/L, respectively. In hospital treatment plant the average influent estrogen level was 61.8 ng/L and the average effluent level was 10.8 is ng/L. The results showed that biological treatment using activated sludge can remove significant amounts of estrogen and could reduce its level to a value lower than international standards. The removal mechanism of estrogen in biological treatment system, especially activated sludge are adsorption and biological degradation. Secondary treatment of wastewater is effective in reducing hormones that could be due to wastewater biological treatment.

Keywords: estrogen, municipal wastewater, hospital wastewater, activated sludge, extended aeration.

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Removal of Fluoride from Aqueous Phase onto *Prosopis Cineraria*: Evaluation of Biosorption Kinetics and Isotherms

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Abstract

In the present study the biosorption characteristics of fluoride (F) from aqueous solution using Prosopis Cineraria were determined. Biosorption was studied in a series of batch experiments at room temperature. The effects of experimental parameters including biosorbent dose (1–25 g/L), contact time (5–120 min), initial F concentration level (3–12 mg/L) were investigated. The highest removal biosorption was observed at 10 g/L biosorbent dose, 120 min contact time, and initial F concentration level of 5 mg/L (98.94% F removal). Langmuir model was better fitted than Freundlich model that showed homogeneous biosorption surface and the possibility of monolayer biosorption of F by biosorbent. The biosorption kinetics was controlled by the Pseudo-first-order model. It was concluded that the Prosopis Cineraria can be used as an effective, cheap and environmental friendly biosorbent for F removal from aqueous solutions.

Keywords: Biosorption; Flouride; Prosopis Cineraria; Persian Gulf; Pseudo-second-order kinetic

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Removal of Nonylphenol from Aqueous Solutions using Carbonized Date Pits Modified with ZnO Nanoparticles

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Abstract

The adsorption process is a convenient and efficient method for the removal of phenolic compounds. This experimental research investigated the removal of nonylphenol using nanoparticles of zinc oxide-modified date pits. Variables examined were initial nonylphenol concentration, time, pH, and adsorbent dosage. To adsorb nonylphenol from aqueous solutions, date pits and date pits modified with nanoparticles of zinc oxide were used. Adsorption isotherms and adsorption kinetics were also examined. Both adsorbents were characterized using BET and XRD. Nonylphenol concentrations of samples were determined using UHPLC after the adsorbents were added. Maximum removal efficiency of nonylphenol and maximum adsorption capacity of modified date pits under optimal conditions including a contact time of 60 min, pH 6, concentration of 1.35 mg/L nonylphenol, and an adsorbent amount of 1.01 g/100mL were 95% and 126.98 mg/g, respectively. The nonylphenol removal efficiency under optimal conditions of wastewater from the campus of Kerman University of Medical Sciences was reported as 74%. The adsorption reaction of nonylphenol by date pits followed the Freundlich isotherm and pseudo-second-order models. Modified date pits are a good adsorbent and can be recommended as an efficient adsorbent for the removal of nonylphenol.

Keywords: Nonylphenol, Date Pit,Nano-particles, Design of experiment

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Removal of Organic Materials and Hexavalent Chromium from Landfill Leachate by Using a Combination of Electrochemical and Photocatalytic processes

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Abstract

One of the major problems of municipal waste landfill is leachate produced in the earth**.** The landfill produces a dark black color liquid with high concentrations of COD and heavy metals and low BOD/COD ratio. The objectives of this study were the effectiveness of electrochemical process using graphite electrodes of platinum and photocatalytic properties of titanium dioxide nanoparticles stabilized on bentonite at different reaction time period for removal of chromium and organic materials from leachate. Equipment for electrochemical reactor included an anode electrode plate of dimensions 3 × 6 cm^2 and commercial platinum electrode, the cathode of graphite in the dimensions of 3 × 8 cm^2 was used. The impact of electrical current density were studied in the range of 1 to 4A/m^2, the effect of reaction time in the range of 1 to 8 hours, the catalyst concentration in the range of 1 to 4 grams per liter and the impact of UV radiation intensity in the range of 3 to 8 of UV lamps were studied. The results showed that the removal efficiency increased with increasing of reaction time, current density, intensity of UV radiation and dosage of catalyst. Also biodegradability (BOD/COD ratio) increased. It turned out that electrochemical process as a pre-treatment process could remove organics matter, heavy metals, organic load reduction and increase wastewater biodegradability and could be used as an effective option for treating sewage efficiently, preventing environment pollution.

Keywords: Leachate, Organic matter, Chromium, electrochemical, photocatalytic processes

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Removal of Organic Micro-Pollutants from Aqueous Solutions Using Adsorption Column: Operational Variables, Reusability, and Nonlinear Modeling

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Abstract

In recent years, the presence of micro-pollutants is increasingly being detected in the aquatic environments. This type of pollutants can create challenges for water and wastewater treatment processes because current available water and wastewater treatment processes are not specifically designed for the removal of micro-pollutants. Therefore, advanced removal technologies are required for their complete removal.This study focuses on the preparation, characterization, and application of AC/MgO/ZnO composite for the adsorption of atrazine herbicide as a model of organic micro-pollutant from synthetic aqueous solutions as well as from an agricultural effluent in column adsorption-desorption experiments. In this continuous system, the adsorption of atrazine was investigated as a function of influent flow rate, adsorbent bed depth (height), and initial atrazine concentration. In addition, the performance of the system was investigated for the removal of atrazine from an agricultural effluent. The breakthrough curves for influent flow rate and initial atrazine concentration showed that an increase in the flow rate and initial concentration caused the exhaustion time to appear earlier, while the lower flow rate and longer adsorbent bed depth increase the life span of the column. The column experimental data were fitted to nonlinear form of the Adams-Bohart, Thomas, Yoon-Nelson, and Yan (dose-response) models, and the same results were obtained for the first three models, indicating these models are mathematically same. The experimental data were well described by these models especially by the first three models with adjusted R^2 value in the range of 0.97-0.99. Methanol, acetone, and a mixture of methanol-acetone could elute atrazine adsorbed onto the adsorbent (AC/MgO/ZnO composite) with the recovery efficiency near 100%, and the adsorbent was successfully reused after four adsorption-desorption cycles. The AC/MgO/ZnO composite could remove atrazine from an agricultural effluent without significant decrease in its adsorption capacity.The results of this study indicate that the AC/MgO/ZnO composite has excellent adsorptive capacity and can be used as an effective adsorbent for the removal of atrazine from aqueous solutions.

Keywords: Organic micro-pollutants, Adsorption, Atrazine, Composite, Column study

Removal of Pentachlorophenol from Aqueous Solutions by Adsorption on the Silicated Montmorillonite

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Abstract

Pentachlorophenol (PCP) is an organic compound with phenolic compounds in the category of priority pollutants, which has been considered more than other phenolic derivatives due to having five chlorine atoms on the benzene ring. Priority pollutants have the effects of known or suspected carcinogenesis, mutagenesis, or detoxified very severe damage to the fetus. The most important properties of this organic substance are absorption through the digestive tract and damage to the liver, kidneys, blood, respiratory tract, central nervous system, immune system, digestive system, skin and eyes. Since the purification of the different industrial wastewater that has chlorophenol derivatives is difficult or impossible with conventional biological treatment processes, it is necessary to find advanced treatment to remove these compounds and their harmful effects. In this study, removal of pentachlorophenol with adsorption by natural adsorbent montmorillonite were been investigated. In this study, the montmorillonite ore as a sorbent was used in the laboratory scale, and then the effects of parameters such as adsorbent dose and adsorbent type on adsorption of pentachlorophenol from aqueous solutions were investigated. The results showed that the removal efficiency of PCP was determined 15.35% ,41.39% and 66.2% for acid-activated ,silylation and reaction with imidazole of Montmorillonite respectively. Results showed that the use of the silicated montmorillonite to remove pentachlorophenol in industrial wastewater is more effective.

Key words: Pentachlorophenol, Industrial wastewater, Adsorption, Montmorillonite

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Removal of Remazol Black B Dye by Electrocoagulation Process Coupled with Bentoniteas an Aid Coagulant and Natural Adsorbent

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Abstract

Colored discharge effluent into aquatic ecosystems may be carcinogenic and mutagenic besides aesthetic problems. In this work, the ability to remove (Remazol Black B) colored water using electrocoagulation process is equipped with iron and aluminum electrodes with bentonite as a coagulant aid and natural adsorbent has been investigated. Remazol Black B was selected as a model dye and the treatment process was performed in a batch of electrocoagulation (EC) cell using iron and aluminum electrodes and bentonite. Experiments were conducted under 5 levels of various operational parameters at bench scale. The initial dye concentration was varied between 200-1200 mg/L, pH ranging from 2-10; the retention time was between 0-60 minutes, the voltage studied was in the range of 5-30 V and the electrical conductivity was 0.25 to 2 Siemens/cm. Results showed that the use of electro-Aluminum and Iron, under optimum conditions of pH 2 and 4, concentration of dye1000 mg/L, voltage of 30 V and 30 min havethe maximum dye removal of about 99% and 91%, respectively. Results showed that both electrode voltages increasethe efficiency of the above process in paint removal with decreasing pH from 10 to 2 and increasing the voltage from 5 to 30 V. Results showed that electrocoagulation Process Coupled with Bentonite as an Aid Coagulant could be used as well as an effective method for dye removal from colored wastewater.

Keywords: Bentonite, Electrocoagulation, Iron Electrodes and Aluminum Electrodes, Color Removal, Remazol Black B.

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Removal of Sunset Yellow Dye from Aqueous Solution by Granular Activated Carbon

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Abstract

Sunset yellow (SY) FCF is a hazardous azo dye pollutant found in food processing effluent. We investigated the use of granular activated carbon as an adsorbent for the removal of SY from wastewater. Tests for initial dye concentrations of 25, 50, 100 mg/l, the adsorbent concentrations of 1, 2, 4, 6, 8 g, the contact times of 5, 10, 20, 30, 40, 50 min, the pH 4, 7, 9, 11 were conducted. Contact time played a greater role in the adsorption process than either pH or initial dye concentration. Increasing the contact time from 5 to 50 min, the dye removal efficiency increased from 62% to 85%. When the adsorbent's weight increased from 1 to 8 g, the dye removal efficiency increased from 65% to 82%. Freundlich isotherm models could describe the adsorption equilibrium of the dye onto the granular activated carbon. Freundlich isotherm represented a better correlation compared to other isotherms ($R^2 > 0.9998$). Moreover, Pseudo-first order models fits well with experimental data ($R^2>0.9975$). According to the results of experiments, using granular activated carbon was effective on dye removal of Sunset Yellow Dye.

Keywords: Adsorption, Granular activated carbon, Sunset yellow, Dye

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Response Surface Modeling and Optimization of Lignin Degradation from Wastewater of Pulp and Paper Industries Using TiO_2/UV process: Box-Behnken Design

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Abstract

Lignin is a waste by-product from pulp and paper (P.P) industries and the main reason of the remaining colors in pulp and paper industries effluents. Hence, lignin should be eliminated from wastewater before being discharged to the environment, but according to its structure and properties, it is very difficult to degrade by common biological process. So, P.P industries strongly need to supplementary treatment as a powerful tool to achieve the stringent environmental regulations. In the present study, the photodegradation of lignin was studied using TiO_2 under UV irradiation as a supplementary treatment for pulp and paper industries. The 3-level, 3-factor Box-Behnken design and response surface methodology were applied to study the effects of main operating variables and optimization circumstances. Moreover, a quadratic model for lignin degradation was suggested. The predicted model had R^2 and R^2_{adj} correlation coefficients of 0.97 and 0.99, respectively, which showed goodness of fit between the experimental results and predicted values. The ANOVA results indicated that at 95% confidence level all three variables significantly affected the lignin degradation. Furthermore, the most effective variable was reaction time. Under the optimal conditions (T=115.66, TiO_2=100g/L and lignin=50 mg/L) the lignin degradation efficiency was 88.24%. The results also demonstrated that the kinetic of photodegradation of lignin can be explained through the pseudo-first-order model. This study revealed that the Box-Behnken design was applicable and suitable model to optimize the experiments for lignin degradation and it can be used to guide and conduct the full scales studies about lignin degradation. The obtained results demonstrated that photocatalytic process using TiO_2 can be used as an effective supplementary treatment for lignin degradation by biological processes.

Keywords: Box-Behnken Design, Photocatalytic process, Pulp and paper, Response surface methodology, Optimization

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Seasonal Changes of Arsenic Contamination in Drinking Water in a City of Iran and Comparing its Pollution Distributions via GIS

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Abstract

Based on the epidemiological studies, long-term consumption of arsenic contaminated water, even in low arsenic concentrations, can cause carcinogenic and non-carcinogenic diseases. The maximum permissible arsenic concentration in drinking water defined by the World Health Organization and Iranian national standard is 10. In Iran, arsenic contaminations in both groundwater and public water supplies have been reported in the Northwest area.For considering the health effects of arsenic exposure via drinking water, water monitoring, especially in regions with the potential for contamination of natural water, is necessary.

In this research, probable arsenic contamination in drinking water in the city of Ardabil was studied in 163 samples during four seasons. In each season, sampling was carried out randomly in the study area. Results were analyzed statistically applying SPSS 19 software and the data was also modeled by Arc GIS 10.1 software. Statistical analysis showed 75, 88, 47, and 69% of samples in autumn, wint spring and summer, respectively, had concentrations higher than the national standard.

The mean concentrations of arsenic in autumn, winter, spring and summer were 19.89, 15.9, 10.87 and 14.6 µg/L, respectively, and the overall average in all samples through the year was 15.32 µg/L. Although GIS outputs indicated that the concentration distribution profiles changed in four consecutive seasons, variance analysis of the results showed that statistically there is no significant difference in arsenic levels in four seasons. Consequently, to prevent exposure of the large population of Ardabil, it is necessary to continuously monitor the quality of drinking water and reduce arsenic level in drinking waters of this city.

Keywords: Iran, Arsenic, Drinking Water, GIS

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Seasonal Circulation of Enteroviruses in Treated Wastewater and Correlation with Bacterial Indicators

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Abstract

Enteroviruses are the largest group of Picornaviridae family. They are responsible for a wide range of infectious diseases, because they have low infection dose and high resistance in the environment. Enteroviruses are not easily removed by conventional wastewater treatment processes and are transported into the environment through the use of treated wastewater. The aim of this study was to evaluate the presence and seasonal circulation of the enteroviruses in wastewater effluent. Their correlation with total and fecal coliforms bacteria were also determined. 30 samples of treated wastewater were collected from two wastewater treatment plants, during summer, autumn and winter seasons. Enteroviruses and coliforms bacteria were determined by cell culture with Hela cells and multiple tube fermentation tecknique , respectively. The results reported with pfu/ml and MPN/100ml and analyzed by SPSS 22.The mean concentrations of enteroviruses in two wastewater treatment plants were 44 and 5 pfu/ml in summer and autumn season, respectively and were not detected in winter. The mean concentration of total and fecal coliforms bacteria were 5.2×10^7 and 3.4×10^6 MPN/100ml, respectively.The results of this study showed the seasonal circulation of enteroviruses. Based on the results of the study, the presence of total and fecal coliforms bacteria is not predictive of viruses' presence. Therefore, detection of entervirouses as an indicator for the monitoring of microbial quality of wastewater effluents may be needed.

Keywords: Enteroviruses, Seasonal Circulation, Total Coliforms, Fecal Coliforms, Wastewater Effluent

Simultaneous Adsorption of Cationic Dye (BR 46) and Heavy Metal (Copper II) from Synthetic Textile Effluent Using Adsorbent of Melia Azedarach Sawdust

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Abstract

Dyes and heavy metals are hazardous pollutants often found together in wastewaters of textile industries; these pollutants have a significant ecological impact on the ecosystem and can modify the physical and chemical properties of water affecting the aquatic flora and fauna. In this work, sawdust of Melia Azedarach wood was investigated for removal of BR46 dye and Cu^{2+} from a binary-solute system. A central composite design was used to determine the effect of various parameters including initial concentration of dye and Cu^{2+}, solution pH, contact time, and adsorbent dosage on the process. Fourier transform infrared spectroscopy (FT-IR) was utilized to characterize surface chemistry of pristine and solute-loaded sawdust. The results of FT-IR showed that functional groups, especially OH groups, on the sorbent surface are capable of adsorbing cationic dye and heavy metal. Based on the results, the mean removal efficiency of BR46 and Cu^{2+} was 92.07% and 92.72%, respectively. The experiments indicated the antagonistic adsorption of a cationic dye and heavy metal in a binary system. Adsorbent dosage and contact time had the highest and lowest impacts on the decolorization efficiency, respectively, while solution pH and adsorbent dosage were the most and the least influential factors on the copper removal percent, respectively. Adsorption isotherm studies revealed that the experimental data better fitted to the Langmuir isotherm model. An R^2 value in Langmuir isotherm was determined 0.994 for dye and 0.9712 for Cu^{2+}. Furthermore, the kinetic results showed the best fit with pseudo-second-order model. Show the R^2 value determined same and equal amounts of 0.9998 for dye and Cu. According to the study, adsorption process sawdust of Melia Azedarach can be considered as a choice for economical treatment of polluted effluents of the textile industry.

Keywords: Adsorption, Cationic dye, Copper ion, Sawdust of Melia Azedarach Tree

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Single and Alumina-Catalytic Ozonation Processes for Decolorization of Malachite Green

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Abstract

Considering harmful environmental and health effects of malachite green (MG) including respiratory complications, carcinogenicity, mutagenicity, chromosomal fractures, growth disorders and reduced fertility, the removal of MG from dye wastewater is necessary. Accordingly, the aim of this interventional-experimental study is to compare single and alumina-catalytic ozonation processes for decolorization of MG in a lab scale reactor. An oxygen concentrator with a capacity of 5 L/min and an ozone generator were used to provide the required ozone. During the process, the ozone gas flow continuously entered the reactor through the bottom and, after its contact with the solution, exited the top of the reactor. The surplus ozone was neutralized in two gas washing bottles containing 20 percent potassium iodide. The ozone mass flow rate, the concentration of MG, the chemical oxygen demand (COD) and the mineralization rate were determined using standard methods of iodometric, absorptiometry, closed reflux with thermal digestion, and the total organic carbon (TOC), respectively. The full decolorization of 50 mg/L MG was carried out in single ozonation process (SOP) after 30 minutes but in catalytic ozonation process (COP) after 15 minutes. For 3000 mg/L MG, the decolorization efficiency increased from 95.38 to 99.53 percent after 30 minutes in optimal conditions by converting the process from SOP to COP. However, the COD removal increased from 60 to 82.35 percent, but the TOC removal rose from 62.39 to 69.76 percent. The decolorization kinetics of MG in SOP and COP processes follow a pseudo-second-order reaction. Accordingly, by increasing the initial concentrations of MG from 50 mg/L to 3000 mg/L, the rate constant of 1/MG versus reaction time decreased from 0.0506 min^{-1} to 0.0002 min^{-1} in SOP and from 0.1827 min^{-1} to 0.008 min^{-1} in COP. The use of γ-alumina improves the SOP process in decolorization of MG. Accordingly, the reaction rate coefficients of COP at the initial MG concentrations of 50 mg/L and 3000 mg/L are about 3.6 and 14 times, respectively, more than the reaction rate coefficients of SOP. Although COP and SOP processes, respectively, have adequate efficiency in decolorization of MG, the efficiency of both processes in oxidation and mineralization in intermediate products is lower than their efficiency in decolorization.

Keywords: Alumina, Catalytic ozonation, Malachite green, Wastewater

Slaughterhouse Wastewater Treatment by Combined Anaerobic Baffled Reactor and Anaerobic Filter; Study of OLR and HRT Optimization in ABR/AF Reactors

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Abstract

Slaughterhouses wastewater is hardly treat due to the high amounts of organic matter, nutrients and suspended solids. These materials are decomposed naturally through biological processes, and then environmental pollution, transmission of pathogens and problems become smelled. Conventional purification methods require high investment costs, high energy consumption and expert workforce. Therefore, efficient and sufficient treatment of slaughterhouse wastewater is important with low cost, efficient construction and operation. A combined anaerobic system consisting of three pilot scales anaerobic baffled reactors (ABR) in first stage, therefore three anaerobic filters (AF) were used to treatment slaughterhouse wastewater. The ABR reactors were equipped, with different hydraulic retention time (HRT) (12, 18 and 24h) and organic loading rate (OLR) (4, 7 and 10 kg COD/m^3.d), AF reactors received ABR pre-treated effluents as influent with HRT (18, 24 and 36h) and OLR (0.5 to 1.55 kg COD/m^3.d). The results of present study illustrated that in OLR 7 and 10 kg COD/m^3.d with HRT 18h the COD removal efficiency were 83.29 and 85.79 percent, respectively, for ABR. Also, for AF reactor, in OLR 0.981, 0.576 and 0.561 kg COD/m^3.d at HRT 36h COD removal efficiency was obtained 79.39, 74.09 and 63.14 percent respectively. Thus, the optimum HRT and OLR were 24 h and 7 kg COD/m^3.d and 36 h and 1kg COD/m^3.d in ABR and AF reactor respectively.

Keywords: Slaughterhouse wastewater, Anaerobic baffled reactor (ABR), Anaerobic filter (AF), Organic loading rate (OLR), Hydraulic retention time (HRT).

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Sorption of Mn^{+2} and Co^{+2} ions on AMBERLITE IRN150 - cation Exchange Rsin and Their quantitative Determination Using AAS

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Abstract

The discharge of heavy metals into aquatic ecosystems has become a matter of concern over the last few decades. These pollutants are introduced into the aquatic systems significantly as a result of various industrial operations. The main objective of this study was to investigate the adsorption behaviour of cation exchange resin AMBERLITE IRN150 with respect to Mn^{+2} and Co^{+2} ions in order to consider its application to purify metal finishing wastewaters. The sorption of Mn^{+2} and Co^{+2} ions from aqueous solutions with macroporous resin which contain Sulphonic acid Functional groups was studied at varying of Mn^{+2} andCo^{+2} concentrations, adsorbent dose and contact time. Batch shaking sorption experiments were carried out to evaluate the performance of AMBERLITE IRN150 cation exchange resin.The concentrations of Mn^{+2} andCo^{+2} in aqueous solution was determined by atomic adsorption model Varian AA240FS . The experimental isotherm data were analyzed using the Langmuir, Freundlich, Temkin and Dubinin–Radushkevich (D-R) equations. Furthermore, FTIR spectroscopy analysis of the samples was carried out before and after the adsorption.The batch method has been employed, using metal concentrations in solution ranging from 5 to 50 mg/L.It was observed that more than 97% removal efficiency was achieved under optimal conditions for both cobalt and manganese. The experimental equilibrium data were tested for isotherms and correlation coefficients indicate the following order to fit isotherms: Freundlich> Langmuir >Temkin>Dubinin–Radushkevich (D-R) and Freundlich>Temkin> Langmuir >Dubinin–Radushkevich (D-R) for cobalt and manganese ions, respectively. It was determined that removal of Co^{2+} and Mn^{2+} was well fitted by second-order reaction kinetic. These results show that cation exchange resin AMBERLITE IRN150 holds great potential to remove cationic heavy metal species from polluted wastewater.

Keywords: cobalt, manganese , FTIR , isotherm, ion exchange.

Spatial Modeling of Groundwater Quality with Geographic Information Systems in Yazd-Ardakan Plain for Agricultural Purposes

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Abstract

The use of geographic information system software (GIS) for water resources monitoring can be very effective for the protection, management, and correct operation of water resources. The aim of this study was to assess groundwater quality in Yazd-Ardakan plain for agricultural purposes using GIS in 2016. To assess groundwater quality in Yazd - Ardakan Plain, the data were collected from 75 wells within 10 years (2005 to 2015) and then GIS 10.22 software and kriging spatial analysis model were used for interpolation data and zoning maps. The results showed that based on the TDS, SAR, and EC parameters 42%, 40.26%, and 55.3% of Yazd - Ardakan plain water quality were respectively in the unfavorable conditions reagrding the irrigation. The calculated total quality index showed that 53.18% of Yazd – Ardakan plain area had suitable water quality irrigation, 28.65% had average water quality, and 18.17% had poor water quality. According to the results, genus and tissues differences in soil induce changes in water quality.The findings showed that the main problem of water quality in Yazd – Ardakan plain was relate to EC, SAR, and TDS. So, to prevent damage and reduction of crop yields, direct use of groundwater for agricultural in the north and east of this area must be avoided.

Keywords: Groundwater, Agricultural uses, Geographic information systems (GIS), Kriging model

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Spatial Distribution of Arsenic in Surface and Groundwater Resources of a Water Reservoir Basin, A Case Study in Northwest of Iran

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Abstract

To better understand the existing water quality of Ardabil, some samples were taken from upstream and downstream of the Yamchi reservoir (providing over 60% of Ardabil drinking water), surface resources (rivers), and drinking water in some villages in inlet and outlet tracks of the reservoir to analyze general chemical parameters, and arsenic contamination.

The amount of arsenic in different water samples was 1-1758 µg/L, the highest value which is 175 times above the guideline value is belonging to Ilanjikh hot spring mineral water. The amounts of arsenic (µg/L) in the Nir river, the Baliqli chai, Yamchi olya, Kamalabad village, the entrance of the treatment plant, the river in Yamchi olya, the Diman river, in the river downstream of the Yamchi dam and, Qasem gheshlaghi, Balkhli river and inside Ardabil was determined 20, 70, 112, 156, 102, 112, 110, 74, 163, 86, 207, 224, respectively that can be indicate the pollution of most upstream and downstream rivers of Yamchi reservoir basin. In most samples, there was a positive correlation between arsenic values with electrical conductivity and chloride and sodium levels. In drinking water of the villages of Yamchi sofla and Tajraq Villages the arsenic values were more than 8 times higher than the guideline and in Golestan village it was 28 µg/L. Jorab and Yamchi olya villages were healthy in terms of the amount of arsenic. At the outlet of water treatment plant, the amount of arsenic was below 10 µg/L (WHO guideline value). Therefore, it can be concluded that water treatment plant is efficiently removing arsenic from contaminated water.

In general, the study area was naturally contaminated by arsenic due to the geological features of the area (volcanic region). Except Jorab village, the Bulaqlar spring of Yamchi olya, and the outlet of treatment plant, in the remaining samples, arsenic was higher than the guideline value.

It is strongly suggested to control the pollution due to the contaminated Ilanjikh hot spring mineral water effluent and identify the origin of arsenic in the area. Furthermore, to reduce exposure to arsenic through drinking water, implementation of necessary mitigation measures in the area is also recommended.

Keywords: Water quality, Contamination, Arsenic

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Spatial Distribution, Health Risk Assessment, and Survey of Pollution Source of Fluoride with GIS and Morans Index in Drinking Water of Abarkouh, Iran

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Abstract

Exposure to high concentrations of fluoride in drinking water can negatively affect lung, liver, and kidney tissues and cause skeleton pain. In this study, the concentration of fluoride was reviewed and its spatial distribution was studied with ArcGIS software in underground waters of Abarkouh aquifer. Health risk assessment, type of pollution distribution, and its source were investigated by using moran index. The average concentration of fluoride in 21 wells was 0.623 ± 0.296 mg/l, which was less than the minimum concentration standard range set by the WHO guidelines in 47.61% of cases. Non-carcinogenic risk results indicate a high risk for children (HQ=1.03E0). Moran index for fluoride concentration in the study area was 0.653 and given the z-score of 4.117, there is less than 1% likelihood that this clustered pattern can be the result of random chance .

According to the analysis, the source of pollution is close to well No. 15. Investigating the study area and eliminating the source of pollution is effective in decreasing the fluoride concentration of water and can reduce the health risk.

Keywords: Water, Fluoride,Health risk assessment, Abarkouh, Geographic information system, Morans index

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Spatial Variability Analysis of Water Quality for Drinking, Agriculture, Electrical Conductivity and Total Hardness (Case Study: Sabzevar Plain Wells and Davarzan)

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Abstract

Considering the various uses of water in the drinking, agricultural and industrial sectors, it is necessary to identify areas that have the required water quality. Also, if we can predict the other items by having each of the four parameters examined. It will certainly save time and money and will be helpful in managing water resources. In this study, spatial variations of total hardness and electrical conductivity parameters were investigated using GIS tool. Also water quality for drinking and agricultural applications was investigated using Shooler and Wilcox diagrams, respectively. , and their spatial variations were determined. In addition to spatial variations, the degree of matching of spatial variations of parameters with each other (the general form of variation) was also studied. The electrical conductivity of groundwater from the north to the south and south-east of the region is eextreme changes. Total hardness valuesindicatesimilar changes in the north and west to the south-east and south of the region.

Water quality is good for drinking in the north and center of the region and it reaches emergency levels in the south-east and south of the region. The quality of water for agricultural use in the north, west and center is slightly salty to salty (for good to medium farming) in the southern half (south, southeast, and west) to very high salinity (for inappropriate agriculture) Changes. The above results show that the overall shape of the changes in these four cases is in relative agreement. With having each of the four parameters examined, variations of the other three parameters could be predicted by approximate estimates.

Key words: Drinking , agriculture, electrical conductivity , total hardness , Spatial variability

Spent Filter Backwash Water Treatment by Polyaluminium Ferric Chloride and Ferric Chloride

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Abstract

Water reuse is one of the most important policies for preventing water shortage in many countries. There are many options, choices and resources for water reuse like treated wastewater, industrial wastewater, rain water and run off. Another resource for this matter is spent filter backwash water (SFBW) which is generated daily in most water treatment plants. Many techniques are available for SFBW treatment and coagulation is the most common process. The aim of this study was to investigate the removal efficiency of polyaluminium ferric chloride (PAFCl) and ferric chloride ($FeCl_3$) for treatment of SFBW produced in Isfahan water treatment plant. In this study Jar test apparatus was used and findings showed that the optimum pH ranges for the coagulation of raw SFBW with PAFCl and $FeCl_3$ were 6 to 8.5. Also, the optimum doses of PAFCl and $FeCl_3$ for coagulation were 7 mg/L and 15 mg/L, respectively. The removal efficiency of turbidity, color, dissolved organic carbon, UV_{254} absorbance, aluminium and iron by PAFCl were 98.68%, 100%, 39.29%, 40.68%, 76.5% and 90%. For $FeCl_3$ removal efficiency rates were 98.66%, 100%, 35.71%, 35.59%, 74.5% and -33.3%, respectively. It was concluded that PAFCl showed a good efficiency in comparison with $FeCl_3$ at lower dose. Finally, treated SFBW can be circulated to the plant entrance.

Keywords: water treatment, spent filter backwash water, coagulation, PAFCl& FeCl

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Study of Electro-Fenton process Efficiency in the Removal of Reactive Yellow42 Dye from Aqueous Solutions

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Abstract

Reactive Dyes have good features such as bright colour، water fastness and require simple application techniques with low energy consumption, and are used extensively in the textile industry. These colors have a carcinogenic and mutagenic effect, and also cause allergies, dermatitis and skin irritation, In addition they damage the environment of living organisms and disturbing the natural growth activity of aquatic life. Conventional removal of these colors often leading to high volume production of sludg which has a sludge disposal and treatment problems. Electro-fenton is an advanced oxidation process that effectively reduces the amount of dye in the sewage. Synthetic samples containing reactive yellow 42 Dye were prepared by dissolving dye powder in Distilled water and transferred into an pilot electrochemical cell containing two anode and cathode electrode made of iron , and the Electro-fenton process was began by adding of H_2O_2 to the sample and establishing a electrical potential difference . In this study, the effect of different parameters pH of solution, reaction time, H_2O_2 concentration, initial dye concentration, flow rate, electrodes distance in removal of dye was investigated. In this experiment, a colorimetric method was used with a spectrophotometer device at 430 nm to determine the concentration of the color, and data analysis was performed with Excel software. Based on the results obtained، optimum conditions of Electr-fenton process for dye removal was determined. Accordingly ، pH of solution 3، dye initial concentration of 50 mg/L , H_2O_2 concentration of 3.2 mmol/L , reaction time 15 minutes, flow rate 0.3، the distance between the two electrodes 1 cm had the highest percentage of removal .under such situations The removal efficiency was 99%. The electro-fenton process is able to remove the reactive yellow 42 dye with a high percentage. Based on the results, pH and H_2O_2 concentration,are the effective parameters in Electro-fenton process for removal Reactive yellow42 dye, and the parameters of the flow rate and electrolysis time have a lesser effect in Electro-fenton process for removal reactive yellow 42 dye

Keywords: Electro-Fenton, Advanced Oxidation, Reactive yellow42

Study on the Efficiency of Advanced Oxidation Process Ozone-Based for Removal of Catechol from Aqueous Solution

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Abstract

Wastewater of industrial activity often contains a wide range of pollutants and toxic compounds which if discharged into the environment, has adverse effects on human and environmental health. Catechol is an example of these compounds that is a cyclic organic compound with high toxicity. Therefore, Purpose of This study was to investigation of the efficiency of advanced oxidation process ozone-based for the removal of catechol from aqueous solution. This study is applied research which effect of parameters such as solution pH (2-10), reaction time (0-60 min) and initial concentration of catechol (50-1000 mg/l) were investigated on the efficiency of ozonation process. The residual concentration of catechol was measured by HPLC at 275 nm and TOC tests was done to determine the mineralization. According to the results of study, optimum pH for ozonation process was 10. The maximum of process efficiency was 96.20%, at pH 10 and the contact time 60 min. The best compatibility for catechol degradation kinetic was found whit first order model. catechol mineralization rate was about 78%. The results showed that ozonation process is an effective method to remove catechol from industrial wastewater and the removal of catechol at alkaline pH has better efficiency due to production of hydroxyl radicals.

Keywords: advanced oxidation process, ozonation, catechol, aqueous solutions.

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Study the Physical, Chemical and Microbial Quality of Ground Waters around the Landfill Site of Babolsar City Considering the Environmental Aspects

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Abstract

Studying the quality of groundwaters around the landfill site is one of the important environmental issues. The aim of this study was to assess the landfill site and evaluate the physical, chemical and microbial quality of groundwaters around the landfill site of Babolsar City. All parameters were measured based on the national standard methods for drinking water. Data were analyzed using SPSS 23. The significant difference of means of the concentration of each parameter compared to control well was determined in summer and winter, in upstream and downstream. The distribution of variables was mapped based on GIS using IDW model. The mean of the studied parameters in the samples of well water was 7.54 and 1180.17 $\mu s/cm$ for PH and EC; 794.21, 93.87, 62.53, 362.29, 98.03, 32.91 and 0.044 mg/L for TDS, Ca^{2+}, Mg^{2+}, HCO_3, CL^-, NO^{3-} and NO^{2-}; 52.32 and 19.18 MPN/100mL for T.coliforms and F.coliforms ,and in the leachate samples was 7.78 and 5230 $\mu s/cm$ for PH, EC; 4000 NTU for Turbidity; 3503.5, 835, 316, 0.138, 0.026, 0.126 and 3.32 for TDS, COD, BOD_5, Zn, Cr, Mn and Fe, respectively. The mean of Cu, Cd, and Pb was undetectable and of T.coliforms and F.coliforms was greater than 2400 MPN/100mL. The results of the current study indicated that the values of TDS, $HCO3^-$, Ca^{+2}, T.coliforms and F.coliforms were higher than the standards of drinking water.

Key words: Landfill, Leachate, Groundwater quality, Babolsar.

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Study to Survey of Fluoride Contamination, Exposure Dose and Non-Carcinogenic Risk Assessment in Groundwater Resources of Hamedan Province 2016-2017

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Abstract

Like many elements, fluoride is beneficial to human health in trace amounts, but can be toxic in excess. Drinking-water is typically the largest single contributor to daily fluoride intake. In Hamedan province, ground water is the main source of drinking water for local residents. The purpose of this study is to determine the levels of fluoride contaminant in water used in all city and rulers of Hamedan province to evaluate Exposure and associated health risks for fluoride in drinking water. 627 participants were randomly recruited from tap water in all cities and villages in Hamedan in 2016-2017. Fluoride analysis was performed using Spectrophotometery(SPADNS method, DR 6000). Finally according to USEPA and IRIS exposure dose through ingestion for three groups, infant (6 Kg body weight), children (20 Kg), and adults (70 Kg) were estimated. Water intake according to WHO for infants, children and adults are 0.5, 0.75, and 2 liter per day. Standard value for the exposure for fluoride is 0.05 mg/Kg day which is the minimum risk level value recommended. Finally, non-carcinogenic risk, hazard quotient (HQ) was calculated. The fluoride concentration in groundwater resources ranges from 0.1 to 2.32 mg/L. Fluoride content only in 3.55% regions of Hamedan was higher than WHO guideline value of 1.5 mg/l and in 25.16% regions the fluoride content was lower than the minimum permissible level of 0.5 mg/L. The exposure dose of fluoride (mg/kg day) from drinking water in infants, children, and adults was in ranges 0.008-0.193, 0.003-0.087, 0.002-0.066 respectively against the standard value of 0.05. The non-cancer risk estimations show that fluoride has HQ values in three villages of Hamedan province (Amirabad, Aghkahriz, and Khalilkord) are more than one. In these regions were found considerable risk of fluorosis disease. High fluoride intake (>1.0mg/L) in drinking water will cause dental and skeletal fluorosis in local residents especially infants and children in long term exposure but, adults in the most areas aren't at high risk due to excessive fluoride intake.

Keywords: Fluoride concentration, groundwater, exposure dose, risk assessment, non-carcinogenic effect

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Survey of Biosorption Lead (II) by the Fungi Penicillium Notatum in Aqueous Solutions

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Abstract

Lead is one of the most persistent and non-biodegradable pollutants that has been emitted in recent years as a result of industrial, agricultural and technological development. This metal, even at low concentrations, has adverse effects on the environment and the health of living organisms, especially humans due to its toxicity. The purpose of this study was to investigate the Biosorption of lead by the Penicillium Notatum fungi in water solution whit dead conditions. Lyopholized Penicillium Notatum fungi PTCC 5074 was obtained from the Organization of Industrial Researches of Iran and the Potato Dextrose Agar and Sabouraud Dextrose Broth media were used to culture and proliferation of this species. In this study, the effects of parameters such as lead metal concentration, ion intensity, biomass concentration, temperature and contact time were investigated on the adsorption of lead metal by dead biomass. In this study, the pH was adjusted to a fixed number of 5. The highest adsorption rate by dead biomass (180.71 mg/g dry weight biomass) was obtained under optimal conditions of concentration of metal, 228 mg/L, ion intensity 43.2 mg calcium per liter, biomass 1.2 g/dry biomass, temperature 23°C and contact time 131 min. According to the results the Penicillium Notatum dead biomass is a suitable absorbent for recycling lead metal from aqueous solutions and the implementation of the process of biological adsorption at ambient temperature and short time indicates the proper function of the fungus in the treatment of industrial waste water.

Keywords: Biosorption, Lead, fungi Penicillium Notatum

Survey of Drinking Water Parameters (pH, Total Hardness, Alkali, Fluorine, Electrical Conductivity) in the City of Kaşhmar, 2014-2015

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Abstract

Analyzing, monitoring, and controlling the quality of drinking water is one of the duties of health centers. This study was conducted on the chemical qualities of Kashmar water. In this study, data from the health center of Kashmān city were used in 2014-2015. Water samples were taken annually by environmental experts for chemical experiments from 18 wells. In laboratory, 5 parameters of pH, total hardness, alkali, fluorine, and electrical conductivity were measured. The average total hardness of water was 190 mgcaco 3.l, the mean electrical conductivity was 450 µs / cm2, the mean pH was 5.7, the mean fluoride content was 31 µmo l.l, and the mean of total alkalinity in all samples was 110 mgcaco3.l was obtained.

Keywords: Water, Standard, Chemical quality, Kashmar

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Survey of Heavy Metal Contamination in The Effluent, Dried and Wet Sludges of Wastewater Treatment Plant in Gorgan City, Iran

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Abstract

One of important potential source of environments are heavy metals. Pollution of the environment by heavy metals and their migration to groundwater, soil and vegetables are a growing global problem. This study aimed to survey the concentrations of heavy metals in wastewater effluent, wet and dried sludges of wastewater treatment plant in Gorgan city, Iran.In this survey, as the cross section sample size were 176 samples of effluent, as well as returned and dried sludges in wastewater treatment plant, the experiments were analyzed during six months in 2016. The concentration of Pb, Cd, Ni, and Cr were determined using polarography (Metrohm797 AV) and furnace atomic adsorption spectroscopy (AA 240 Varian Co.) in the laboratory of Health Faculty in Golestan University of Medical Sciences. The average concentrations of Pb, Cd, Ni, and Cr in the effluent were 0.105 ± 0.06, 0.0089 ± 0.008, 0.095 ± 0.108, and 0.102 ± 0.175 mg /L, respectively. The concentrations of Pb, Cd, Ni, and Cr in returned sludge were 323.48 ± 217.65, 2.44 ± 3.3, 354.14 ± 322.79, and 388.53 ± 252.59 mg /kg of dry weight, respectively. Also, in dried sludge, the average concentrations of lead, cadmium, nickel, and chromium were 58.48±2.67, N.D, 30.31±1.98, and 506.25±813.81 mg/kg of dry weight, respectively.The concentrations of heavy metals in wastewater effluent and dried sludge, except in returned sludge, were below the standards. Due to long-term use of effluents, necessity of treatment of other parameters, and the effect of bioaccumulation of metals in sludge, caution should be taken for their agricultural application. Also, because of importance of this type of contaminants in soil and food products, continuous monitoring by water companies is highly necessary.

Keywords: Heavy metals, Effluent, Wastewater treatment, Sludge, Gorgan city

Survey of Outlet Sludge Biological and Chemical Quality from Mazandaran province Wastewater Treatment Plants (2015-2016)

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Abstract

Sewage sludge is rich in fecal coliforms, Salmonella, parasite eggs and heavy metals that using of them in agricultural fieldslead to human diseases, therefore before using of them they have to purified.This study aimed to evaluate the quality of sludge discharge from WWTP in Mazandaran province and compare them with EPA standards. This study was carried out in six months from the middle of winter of 2015 to mid -summer of 2016 on the derived sludge from treatment plants in Sari, Jouybar, Babol, Babolsar, Noshahr and Noshahr sludge compost. In this study, the physical and biological properties of the sludge samples including the remaining time, pH, total solids, color, fecal coliform, Salmonella, parasite eggs and total metal concentrations for Cu, Zn, Ni, Cd, Cr were determined and reported, and finally the results were evaluated and analyzed. The mean fecal coliforms in the mentioned cities were 1.5×10^4, 58, 2.6×10^2, 2.3×10^3, 72 and 3 MPN/g Ts, respectively. The average Salmonella density was reported at 9, 3, 8.2, 9.2, 5.25 and 0 MPN / 4g Ts, respectively. The average number of parasite eggs was also calculated as 5.33, 0, 0.15, 0.33, 0 and 0.33, respectively. The average concentrations of heavy metals such as copper, zinc, nickel, cadmium and chromium were determined in mg/kg Ts, which was lower than EPA standard in all treatment plants. The results showed that based onU.S.EPA standards, in terms of coliform, the sludge of Sari and Babolsarclassified in class B and should be considered for legal constraints. Sari, Babol, Babolsar and Noshahr-Chalous treatment sludge has been classified by USEPA as below the Class A rules of the USEPA. In terms the number of parasite eggs,the sludge of sari treatmentclassified in class A of USEPA standards and should not be used before purification in agricultural land. The concentration of heavy metals in these sludges is lower than the EPA rules and the use of these sludges in agriculture is not limited to any of the examined metals.

Keywords: Fecal coliform, Salmonella, Parasite egg, Heavy metal, Wastewater treatment plant.

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Survey of Organic Loading Rates in Degredation of Linear Alkylebenzene Sulfonate from Gray Water

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Abstract

Now a day, due to the increase in population and reduction of available water resources, purification and reuse of gray water has been considered in most parts of the world. In this study, the efficiency of multi-layer filtration in the removal and degradation of linear alkylebenzene sulfonate from synthetic gray water and the effect of different organic loading rates on the efficiency of this system was investigated over a period of 157 days.This study revealed that with increasing OLR, the system efficiency to remove BOD_5 and COD increased. Nevertheless, in terms of LAS and TSS, efficiency decreased with increasing OLR. It can be concluded that the use of multilayer filtration in removing LAS from gray water in different loadings can be an appropriate option.

Keywords: Linear alkylebenzene sulfonate, Organic loading, Gray water

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Survey on Removal of Remozal Black B Dye Removal by Electrocoagulation Method Using Aluminum and Iron Electrodes

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Abstract

Discharge of textile wastewater contains hazardous dye compounds such as Remozal Black dye which results in severe damages to the environment and health. Majority of conventional wastewater treatment methods are not efficient enough for textile dye compounds degradation. This study aimed for the removal of Remozal Black B dye from synthetic solution using electrocoagulation method. In this experimental study the batch reactor was equipped with iron and aluminum electrodes by bipolar connection. Then the effect of initial concentration, electrical conductivity (EC), pH and electrical potential during maximum reaction time of 80 minutes was examined. Moreover, the efficiency in dye compound removal by spectrophotometry in 597 nm wavelength was determined. The results demonstrated that the maximum removal efficiency took place in reaction time of 80 minutes, electrical conductivity of 3000 µSiemens/cm and initial concentration of 5000 mg/l. The maximum removal percentage was obtained 89.45% and 96% at pH values of 6 and 5 using aluminum and iron electrodes, respectively. As time passed, energy consumption, pH and removal efficiency increased. Electrocoagulation process equipped with iron and aluminum electrodes can be used as an efficiency method to treat wastewater containing Remozal Black B dye.

Keywords: Electrocoagulation, Remozal Black B Dye, Iron, Aluminum, Aqueous solution.

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Survey on the efficiency of household drinking water devices in Behbahan city, 2016

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Abstract

Monitoring of drinking water quality is perfectly important for the healthy consumers. Based on consumer view, high level of total dissolved solids (TDS) in water maybe decrease softening of it. In a recent decade, often Behbehanian family use household desalination plants set into operation by private sectors. This study aimed to evaluate the chemical quality of raw and treated water of household Desalination Plants in Behbahan in the year of 2016. In this descriptive cross-sectional study, samples were obtained from the inlet and outlet water of household desalination devices in Behbahan in dry and wet season during 2017. The main studied parameters include: total hardness, electrical conductivity (EC), total dissolved solids (TDS), turbidity, temperature, pH, fluoride nitrite, chloride and sulfate. To analyze the chemical quality of water 96 samples were taken from 48 household desalination plants and the obtained data analyzed with SPSS 22. Results showed that the mean of TDS, EC, and turbidity in inlet water of household desalination devices, were 1061.23, 1232.35 mg/l and 3.5 NTU, respectively. Fluoride in the treated water from this process was lower than desirable limits (0.22mg/l) and the free chlorine residual was zero. Based on the Iranian national standard of drinking water, the mean concentration of sulphate was higher than the standard level (433.72 mg/l). The rest of the other analyzed parameters were in acceptable range. Most qualitative parameters of the outlet water of the RO process decreased by 79% compared to the inlet water and outlet levels were in the standard range. The results of *Student's t-test* showed that there was a significant difference between inlet and outlet water taken from the household desalination devices in all of the parameters ($P<0.001$). According to the results of this study, based on qualitative standard level, the Household Desalination devices have a high efficiency in treating drinking water, by the way some parameters in this water like free chlorine residual and fluoride do not meet the standard

Key words: Reverse osmosis, Household desalination, Household drinking water

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Synthesized Activated Carbon from Carrot Dross for Removal of Methylene Blue from Aqueous Solutions

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Abstract

Colors are complex structures resulting from different processes of the textile industry such as dying which enter the environment. Nowadays methylene blue, a cationic color, is commonly used in the textile industry. This study evaluated the efficiency of adsorption of methylene blue by activated carbon from carrot dross in aqueous solutions. Activated carbon synthesized from carrot dross. Its efficiency was evaluated to remove methylene blue from aqueous solution. Batch sorption studies were carried out at parameters such as pH(5-8), initial concentration(20-100ppm),adsorbent dose(0.1-0.7g/L) and equilibrium time(0-120min). optimum condition include pH=7, initial concentration=40ppm, adsorbent dose= 0.7g/L and equilibrium time=45 min. removal efficiency in these condition was 100%. adsorption Kinetics was well described by pseudo-second-order kinetic model. The maximum adsorption capacity was 98.4 mg of dye per gram of adsorbent (R^2=0.977). Also results fit well with Freundlich isotherm. this study shows that adsorption by activated carbon is one of the effective technology for effective removal of dyes like methylene blue. This adsorbent shows good enough adsorption capacity.

Keywords: Activated carbon, Carrot dross, Adsorption, Methylene blue

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The Assessment of Carcinogenicity and Non carcinogenicity of Heavy Metals in Drinking Water of Shiraz (Southwest of Iran) from 2015 to 2016

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Abstract

The entrance of heavy metals to water resources in many different ways results in poisoning and carcinogenicity in live creatures. Thus, the main objective of the present study was to investigate the concentration of chemical pollutants and also to assess the healthily risk of carcinogenicity and noncarcinogenicity of the density of these elements in ten neighborhoods of Shiraz. The study enjoys a descriptive cross-sectional design. The study was conducted in summer of winter of 2015-2016. In this study, 27 samples of water distribution network from ten neighborhoods of Shiraz were selected and chemical pollutants (Arsenic, Cadmium, Chromium, Lead, Zinc, Copper, and Fluoride) were calculated based on 1999 standard methods of atomic absorption. Then, the risk of human being healthfulness was assessed based on Environmental Protection of America's (EPA) Index. The overall average of the concentration of elements was zn= 337/64, Cu=76/68 ، Pb=7/38, As=3/84، Cr=8/10، Cd=1/17 و F^- = 525/63 µ/l respectively. Also, the carcinogenicity risk both for adults and children by means of drinking water was 3.31×10^{-4} and 4.46×10^{-4} and non-carcinogenicity risk was 1.15 and 1.55 respectively. The results of the concentration of the elements and their comparison to the standards demonstrated that there is no healthy risk in the region under study, but the amount of Fluoride in water resources is less than the recommended amount. The risk results by means of drinking water were close to 300 and 400 times above the recommended range respectively.

Keywords: Risk assessment, Drinking Water, Heavy Metals, Fluoride.

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The effect of concentration of paranitrofenol in wastewater on biomass production, sludge Volume index and COD removal efficiency in the Aerobic biological wastewater treatment

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Abstract

The aim of this study is to reduce paranitrofenol from wastewater using an SBR Reactor for biological treatment of sewage and the effect of concentration of paranitrofenol in wastewater on biomass production, sludge Volume index and COD removal. In this study, two SBR reactors with a volume of 20 liters controlled by on-line system were used. Sampling and testing of parameters such as COD, MLSS, MLVSS, PH, DO, SV1, SOUR, paranitotrophon (PNP), and finally the rate of reduction of biological solids production were performed after stable conditions in the reactors during 12 months of research. The results showed that in the amount of more than 100 mg / l PNP, the COD reacted with a COD value from 772 to 193 mg / L, and the COD removal efficiency decreased to 75% and PNP decreased to 36.7 mg / L.The biodegradable solids decreased by about 49.5% relative to the control reactor. On the other hand, in this dose of PNP, the amount of SOUR was 31 mg O2 / hVVSS and the SVI value was less than 48 ml / g. At 150 mg / L PNP, no Biosolids was produced in the reactor, but COD and PNP levels increased in the effluent. The presence of toxic organic compounds such as paranitrofenol in high concentrations of wastewater, although reducing the removal efficiency of organic matter, but decrease in biological solids and thus reduces the amount of Biosolids.

Keywords: SBR reactor- Biological sludge-PNP –Biomass production-SOUR- COD-MLSS.

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The Effect of Using Peroxide Hydrogen, Persulfate with Ultrasound Waves to Remove Phenol from Aqueous Solutions

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Abstract

Nowadays, resistance of organic compounds to biodegradation in the chemical and petrochemical effluents has become an important environmental problem. Phenol is an aromatic hydrocarbon that is discharged into the environment through certain industrial effluents and pollutes water resources. In this study the performance of oxidizing agents such as peroxide hydrogen and activated persulfate by ultrasound for removal of phenol from aqueous solutions was examined. In this experimental study, to treat of contaminated solutions with phenolic compounds, the removal of phenol using US/S_2O_8 and US/H_2O_2 with a frequency of 40 kHz were investigated. In addition, the effects of operational parameters such as the concentration of persulfate (0.001-0.005 M) and peroxide hydrogen (0.004-0.1M) in pH of 3, 7and 10 at different reaction times were examined. Finally the influence of changes ionic intensity at different times was checked. The results of this study showed that by increasing the concentration of oxidants the removal efficiency increased significantly and then a decreasing trend was observed in the removal of phenol. So that, optimal concentration of persulfate and hydrogen peroxide were selected as 0.003 M and 0.1 M respectively. Study of different amount of pH showed that both processes had the most removal efficiency at pH= 3. Ionic intensity reduced the efficiency of US/S_2O_8 process while had no effect on the other process. The findings of this study indicated that compared to peroxide hydrogen/ultrasonic process, combined ultrasonic/persulfate process in the optimal conditions had more efficiency. Therefore, for the removal of phenol from solutions, persulfate can be used as a suitable oxidizing with ultrasonic waves.

Keywords: Peroxide Hydrogen, Persulfate, Ultrasound Waves, Phenol

The Importance of Measuring Total Organic Carbon Compounds in Order to Monitor the Quality of Water in the Shortest Time

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Abstract

Consumer exposure to opportunistic pathogens in potable water systems poses a significant challenge to public health.Total organic carbon (TOC) is the amount of carbon found in an organic compound and often used as a non-specific indicator of water quality and cleanliness of pharmaceutical manufacturing equipment. TOC has been an analytic technique used to measure water quality during the drinking water purification process.A relationship may exist between endotoxins, microbial growth (HPC bacteria), and the development of biofilms on pipeline walls and biofilm growth within pharmaceutical distribution systems.

A correlation is believed to exist between TOC concentrations and the levels of endotoxins and microbes. Sustaining low TOC levels helps to control the levels of endotoxins and microbes and thereby the development of biofilm growth. For this reason, TOC has found acceptance as a process control attribute in water industry to monitor the performance of unit operations comprising purification and distribution systems. There is also a statistical relationship between the amount of chemical and biological oxygen demand in the sample of sewage or wastewater with total carbon content. measuring the amount of organic carbon does not mean that the result is not equivalent to the BOD and COD, but the appropriate factor that can be obtained by monitoring the total amount of carbon can be obtained and multiplying it in the appropriate coefficient to an equivalent and acceptable result. Considering the time-consuming BOD test, the total organic carbon measurement can be an appropriate equivalent index for monitoring the quality of water and wastewater treatment systems. The purpose of this study is to provide a suitable method and measurable parameter (total organic carbon) in water and wastewater systems in order to achieve the highest possible levels of contamination of heterotrophic bacteria and the amount of chemical and biological oxygen demand in the shortest possible time. Due to the rapid detection of bacterial and chemical contamination at the time of the occurrence of critical water pollution and contamination, the use of these equivalents and approved by the international sanitary associations of water and food industries has great importance.

Keywords: Total organic carbon, quality of water, HPC bacteria, BOD, COD

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The Investigation of Moving Bed Biofilm Reactor (MBBR) Performance in Removal Nitrogen Compounds from Municipal Wastewater

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Abstract

Recently, Moving-Bed Biological Reactors have been used progressively for municipal and industrial wastewaters treatment. Sewage is one of the factors causing environmental pollution. Eutrophication phenomenon is one of the negative effects of discharging of sewage into accepting water bodies. Therefore, sewage should be collected and treated in outside the city prior to discharge to the natural water cycle. So, the aim of this study was to remove nitrogen compounds from municipal wastewater using Moving-Bed Biofilm Reactor. This experimental study was carried out on a pilot scale with continuous hydraulic flow. In this study, Kaldnes K3 acne was used as a bed. This acne for three percent filling of 40%, 50%, and 60%, and three time periods of 4, 8 and 12 hours, removal of BOD, COD, comparison of the total nitrogen removal efficiency and hydraulic residence time were investigated in total nitrogen removal with the input organic loading of 300 mg/l. The results showed that under optimal conditions in organic load (BOD_5) 250 mg/l and in the three-hour hydraulic system of 4, 8 and 12 hours, the maximum of removal efficiency was 90.48%, 81.84%, and 59.92%, respectively. Also, optimal load conditions (COD) of 300 mg/l, the maximum of removal efficiency was 91.95%, 95.34% and 93.34%, respectively. At the time of different hydraulic, removal efficiency of COD and COD residuals of the reactor at the inlet organic loading of 300 mg/l to the MBBR system in 40% filling, the removal efficiency was 84.5%, 86.6% and 86.4%, respectively. In 50% filling, in the amounts of 39.92, 31.93 and 35.79 mg/l, the removal efficiency was 83.2%, 84.3% and 84.3%, respectively. At the time of different hydraulic, the removal efficiency of TN and TN residuals of the reactor outlet in the organic loading input of 300 mg/l to the MBBR system in 40% filling in the amounts of 26.7, 6.33 and 6.35 mg/l, total nitrogen outputs were 81.9%, 83.4% and 84.1%, respectively, in 50% filling in the values of 6.5, 5.97 and 6.29 mg/l, respectively, of the total removal efficiency of the nitrogen 84.8%, 85.1% and 84.3%, respectively, and in 60% filling in the amounts of 48.5, 4.95 and 5.27 mg/l outlet organic loading the removal efficiency was 86.8%, 6 / 87% and 86.8%, respectively. According to the results obtained in this study, and the significant removal of COD and TN, The Moving-Bed Biofilm Rector, With Kaldness K3 bed, can be used to remove organic compounds.

Keywords: Bed Biofilm Reactor, Nitrogen Compounds, Municipal Wastewater

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The Investigation of Enzymatic Biodegradation of Bisphenol-A in A Sequencing Batch Reactor

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Abstract

Today the release of toxic organic compounds, including endocrine disrupting compounds (EDCs) are to receptor environments. Bisphenol A (BPA) is one of the endocrine disrupting chemicals that are widely used for the production of epoxy resins and poly carbonate. The aim of this study was to biodegradability of enzymatic BPA in the SBR reactor. This experimental study in laboratory scale using synthetic wastewater containing BPA has been done. After the design and building a system SBR, different stages were studied. In this study, include three accumulation and enrichment of degrading bacteria BPA, the effect of concentration of H_2O_2 on process (0-15 mM) and the effect of initial concentration of BPA (20-100 mg / L) on SBR reactor performance was investigated. HPLC was used to determine the concentration of BPA. accumulation and enrichment was done within 25 days. The optimal amount of H2O2, 10 Mm per 20 mg/L Bisphenol A was obtained. Complete degradation of Bisphenol A in observed concentration was obtained. With increasing concentrations of Bisphenol A, the time required for complete degradation is also increased. Based on the study, BPA was completely dagradated by produced of proxidase in situ. So we can used by remove of biodegradation enzymatic methods to produce the enzyme in situated as a modern and effective method used for the removal of estrogenic compounds.

Keywords: endocrine disrupting compounds, Bisphenol A, SBR, peroxidas

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The Occurrence and Analysis of Non-Steroidal Anti-Inflammatory Drugs in Tehran Source Water, Municipal and Hospital Wastewaters and Their Environmental Risk Assessment

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Abstract

Pharmaceutical are becoming widely distributed in waters and wastewaters, and poses a serious threat to public health. The present study aimed to analyze non-steroidal anti-inflammatory drugs (NSAIDs) in surface waters, drinking water and wastewater in Tehran, capital of Iran. 36 samples were collected from surface waters, tap water, and influent and effluent of municipal and hospital wastewater treatment plants (WWTP). A solid-phase extraction (SPE) followed by liquid chromatography-tandem mass spectrometry method was used for the determination of pharmaceuticals, namely ibuprofen (IBP), naproxen (NPX), diclofenac (DIC) and indomethacin (IDM). IBP was found in most of the samples and had the highest concentration. The highest concentrations of NSAIDs were found in the municipal WWTP influents and hospital WWTP effluents. In the municipal WWTP influent samples (n=4), the concentrations of IBP, NPX, DIC and IDM were 1.05, 0.43, 0.23, and 0.11 µg/L, respectively. DIC was found only in one river sample (n=5). All NSAIDs were detected in tap water samples (n=17). However, their concentration was very low and the maximum values for IBP, NPX, DIC and IDM were 47, 39, 24 and 37 ng/L, respectively, in tap water samples. Results showed that the measured pharmaceuticals were detected in all rivers with low concentrations in ng/L range, except DIC which was found only in one river. This study showed that the aforementioned pharmaceuticals are not completely removed during their passage through WWTPs. Environmental risk assessment was evaluated and at the measured concentrations no ecotoxicological effect is suspected to occur. In conclude, a mixtures of various therapeutic classes of pharmaceuticals are present in the aquatic environment, which could lead to synergic or additive effects, resulting in higher toxicities than single classes.

Keywords: Nonsteroidal anti-inflammatory drugs, Monitoring, Surface waters, Liquid chromatography–tandem mass spectrometry, Risk assessment

The Occurrence, Fate, and Distribution of Natural and Synthetic Hormones in Different Types of Wastewater Treatment Plants in Iran

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Abstract

Over the past few years, the presence of steroid estrogens in the environment has become a major concern. In this study, the concentrations of estrone (E1), 17β-estradiol (E2), and 17α-ethinyl estradiol (EE2) were measured in some wastewater treatment plants (WWTPs) in Iran. These samples were collected from the municipal, rural, livestock, commercial, and hospital WWTPs, extracted by dispersive liquid-liquid micro extraction (DLLME) technique, derivatized, and detected by GC/MS. In these treatment plants, various processes including conventional activated sludge (CAS), aerated lagoon (AL), moving bed biofilm reactor (MBBR), and activated sludge with wetland (AS+ WL) are used. The highest concentration of hormones was observed in the influents and effluents of livestock, municipal, commercial, and hospital WWTPs, respectively. The maximum elimination rate was obtained in MBBR followed by AS+WL, CAS and AL. The biodegradation and adsorption rates along with adsorption coefficients of log kd and log koc were measured for all target compounds.

Keywords: Influent, Effluent, Estrogen, Wastewater, Biodegradation

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The Optimization of Ni,Co and Mn Heavy Metals Reduction and Removal by Ion Exchange Resin Using Response- Surface Methodology

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Abstract

Heavy metal pollution of wastewater is a common environmental hazard, since the toxic metal ions dissolved can ultimately reach the top of the food chain and thus become a risk factor for human health. The objective of the present study is to optimize sorption of nickle(II),cobalt(II) and manganese(II) ions in aqueous solution onto AMBERLITE IRN150 cation exchange resin in a batch experiment. Response surface methodology (RSM) was employed to model and optimize the effect of process variables including initial heavy metals concentration (5-50 mg/L), solution pH ,optimized manually adjusted, adsorbent dose (0.1-2 g/L), and contact time (5-60 min) on the percentage of heavy metals removal as the response. The optimum levels of independent variables for the removal of nickel were time 46 min, initial concentration of 38 mg/L, adsorbent dose of 1.61 g/L, and pH of 4.5, for the removal of cobalt were time of 48 min, initial concentration of 38 mg/L, adsorbent dose of 1.60 g/L, and pH of 4.5, for the removal of manganese were time of 47 min, initial concentration of 39 mg/L, adsorbent dose of 1.61 g/L, and pH of 4.5.Under optimal conditions, the predicted removal percent of the model was 97.12 % ،100% ,97.82 % for nickel, cobalt and manganese, respectively. The experimental data of nickel were better described by Freundlich and Temkin isotherms, cobalt was better described by Langmuir and Freundlich isotherms,and experimental data of manganese followed Freundlich isotherm model. The pseudo-first-order, pseudo-second-order models and the intraparticle diffusion model were employed to analyze the kinetic data. The kinetic data were well described by pseudo-second-order model with R^2_{Adj} values of higher than 0.973, 0.956 and 0.959 for nickel,cobalt and manganese, respectively. The results showed that all of the independent variables exhibited a significant effect on heavy metals removal. The results have shown that AMBERLITE IRN150 exchange resin can be used as an effective process for the removal of Ni,Co and Mn heavy metals from aqueous solution.

Keywords: Heavy metals , RSM , AMBERLITE IRN150, Cationic resin.

The Photochemical Degradation of Bisphenol A in the VUV/PS Process

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Abstract

Bisphenol A (BPA), is extensively used for manufacturing different types of polymeric and petrochemical products, is well-known as endocrine disrupting compounds (EDCs). Due to the harmful effects of BPA on human health, the removal of this compound from contaminated water is necessary. This study aimed to evaluate the performance of VUV and VUV/persulfate (PS) in degradation of BPA. The effect of some parameters such as solution pH, BPA and PS concentration and radical scavengers was investigated on BPA removal efficiency. The results showed that the optimum solution pH for degradation of 20 mg/L of BPA was 3 after 4 min reaction time. The reaction time for BPA complete degradation under optimum condition observed to be increased from 4 to 8 min, while BPA concentration increased from 20 to 100 mg/L. The effect of PS concentration of 0.1 – 1 g/L on 100 mg/L of BPA degradation showed with increasing PS concentration from 0.1 to 0.5 g/L, the time for complete BPA degradation decreased from 16 to 8 min. Also, 100 mg/L of salicylic acid (SA) as a radical scavenger was investigated on the degradation of 100 mg/L of BPA and the results showed BPA removal efficiency decreased from 100 to 45.6%. Due to depletion of removal efficiency in the presence of SA itconfirmed that SA is a strong hydroxyl radical ($^{\bullet}OH$) scavenger. Therefore, the oxidation with $^{\bullet}OH$ was the main mechanism involved in the BPA degradation. The results for cytotoxicity test of treated effluent of VUV/PS showed the toxicity of the BPA significantly decreased after treatment using this process. Therefore, the VUV/PS process is to bea very efficient and cost-effective process for the oxidation of BPA.

Keywords: Bisphenol A, Vacuum UV, Persulfate, Radical scavenger, Salicylic acid.

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The Removal of Formaldehyde from Concentrated Synthetic and Industrial Wastewater Using Advanced Oxidation Processes (Fenton and Photo-Fenton)

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Abstract

Formaldehyde is usually used as a raw material in many industrial processes. High levels of formaldehyde may be found in effluent of the industries. Formaldehyde appears to have the potential for DNA damage, cell mutagenicity and carcinogenicity. The aim of this study was to determine the performance of fenton and photo-Fenton processes in reduction of formaldehyde. This bench-scale experimental study was conducted on aqueous solution containing 215.91 mg/L of formaldehyde. The experiments were conducted at two stages. First, the optimum Fe and H_2O_2,Formaldehyde concentration,contact timeandpHwere determined. Then, the effect of the radiation was studied. The samples were taken from reactor in different time intervals and the residual concentrations of formaldehyde were measured by titration with acid according to the method ASTM D2194. The rates of formaldehyde removal from concentrated synthetic and real wastewater under the conditions include: pH 5.32, reaction time 72.5 min, Fe concentration 0.34 mg/l, H_2O_2 concentration 0.5 mole/L using fenton and photo-Fenton processes were 67.85%, 75% and 60%, 72%, respectively. According to the rates of formaldehyde removal from concentrated synthetic and real wastewater using photo-Fenton process, it can be used as a good process for treatment of wastewater pollution.

Key words: Formaldehyde, Advance oxidation, Fenton, photo-Fenton, Industrial Wastewater

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The Role of Decentralized Municipal Desalination Plants in Removal of Physical, Chemical and Microbial Parameters from Drinking Water: A Case Ctudy in Bushehr, Iran

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Abstract

Nowadays, a ccess to safe drinking water as become as a basic concern for human health and health protection. Decentralized municipal desalination plants have an important role in providing community drinking water. This study aimed to evaluate the role of decentralized municipal desalination plants in removal of physical, chemical and microbial parameters from drinking water in Bushehr, Iran and to compare the quality of outlet water with National and International guidelines for drinking water. In this cross-sectional descriptive study 50 samples were taken from 10 decentralized municipal desalination plants (5 times from every station). The mean values of physical, chemical and microbial parameters in outlet water were electrical conductivity (322.08 µS/cm), turbidity (0.0NTU), pH (6.84), alkalinity (61.2 mg/l), carbonate (0 mg/l), bicarbonate (61.2 mg/l) total hardness (82.96 mg/l), calcium hardness (73.8 mg/l), magnesium hardness (18.96 mg/l) as $CaCO_3$), calcium (29.52), magnesium (4.72), residual chlorine (0.37), chloride (25.61), TDS (161.04), iron (0.045), fluoride (0.167), nitrate (1.71), nitrite (0.0026), sulphate (107.17) mg/l, total coliform (0), fecal coliform (0) MPN/100ml and HPC (322.9 CFU/ml). Our results showed that 10% of HPC outlet samples were not in compliance with the INR, EPA, and WHO guidelines. On the other hand, the mean levels of examined parameters in desalination plants outlets were in compliance with the INR, EPA, and WHO guidelines. Moreover, decentralized municipal desalination plants efficiency in removal of measured parameters was in the range of 18.52% (in the case of nitrite) to 100% (in the case of turbidity).

Keywords: Bushehr, Drinking water guidelines, Decentralized municipal desalination plants, Water treatment

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Toxicity of By-products Resulted from Photodegradation of Toluene by UV/ZnO Process

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Abstract

Toluene by-products produced in zinc oxide/ultra violet (UV/ZnO) process may consist of toxic compounds. The aim of this study was toxicity evaluation of toluene by-products produced during its degradation during UV/ZnO process. The toxicities of toluene solutions (C_0 = 0.5, 5 and 50 mg/L) and their by-products produced during its degradation by UV/ZnO treatment were evaluated. The initial toluene solution and the effluent after photocatalytic treatment were used in bioassay tests performed with *Pseudomonas aeruginosa* at 6 h exposure and 50% effective concentrations (EC_{50}) were determined using probit analysis in SPSS ver. 16.0 software. Toluene with initial concentration of 0.5, 5, and 50 was decreased to 0.03, 0.38, and 7.34 mg/L after photodegradation within 180 min, respectively. According to the obtained values of EC_{50}, the effluent toxicity was 2-3-fold higher than that of initial toluene solution at all of the tested concentrations. The by-products of toluene photodegradation by UV/ZnO process induce more toxic effects on *Pseudomonas aeruginosa* and this phenomenon should be considered in the degradation of such compounds and preventive measures should be investigated for decreasing toxicity.

Keywords: Toluene, Toxicity, Pseudomonas aeruginosa, UV/ZnO process, EC_{50}.

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Treated Eucalyptus Leaf by $ZnCl_2$ as a Natural Adsorbent to Fluoride Removal from Aqueous Environments

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Abstract

Fluorine (F) has both beneficial and harmful effects on human health depending on its level. Several processes have been proposed for the removal of F from aqueous environments including adsorption, membrane separation, ion-exchange. In this paper the impact of $ZnCl_2$- treated Eucalyptus leaf as a natural adsorbent for F removal from synthetic solutions was investigated. In this study, to determine the adsorption capacity of ZnCl2 treated Eucalyptus leaf, we investigate the impact of various parameters like viz contact time, pH, adsorbent dose and initial fluoride concentration under controlled laboratory conditions. Then Langmuir and Freundlich coefficient were determined based on optimum conditions. The results of this study showed that The maximum adsorption capacity, at pH 6 was found to be 84.1 mg F/g of adsorpent with an adsorpent dosage of 0.5 g/L and an initial F concentrations of 50 mg/L. F remaining was measured using by the SPADNS method with a DR 5000 spectrophotometer (HACH Company, USA). F removal efficiency was increased with increasing of adsorbent, pH, contact time and F concentration. It was found that the data fitted to Langmuir (R2=0.8469) better than Freundlich model (R^2=0.5995). It has been concluded that Eucalyptus leaf is an inexpensive adsorbent and quite effective for F removal from aqueous environments.

Keywords: Eucalyptus, Fluoride removal, Natural adsorbent.

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Treatment of Petrochemical High-TDS Wastewater by Advanced Oxidation Process based on Persulfate Activated by UV/ZVI

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Abstract

Ultra violate irradiation and Zero–valent iron (ZVI) can effectively activate persulfate (PS) by generating free sulfate radicals ($SO_4^{\bullet-}$) and thereby presenting a promising technology for treatment of recalcitrant wastes, such as petrochemical wastewater with High-TDS. Therefore, this study examined the feasibility and application of UV/ZVI@PS system through batch experiments for the degradation of phenolic compounds (PCs) of high-TDS petrochemical wastewater. Effects of ZVI dosages (0.056–2.8 g/L), ZVI to PS molar ratio (0.1–5.0), PS concentration (2.5–25.0 mM), pH (3.0–11.0), contact time (5–240 min), and ZVI reusability (three cycle) on PCs degradation were examined using a 8W UV lamp. The influence of initial pH on chemical oxygen demand (COD) and total organic carbon (TOC) reduction was studied, too. The results showed that the PCs degradation increased with increase of ZVI dosage from 0.056 to 1.4 g/L, increase of persulfate concentration from 2.5 to 15.0 mM, and increase in ZVI to PS molar ratio from 0.1 to 2.5. The optimal initial pH for removal of PCs, COD, and TOC was 5.0 and the maximum removal efficiency of 70%, 43.5, and 46.5% (using ZVI@PS) and 89.5%, 65.7% and 68% (using UV/ZVI@PS) was achieved within 120 min, respectively. Moreover, the ZVI catalyst was reused until the third cycle to activate the persulfate and degrade PCs. However, the degradation efficiency of PCs gradually decreased to 51.7% in ZVI@PS system and to 73.2% in UV/ZVI@PS system when the ZVI reuse time increased. The results indicate that using ZVI@PS system is not an efficient method for the treatment of petrochemical effluent, due to the complexity of petrochemical wastewater matrix and High TDS content. However, the application of UV alongside ZVI for persulfate (PS) activation significantly increased the process efficiency for petrochemical high-TDS wastewater treatment.

Keywords: Persulfate, Zero valent iron, UV, Phenolic compounds, Petrochemical high-TDS wastewater

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Uisng Ozonation Process with Calcium Peroxide to Remove Metronidazole Antibiotic from Aquatic Solution

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Abstract

Metronidazole is one of the most widely utilized antibiotics, it possess an annular structure with different health effects including carcinogenic and mutagenic potential. Advanced oxidation processes are the most efficient and effective methods for decomposing dangerous organic contaminants that are resistant and non-biodegradable in the aquatic environments. The aim of this study was to determine the efficiency of ozonation process with calcium peroxide to remove antibiotic metronidazole from the aquatic environments.
This empirical research was carried out in the first half of 2016 at the Research Center of Environmental Health Engineering in Kerman University of Medical Science. A synthetic sample was prepared with a concentration of 5 to 40 mg/L of the antibiotic metronidazole. The removal efficiency of metronidazole and COD by ozonation and calcium peroxide in different conditions such as pH (3, 5, 7, 9 and 11), calcium peroxide concentrations (0, 0.025, 0.05, 0.075 and 0.1 mg/L), contact time (5, 10, 20, 30, 40and 50 min), concentration of the antibiotic metronidazole (5, 10, 20, 30 and 40 mg), and 1 g of ozone per minute were examined. The optimal conditions for synthetic samples were obtained. Metronidazole and COD removal under optimal conditions with real samples were also tested. All water and wastewater experiments were based on the standard methods with three replications. Data were analyzed using SPSS software version 18 and the results were reported with mean scores and descriptive statistics. The higher rate of metronidazole antibiotic and COD removal with a concentration of 5mg/L metronidazole, pH = 3, 0.025 mg/L of calcium peroxide, contact time of 40 min equal to 1g/min, were obtained in synthetic samples as 1.90%, 6.86%, 5.79%, and 71% in real samples, respectively. Due to the relatively high removal efficiency of ozonation with calcium peroxide for the removal of metronidazole as a resistant combination to decomposition, this method is an effective method for the removal of contaminants.

Keywords: Metronidazole, Aalcium peroxide, Catalytic ozonation, Advanced oxidation, Aquatic solution

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Using H2O2-based Photochemical Oxidation (UV/ H2O2) in Eliminating Paraquat from Aqueous Solutions

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Abstract

Paraquat (PQ) is a bipyridinium herbicide very soluble in water. This non-selective contact herbicide is widely used in agriculture for weed control. PQ In addition to the environmental impact, Paraquat affects the entire body system, especially the respiratory system, central nervous and lymph node. In this study degradation of paraquat using UV/H2O2 process were investigated.

In this research PQ degradation has been compared in UV/H2O2 using advanced oxidation processes. In this study Concentration of PQ, pH, H2O2 on PQ degradation efficiency in a laboratory scale were investigated. The residual PQ concentration and intermediate products amount were measured by HPLC and GC/MS measurement devices respectively.The results indicated UV, H_2O_2 alone processes can remove 26.5%, 3.2% of 25mg/L PQ and, UV/H_2O_2 process 87.75% of 25mg/L PQ under optimal condition (pH=3, H2O2=33mM-)in a 120min. TOC removal efficiency in UV/H_2O_2 77.29%, respectively. The results showed that the fusion processes for the removal of paraquat, mineralization and reduced toxicity have been better. Research has shown that processes (UV / HP) are more effective than the UV process alone and the H_2O_2 effect alone. This research showed that according to purification goals and standards for wastewater treatment, (UV / HP) process can be used as a past or final treatment.

Key words: Pesticide, Paraquat, Advanced Oxidation, (UV/HP)

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Using Natural Clinopetiolite Zeolite for Heavy Metals Removal in Waste Water and Determination of its Adsorption Kinitics and Isoterms

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Abstract

Recently the low-cost adsorbent for heavy metals removal such as Lead in recent years has been noticed by researchers. In this study, lead removal by clinoptilolite was investigated. Non-continuous lead absorption from aqueous solution was carried out by clinoptilolite. The zeolite characteristics were analyzed with SEM and XRD. The effect of pH variables (1, 3, 5, 7, 10), contact time (15, 30, 45, 60, 90 min), clinoptilolite adsorbent dosage (1, 3, 5, 7, 10 g), and lead concentrations (10, 20, 40, 50, 60, 70, 80 & 100 mg/L) were studied on lead removal efficiency, adsorption isotherms, and kinetics in constant temperature and stirrer speed of 250 rpm. According to the results, the optimum conditions of lead removal by natural zeolite were pH of 8, adsorbent dosage of 5 g/L, contact time of 45 min., and the highest removal efficiency of 89.6 were achieved. By increasing metal concentration, the amount of removed lead was decreased while absorption capacity increased. Of the two studied models, the Langmuir isotherm had better conformity for lead adsorption (R2=0.99) than other isotherms. Furthermore, the pseudo second order kinetics model had better conformity with achieved data than other models. Results of this study indicated that natural clinoptilolite zeolite can be considered as an efficient and cost-effective adsorbent for lead removal from aqueous solutions.

Keywords: Natural Clinoptilolite Zeolite, Adsorption, Lead Removal, Adsorption Isotherm

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UVC Assisted Persulfate for Removing Acid Carbolic in Aqueous Solutions the Effect of Operational Parameters and Kinetic Study

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Abstract

Acid Carbolic represent one of the aromatic compounds that can be emitted into wastewater from various industrial branches, mainly from pharmaceutical, plastics, wood products, paint, and pulp and paper manufacture. Such extensive use of this organic compound often poses problems in the form of toxic wastewater which requires treatment prior to disposal into receiving water bodies. Several methods such as physical, chemical and biological are available for the removal of Acid carbolic containing wastewater. Heterogeneous photocatalytic oxidation process is a promising technology for advanced wastewater treatment. Hence, this research aims to study the photochemical oxidation processes for the removal of Acid carbolic in aqueous solution.The UV photolysisand UV/SO_4^{2-} experiments were conducted in a batch-operated, cylindrical quartz photo reactor covered by stainless steel. Irradiation was provided by a UV-C light source being a low pressure Hg vapor lamp of 55W and located in the center of the photo reactor. The effects of pH (3, 7 and 10), different dosage of initial persulfate, initial Acid Carbolic concentration, have been investigated. The concentration of Acid carbolic was determined using DR-5000 spectrophotometer at wavelength of 500 nm. The results of this study indicated that the photodegradation processes is pH dependent and the highest Acid carbolic removal rate were obtained at pH=3 for process. Also, the results indicated that degradation of Acid carbolic increased in the presence of persulfate and influenced by its dosages. Meanwhile, the highest Acid carbolic removal rate was obtained in 50mM of initial dosages of persulfate. The direct irradiation results showed that the degradation of Acid carbolic was 42% after 60 min contact time in UV system without oxidants. The degradation of Acid carbolic by different processes followed first order rate decay kinetics.The present study indicated that UV/SO_4^{2-} processes hasd high potential in treating aqueous solutions containing Acid carbolic.

Keywords: Acid Carbolic, Degradation rate, persulfate, Photodegradation

Water Crisis Management with the Economic Approach in Water Market

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Abstract

Water crisis is one of the three crucial challenges in human societies in which about two thirds of the world's population (four billions) are facing water scarcity and health consequences. Therefore, in order to handle this issue, establishment of smart water management (SWM) system is necessary.This descriptive study was conducted retrospectively, by literature and scientific publications narrative review in scientific databases as well as provided statistics by national and international organizations which focused on economic approaches in water market as a novel method in water resources management. Population growth, economic development and climate change are the three main aspects for further pressure on water supply constraints. Planning and water resources management through several activities for managing the water supply in basin and local scale were the most concern in water crisis challenge for authorities. Unfortunately, these activities only emphasized on water supply policies which revealed that this policy could not lead to optimized management and allocation of water resources, so in many cases raised a deep split between water supply and demand and water crises intensification. The economic approach for integrated water management is inevitable. Water market based on supply and demand policies is a smart management approach and a comprehensive model which can be considered as an efficient tool for water resources allocation. Creation of balance between the features necessary to establish competitive markets and pay attention to the functioning of this market in public policy of water sector as a public good to meet sustainable development goals and resilience of water resources is necessary.

Keywords: Water market, Water crisis management, Smart water management, Economic approach.

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Xylene Removal from Aqueous Solution by a New Carbon Nano Tube Sheet

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Abstract

Removal of xylene (a toxic compound) from aqueous solution by modified multi wall carbon nano tubes (MWCNT) via silica as sheeted carbon nanotube (SCNT) was evaluated. The physicochemical properties of MWCNT such as structure and availability surface were improved due to convert tubes into sheets that caused significant increase in xylene adsorption. The equilibrium amount (q_e (mg/g)) in nano material's dose of 1g/l, xylene concentration of 10mg/l, contact time of 10min, and pH 7, for SCNT (q_e=9.8 mg/g) was higher than single wall carbon nano tubes (SWCNT) (q_e=9.2 mg/g) and MWCNT (q_e=8.9 mg/g). It is concluded that sheeted carbon nanotube due to their large surface area improve performance of xylene adsorption. Also carbon nano tube (CNT) recycling by heating, showed better adsorption performance for recycled SCNT. A comparison study on xylene adsorption revealed that sheeted carbon nanotube had better xylene adsorption performance as compared to CNT, carbon and silica adsorbents. This suggests that the SCNT is an efficient adsorbent for xylene removal in environmental pollutions cleanup.

Keywords: Sheeted Carbon Nanotube; Regeneration; Xylene; Wastewater Pollution

Main Topic:

AirPollution

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A systematic review of investigating the association between dust and their biological contamination with cardiovascular disease in Iran

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Abstract

PM is a mixture of particles that can adversely affect human health and includes dust, dirt, soot, smoke, and liquid droplets. The dust is one of the main air pollutants that include PM_{10}, which can have some adverse effects. The presence of pathogenic microorganisms in the dust can cause diseases such as Asthma, Pneumonia, and respiratory infections. This study aims to evaluate the association between dust and their biological contamination with cardiovascular disease. Five databases such as Science Direct, Pubmed, google scholar, SID and Scopus were searched by using keywords: particulate matters, biological contamination, cardiovascular disease and Iran in both English and Persian language, from 2010 to 2017. Of 437 identified articles, 25 were reviewed in-depth with PRISMA statement criteria. According to studies, biological contamination of dust is more often than gram-positive bacteria than gram-negative bacteria, and the number of bacteria and fungi in a contaminated air is higher than in conventional days. In addition, with a 1% increase in air pollution caused by dust, about 0.5% will be hospitalized for respiratory infections, 1% will be admitted to cardiac patients and about 0.3% will die in cardiac patients. In studies, found that the increase in the number of patients with bronchitis in the treatment centers increased by about 3.5% per 100 $\mu g/m^3$ PM_{10} concentration during the dust storm. According to results, the origin of dust in Iran, Arab countries are neighbors like Iraq. In addition, there is a direct correlation between increased dust concentration and cardiovascular disease, so that the amount of visits to the hospital increases in days of dust. However, it is recommending that more cross-sectional studies will be conducting in this context to claim more solid evidence of the sources of Dust and its association with cardiovascular disease.

Key words: Particulate matters, Biological contamination, Cardiovascular disease.

Adsorption of carbon dioxide from combustion gases of methane by amine modified MCM-41

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Abstract

Large amount of CO_2 emissions from the burning of fossil fuels will lead to environmental crisis. One method for removing CO_2 is adsorption by modified adsorbents. In this study, mesoporous silica, MCM-41, was modified with mono-ethanolamine by impregnation method and used CO_2 adsorption from combustion gases of methane. First MCM-41 was synthesized by using tetraethyl orthosilicate (TEOS) as silica source according to classic method. MCM-41 was modified with different amounts (25, 50 and 75%) of monoethanol amine (MEA) by impregnation method. Then the synthesized adsorbents were placed in tube serves as filter. Aadsorption experiments were conducted to determine sorption capacity by passing CO_2 in different concentration (2000-150000 ppm), different flow rate (100 – 400 ml/min), and different temperatures (25, 55 and 90°C) individually. CO_2 was analyzed by lpex Gasmeter. Regeneration of sorbents were conducted for desorption of carbon dioxide by passing nitrogen gas through filters containing spent sorbents and again the adsorption capacity of each adsorbent were measured in the subsequent adsorption process. MCM-41-MEA50% with an adsorption capacity of 38mg/g at 90°C, showed the highest adsorption capacity. Increasing the temperature from 25 to 90°C, increased the CO_2 adsorption capacity by 11%, but shortened the adsorbent saturation process. Also in experiments conducted by pure CO2 the adsorption capacity increased by 25% with increasing the CO_2 concentration from 30000 to 150000ppm, and decreased by 91% with increasing the flow rate from 100 to 400ml/min. Under normal conditions of methane combustion, physical adsorption of carbon dioxide was not suitable on MCM-41, but by using amine modified MCM-41 chemical sorption was led to increase CO_2 removal efficiency.

Key words: CO_2 adsorption, MCM-41, Amine Modified MCM-41.

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Air pollution around the Isfahan Bama mine area using geographic information system (GIS)

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Abstract

Air pollution is one of the most important environmental issues that its impact on human health has been proven in the twentieth century. It is one of 10 known major causes of increased mortality in the world. Therefore, the aim of the study was to monitor the concentration of PM_{10}, lead, and radon in the air surrounding the mine in Isfahan. This study was conducted in the summer season. Sampling was performed using fiberglass filters by a high volume sampler. Analysis of PM_{10}, lead, and radon was carried out by weight discrepancy, ICP device, and CR- 39 detector, respectively. The mean concentrations of PM_{10}, lead, and radon were 57.07 $\mu g/m^3$, 0.41 $\mu g/m^3$, and 466.78 (Bq/m^3), respectively that in most sampling stations were higher than the WHO and EPA recommendations. The highest concentration of PM10, lead, and radon was observed in the Southeastand West of the study area. Results of this study showed that high concentration of particulate matters (PM) in the Southeast of study area was mostly due to the vicinity of confluence of two main highways of Isfahan and construction activities of the commercial center (city center). But high concentration of lead and radon in West region and stations near the lead mine can be due to the mining activities and direction of the prevailing winds in the summer.

Keywords: Air pollution, Isfahan, Bama mine, GIS.

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Assessment of concentration changes and temperature effect on total volatile organic compound in the air of Yasuj city in Iran

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Abstract

Volatile organic compounds (VOCs) are among major pollutants in urban air, which can be associated with known effects and complications. Therefore, the aim of this study was to assess concentration changes of total volatile organic compounds (TVOC) and the temperature effect on the concentration of pollutants in the air of Yasuj city. In this cross-sectional descriptive and analytical study, the samples were collected from the main squares of the city of Yasuj during two cold and warm seasons at the traffic peak hours of vehicles (7-22) in accordance with full factorial design. This study was carried out in several stages. Firstly, direct-reading device (First Check) was used to measure the concentration of total volatile organic compounds. At this step, the digital device (Model HD_{50}, made in France) measured the temperature simultaneously. In the next step to determine the type of VOCs, environmental sampling pump and activated- charcoal sorbent tubes were used to collect some air samples. After sample preparation, the pollutants were extracted using carbon disulfide. Analysis of the samples was performed by GC-MS device. Data were analyzed using SPSS version 16 software. Based on the results, the mean TVOCs concentration in the air of Yasuj city was 1058ppb. The concentration of these compounds showed the highest value in the warm season and in the afternoon hours within the midweek days. Concerning the effect of temperature on TVOCs concentration, it can be said that the concentration of these compounds was enhanced with increasing temperature over 10ºC. With regard to the adverse effects of VOCs on human and environmental health as well as the role of these pollutants in the formation of photochemical oxidants, appropriate actions related to monitoring and controlling these compounds should be considered in urban air.

Keywords: Volatile Organic Compounds, Air Pollution, Outdoor Air Yasuj.

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Assessment the type and concentration of the dominant air born bacteria in the indoor air kitchen of restaurants in Babol city during 2014-2015

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Abstract

Bio aerosols enter into the human body through various ways (inhalation, ingestion or skin absorption) and make various health effects. The best conditions for bio aerosols life are high humidity and moderate temperatures. The aim of this study was to investigate the type and density of the predominant bacteria in two seasons -cold and warm- in the kitchen air of restaurants. This descriptive cross-sectional study was conducted on the air of restaurants' kitchen in Babol during two cold and warm seasons (winter and summer). Sampling was performed by using a personal sampling pump with impinger tank using a flow rate of 4 liters per minute during 50 minutes. Counting the colonies in the air was determined in terms of cfu/m^3 and the type of grown bacteria was identified using differential tests such as Gram staining and biochemical methods. Temperature and humidity were recorded at the time of sampling, too. Totally, 120 samples of bacteria were taken from indoor air of kitchen with and without air conditioning. Statistical analysis was conducted by using SPSS version 23. The results of the study revealed that the predominant bacteria were Gram-positive bacteria in the air of kitchen that Bacillus and Micrococcus were the most frequent. The majority were non-pathogenic bacteria. The highest and lowest density of bacteria in the kitchen in cold season was 15 cfu/m^3 and 63.7 cfu/m^3 and the highest and lowest density of bacteria in the kitchen in warm season was 19.6 cfu/m^3 and 80 cfu/m^3 respectively. The findings showed that the density of bacteria in various restaurants was different but the type of bacteria was similar in the environment. Due to humidity and the temperature (warmer), bacterial density was higher in summer than winter and type of bacteria was somewhat different, too.

Keywords: air sampling, bacteria, air pollution, Kitchen.

Association of polycyclic aromatic hydrocarbons urinary metabolites with their atmospheric concentrations in Isfahan

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Abstract

Polycyclic aromatic hydrocarbons (PAHs), as one of the most widespread persistent organic pollutants in the environment, are primarily formed during the fossil fuel combustion, biomass combustion and release of crude oil, petroleum and coal tars products. Both short and long-term exposure to PAHs could cause harmful health effects. This study aims to determine the atmospheric concentrations $PM_{2.5}$-bounded polycyclic aromatic hydrocarbons (PAHs) and their association with their urinary metabolites in children and adolescents. This study was conducted from October 2014 to March 2016 in Isfahan, Iran. We measured 16 species of PAHs bounded to PM 2.5 by gas chromatography mass spectrometry (GC/MS) from different parts of the city. PAH urinary metabolites were measured in 186 children and adolescents, randomly selected from households. Urinary metabolites consisted of 1-hydroxy naphthalene (1-naphthol), 2-hydroxy naphthalene (2-naphthol), 9-hydroxy phenanthrene (9-phenanthrol), and 1hydroxy pyrene using GC/MS. Considering the short half-lives of PAHs, we measured the metabolites twice with 4 to 6 months of time interval. We found that the ambient concentrations of PAHs were significantly associated with their urinary metabolites. 1-hydroxy naphthalene and 2-hydroxy naphthalene concentrations showed an increase of 1.049 (95% CI: 1.030, 1.069) and 1.047 (95% CI: 1.025, 1.066) for each unit increase (1 ng/m3) in ambient naphthalene. Similarly, 1-hydroxy pyrene showed an increase of 1.009 (95% CI: 1.006–1.011) for each unit increase (1 ng/m) in ambient pyrene concentration after adjustment for body mass index, physical activity level, urinary creatinine, age, and sex. The association of urinary 9-hydroxyphenanthrene and ambient phenantherene was significant in the crude model; however after adjustment for the abovementioned covariates, it was no more significant. We found significant correlations between exposure to ambient PM-bounded PAHs and their urinary excretion. Considering the adverse health effects of PAHs in the pediatric age group, biomonitoring of PAHs should be underscored; preventive measures need to be intensified.

Keywords: Polycyclic aromatic hydrocarbons, Atmosphere, Urinary metabolites, Children and adolescents.

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Biomonitoring of heavy metals contents associated with Ahwaz air pollution by using fibers of Date Palm (Phoenix dactlyliferal)

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Abstract

Trace metals are currently of much environmental concern. They are harmful to humans and animals and tend to bioaccumulate in the food chain. The increasing anthropogenic activities intensifies the emission of various pollutants into the environment and introduces different types of harmful substances into the atmosphere. The use of plant tissues in sampling has long been shown to be an effective indicator of atmospheric pollution. The aim of this study is to determine the pollution levels of Pb, Fe, Cr, Ni, and Cd using P. dactylifera L. as a biomonitor in Ahwaz. The date palm fiber samples were all collected from each of the following types of sites: industrial, highway, residential, and control. Two grams of the powdered fiber sample was accurately weighed and transferred into the muffle furnace and ashed at about 480℃. The ash was dissolved and mixed with 10% HNO_3 solution, filtered into 25 ml polyethylene volumetric flasks through 45 mm filters, then diluted to mark with 1% (v/v) HNO_3 solution. Metal concentrations were measured using ICP-OES. The mean concentrations of the metals in fiber were ordered as follows, respectively: Fe > Ni > Pb > Cr > Cd .the highest metal concentrations were found in the industry and heavy traffic sites, while the lowest metal concentrations obtained in the control site. The data obtained in this study showed an increase in the heavy metals concentration with increased industrial activities. The high metal concentration in plant samples was mostly due to the density of heavy traffic which is considered as one of the major sources of metal contamination. The presented results show that date palm (P. dactylifera L.) fibers can be used as an inexpensive biomonitor of heavy metal contamination in areas subjected to industrial and traffic pollutions.

Keywords: Biomonitoring, Date palm, Phoenix dactylifera L., Heavy metals, Air pollution.

Capture of CO_2 from combustion gases of methane by activated carbon and zeolite

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Abstract

The global average concentration of CO_2 in Earth's atmosphere has increased from about 280ppm from the pre-industrial revolution period (early 1900) to the current levels of 400 ppm. One method for reducing CO_2 emission is absorption by physical absorbents. Among physical absorbents, activated carbon has attracted considerable attention due to its abundance, low cost, high temperature stability, and low sensitivity to moisture, high surface area and high CO_2 absorption capacity. Also, natural zeolite has shown promising results in CO_2 separation from a gas mixture. The purpose of this study is to measure and compare the CO_2 absorption capacity of activated carbon and zeolite under normal conditions of methane combustion. Zeolite and activated carbon purchased and then were placed in glass tubes serves as filters. Aabsorption experiments were conducted to determine sorption capacity by passing CO_2 in different concentration (30000-150000 ppm), different flow rate (100– 400 ml/min), and different temperatures (25, 55 and 90 $^{\circ}$C) individually. CO_2 was analyzed by l pex Gasmeter. Regeneration of sorbents were conducted for desorption of carbon dioxide by passing nitrogen gas through filters containing spent sorbents and again the absorption capacity of each absorbent were measured in the subsequent absorption process. In natural condition of burning methane, absorption was not observed. But in experiments conducted by pure CO_2, zeolite and activated carbon with an absorption capacity of 48mg/g and 30mg/g at 25 $^{\circ}$C, showed the highest absorption capacity. Increasing the temperature from 25 to 90 decreased the CO_2 absorption capacity of zeolite and activated carbon by 90%, and 83% respectively. Also the absorption capacity of zeolite and activated carbon increased by 18% and 36% with increasing the CO_2 concentration from 30000 to 120000 ppm, and decreased by 87% and 86% with increasing the flow rate from 100 to 400ml/min. In natural condition of burning methane, physical absorption of carbon dioxide was not suitable on zeolite and activated carbon; and these physical absorbents are efficient just in the absence of moisture.

Key words: CO_2 absorption, Zeolite, Activated Carbon.

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Carbon dioxide removal and biomass production from methane combustion gas in a photobioreactor by using microalgae Spirulina

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Abstract

Global warming and climate change are one of the most important human problems in the third millennium. The concentration of carbon dioxide in the atmosphere is increasing day by day due to the use of fossil fuels and deforestation. One of the possible ways to absorb carbon dioxide is to use photo biorectors. The aim of this study was to determine the amount of carbon dioxide uptake and biomass production in photo bioreactor containing microalgae Spirulina growth medium by injection of combustion gases of natural gas. Two photo bioreactors were fabricated and filled with growth mediumlack of any carbon source. In the control reactor air was fed into inlet of reactor and in the test reactor combustion gases of methane was injected by diffusers. Light sources were natural and artificial. Artificial light source was four fluorescent lamps having 10 Klux intensity operated in continuous and intermittent On-Off mode. Concentration of carbon dioxide in the inlet of reactors was 580 to 5000 ppm measured by ND-IR CO_2 meter. Maximum production of algae was 0.07 and 0.2 gL^{-1} d^{-1} and maximum concentration of biomass was 0.25 and 1.04 gL^{-1}in the control and test reactors respectively. By using 3300 and 4100 ppm of carbon dioxide in the inlet of reactors, the biofixation rates was 2.5 and 3.3%, respectively. Biomass productivity with intermittent light was 35% less than continuous light. By increasing carbon dioxide concentration in the inlet of the reactors, algal biomass production was increased. Combustion gases of Methane can be injected directly, without prior treatment, in the photo bioreactor and it is possible to remove carbon dioxide and produce algae biomass.

Keywords: Carbon dioxide, Spirulina, Biomass, Biofixation, Flue gas.

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Determination of CO concentration in the indoor and outdoor air of the Residential Places in Sarayan city in the winter in 2017

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Abstract

Today, air pollution caused by humans is a serious problem. One of the major sources of carbon monoxide air pollution is called the "silent killer". In Iran, due to the ever increasing population and the widespread use of vehicles and other sources of fossil fuels, we are witnessing significant deaths caused by carbon monoxide poisoning. The purpose of this study is to measure the CO concentration in the indoor and outdoor air of the Residential Places in Sarayan city in the winter. In this descriptive-analytical study, the air in the indoor and outdoor air of the Residential Places of the city of Sarayan was studied to measure the amount of carbon monoxide in a three-month period from January to March 2017. A total of 25 stations were identified at the city level and Sampling locations were selected with almost uniform distribution in all areas of the city. The total number of samples taken per month was 50, with a total sample size of 150, including 3 months of sampling. Sampling was done from 11am to 3 pm. Most samples were taken inside Residential Places in the kitchen. The concentration of carbon monoxide in a height of 75-150 cm (the respiratory region in sitting and standing position) and at least 2 hours is measured using a TES model of carbon monoxide. Data was collected by SPSS-16 software. Descriptive statistics were analyzed by Mann-Whitney and Kruskal-Wallis statistical tests at alpha level of 0/05. Average concentration of carbon monoxide was 0/84±3/21 ppm in the indoor environment and was 0/27±0/92 ppm in the outdoor environment in different months. The highest CO concentration was at 6 ppm for station 4 in outdoor air and the lowest amount was zero ppm in February. The highest CO concentration was 41 ppm for stations 11 in the indoor air in January. According to the obtained results, CO concentrations are well below the guideline values and, therefore, Sarayan indoor and outdoor air quality is acceptable in terms of CO indicator.

Keywords: Carbon monoxide, Indoor air, Outdoor air, Sarayan.

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Estimation of lung cancer mortality attributed to long-term exposure to $PM_{2.5}$ in 25 Iranian cities during 2015-2016; an AirQ+ Modelling

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Abstract

Long-term exposure to particulate matter with an aerodynamic diameter less than 2.5 µm is associated with lung cancer incidence. This study aimed to estimate the number of deaths attributed to lung-term exposure to $PM_{2.5}$ among people older than 30 years in 25 cities of Iran during 2015-2016 using AirQ+ modelling software. Validation of monitoring stations was conducted according to APHEKOM and WHO's criteria for health impact assessment of air pollution. As AirQ+ needs, 24-h concentrations of $PM_{2.5}$ during a year, total population and at-risk population, baseline incidence of lung cancer, as well as cut-off value of 10 µg/m3 for $PM_{2.5}$ concentration were prepared and entered into the model. Annual concentrations of particulate matter in all cities were 1.7 to 6.7 times higher than the WHO's guideline. The most and least cases of lung cancer deaths due to $PM_{2.5}$ were estimated to be in Tehran, Birjand, Yasouj, and Ilam, respectively. Total mortality rate of lung cancer attributed to $PM_{2.5}$ in these 25 cities was 401 cases. Since long-term exposure to $PM_{2.5}$ imposes financial losses to countries, results of this study can be useful for decision-makers to highlight areas requiring urgent action.

Keywords: Particulate matter, Ambient air pollution, AirQ plus, Public health, Tehran.

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Evaluation of cardiovascular and respiratory mortality attributed to ground-level ozone in Bandar Abbas using AirQ model

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Abstract

Epidemiological studies have shown that air pollution is one of the main causes of morbidity and mortality during past two decades. In recent years, Bandar Abbas has experienced accelerated and wide spread urban growth due to its strategic location (located in north of Persian Gulf), proximity to main export and import ports and existence of several industrial zones near it and dealing with increased air pollution during recent years. The aim of the present study was to quantify the health effects of ground-level ozone in Bandar Abbas city using AirQ model. Hourly data for ozone concentration was obtained from environmental protection agency of Bandar Abbas. Ozone concentration was corrected for temperature and pressure and averaged. Thereafter, the data were validated, coded and averaged. The processed data were entered into the AirQ model in order to quantify the ozone health effects (total, cardiovascular and respiratory mortality). The results showed that 1.518% (95% CI: 1.017-2.505%) of total, 2.505% (95% CI: 1.017-3.472%) of cardiovascular and 6.262% (95% CI: 3.472-7.157%) of respiratory mortality were related to ground-level ozone concentrations above 10 $\mu g\ m^{-3}$. Therefore, the cumulative number of total deaths attributed to this pollutant in Bandar Abbas city was estimated to be 140 cases. The AirQ model showed that the ambient air concentrations of ozone pose adverse health effects in Bandar Abbas. The precursors for the production of this secondary air pollutant may be originated from road traffic (urban and suburban), heavy industrial activities and even heavy ship traffic near the coast. Unfortunately, there is lack of sufficient data for current status of ambient air quality in Bandar Abbas. Undoubtedly, existence of reliable information about the status of air quality is a prerequisite for the development of integrated air pollution control strategies. Therefore, the environmental protection authorities need to plan and install sufficient air quality monitoring stations throughout the city.

Keywords: Air pollution, Bandar Abbas, AirQ model, Ground-level ozone, Mortality.

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Evaluation of Ischemic Heart Disease (IHD) and Chronic Obstructive Pulmonary Disease (COPD) mortality attributed to atmospheric $PM_{2.5}$ (2015–2016 year)

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Abstract

Air pollution represents the main environmental risk to health. The World Health Organization (WHO) reported that ambient air pollution accounts for around 6.7% of total deaths worldwide. At the first time, the assessment of the burden and impacts of air pollution on health is operated through a AirQ plus. There are 22 air pollution monitoring stations in the Mashhad city. Based on WHO guideline, some cases out of the data taken from the stations were excluded from the study and 7 stations were used, cover in urban areas of the Mashhad. The annual average and maximum concentration of $PM_{2.5}$ was respectively 29.70 $\mu g/m^3$ and 82.28 $\mu g/m^3$, its value is 3.29 times greater than the provided guide line (25 $\mu g/m^3$).The estimation of health effects caused by PM was carried out based on incidence obtained from the GBD (Global Burden of Diseases). With regard to IHD mortality rates and COPD caused by PM in the study year 25.03 and 3.58 (per 100k) respectively. In our study, 406 cases of the IHD mortality (40.01- 66.35 %) and 14 cases of the COPD mortality (4.76- 19.81 %) in Mashhad was attributed to $PM_{2.5.}$ The outcome of this study has a good compatibly with other studies conducted on the air pollution effects.

Key words: Air pollution, Particles Matter, Health Effects, AirQ +, Mashhad.

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Evaluations of mortality due to exposure to outdoor air pollutants in Isfahan

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Abstract

Long-term exposure to air pollutants can cause spread of cardiovascular, respiratory, decreased lung function, and chronic bronchitis diseases as well as lung cancer, and death. The results of studies on short- and long-term effects of air pollutants were expressed based on the hospital admissions, referral to physicians, number of cases of a particular disease, mortality, and lost years of life. This descriptive study evaluated the health effects of PM_{10}, $PM_{2.5}$, O_3, SO_2, and NO_2 Was by Air Q2.2.3 software that is recommended by the World Health Organization (WHO). The aim was to obtain the health effects of air pollutants on the population health. The results showed that the concentration of air pollutants was higher in winter due to the cold weather since the study was conducted in winter. The number of mortality attributed to PM_{10}, $PM_{2.5}$, O_3, SO_2, and NO_2 was 481, 493, 117, 102, and 54 cases, respectively. Among the aforementioned pollutants, the highest health effect was related to PM10. The number of mortality caused by cardiovascular diseases attributed to PM_{10}, $PM_{2.5}$, O_3, and SO_2 was 224, 43, 83, and 120 cases, respectively. In addition, the rates of mortality caused by respiratory diseases were 40, 11, and 13 cases, respectively. In the present study, to evaluate the adverse health effects of air pollutants Air Q software was used. The findings showed that the number of mortalities caused by these pollutants in Isfahan was considerable. So, it can be said that 15.8 % of the total mortality rates in Isfahan are related to the aforementioned pollutants. Despite its limitations, this software can provide useful information to city officials, health care providers, and policy makers for planning and promoting the public health.

Keywords: Air pollution, Mortality, Air pollutants, Isfahan, Air Q software.

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Examination of air pollution control attitudes in Tehran from the perspective of high-risk groups

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Abstract

Tehran is one of the eight polluted cities in terms of air pollution, which affects the lives of high-risk individuals, including the elderly and pregnant women. Therefore, the present study aimed to investigate the main attitudes of air pollution control in Tehran from the perspective of exposed groups. This cross-sectional study was carried out in 2017 among 300 people (150 pregnant women and 150 elderly people as risk groups) with easy sampling in Tehran. Data were gathered through a questionnaire consisting of 25 questions about demographic information and attitude of people about air pollution control in Tehran. Descriptive statistics were used to analyze the data. 75 percent of pregnant women and 92 percent of the elderly have been forced to stay at home for several years now, due to air pollution. 56.6 percent of pregnant women and 61.3percent of elderly people were told that they used personal cars as the main cause of air pollution in Tehran and demanded heavier penalties for worn-out and pollution-producing machines. 25 percent of pregnant women and 19.3 percent of elderly believed in publishing standards, which introduced factories to pollute the air and called for increased taxes on factories around Tehran. 69 percent of pregnant women and 80 percent of the elderly demanded constant measurements of urban air quality and pollutants from cars and factories. The results showed that high risk individuals in the present study emphasize compliance with air pollution standards. Therefore, it is suggested that in the city of Tehran, as with other polluted cities of the world, four main approaches to air pollution control (standard publishing, air quality standard, publishing and cost of profits) should be considered in order to reduce air pollution and improve the health of people.

Keywords: Attitude, Air Pollution, Pregnant Women, Elderly.

Health impact assessment of exposure to particulate matter and carbon monoxide in the air of Tehran in 2013-2014

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Abstract

The poor state of air quality is most important environmental problem in the major cities that endanger the health of residents. Therefore this study was done with the aim of quantification and estimation of the health effects attributed the pollutants $PM_{2.5}$ and CO in metropolis of Tehran in 2013-2014 by AirQ model. In this cross-sectional study, required data were collected from environmental organization and center of air quality control in Tehran. Data were analyzed by Excel software, and the processed data was imported to the AirQ model. Then the attributed proportion was estimated and finally, results were presented as mortality and morbidity in tables and graphs. The results showed that the average annual concentration of $PM_{2.5}$ was 43 $\mu g/m^3$ and it is about 4.3 times the national standard of clean air Iran and WHO guidelines. Annual concentration of CO was 2 mg/m^3 which was not exceeded the standard limit. According to baseline incidence of 543.5, the total number of mortality attributed to $PM_{2.5}$ was about 2842 and the cardiovascular mortality attributed to CO in baseline incidence of 497, was 31; which contains 4.75% and 0.92% of total deaths of this city (except accidents), respectively. The results showed increase of these pollutants and air pollution in the Tehran air which requires more attention of the authorities and experts to control.

Keywords: Air pollution, Health Effects, Particulate Matter, Carbon monoxide, AirQ model.

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Influence of air pollution on chemical quality of wet atmospheric deposition: a case study in Urmia, Iran

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Abstract

Increased combustion of fossil fuel owing to the energy requirement is a main cause of air pollution throughout the world. Atmospheric precipitation is considered as a major water resource for indoor, municipal, industrial and agricultural uses. This study was aimed to evaluate the effect of air pollution on chemical quality of rain and snow in Urmia, a city in northwest of Iran. Sampling was performed during the wet seasons from October to March at six sampling stations in different locations of the city. Acidity, alkalinity, NO3- , SO42-, Cl- and pH contents of the collected samples were analyzed. All samples showed a pH value of more than 6.8, and lower acidity than alkalinity, therefore, the precipitations were not acidic. Maximum concentrations of SO42- and NO3- in the samples were 5 and 8.8mg/L, respectively. Chloride was varied from 1 to 11.5 mg/L with the highest measures observing in autumn. According to the results, concentrations of the analyzed parameters in wet precipitations in Urmia were within the natural ranges except chloride ions, which was higher than its common level in the atmosphere. This phenomenon may be the result of desert dusts which transfers by wind from the west border to Iran.

Keywords: Atmospheric precipitation; Chemical quality; air pollution; Urmia.

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Investigation of the type and extent of density of bio-aerosols in the air of educational hospital wards of Kerman city, 2014

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Abstract

Emission of bio-aerosols in the air of hospital wards plays an important role in development of different infections. Quantitative and qualitative estimation of microorganisms in the air of these wards is of importance as it is an index for environmental cleanness of different hospital wards. The study was done with the aim of investigating the degree of diversity and density of bio-aerosols in the educational hospitals of Kerman City. This descriptive-cross-sectional study was done in the second half of 2014 in the educational hospitals of Kerman City, possessing over 300 beds. As large as 200 samples were collected from the air of different wards of every hospital using the standard method of national occupational health and safety institute. Following collection, the samples were placed inside an incubator for 48 hours and detected, after which the data were reported in terms of colonies/m^3. The results indicated that the maximum and minimum degree of bacterial density were observed in operation room and the intensive care unit (ICU) of Shafa Hospital. Furthermore, the ICU of Afzalipour hospital had the lowest level of fungal contamination, while the ICU of Bahonar Hospital had the highest level of fungal contamination, when compared with other studied wards. The emitted fungi of Aspergillus and Penicillium along with the bacteria, staphylococci and Acinetobacter had the greatest frequency. As the density of bacteria and fungi in 73.3% of the space of the studied wards across educational hospitals of Kerman City is greater than the guideline proposed by the American industrial health state conference, thus it is suggested that by stipulating some rules for this important issue in the country's hospitals, necessary measures with regard to continuous monitoring, promotion of disinfection level, and ventilation system are more seriously adopted.

Keywords: Investigation, Density, Bioa-erosol, Hospital, Kerman

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Investigation of total PAHs intake in Tehran residents and estimating the relative contribution of exposure through ambient air

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Abstract

Human are exposed to polycyclic aromatic hydrocarbons (PAHs) from multiple pathway, including indoor and outdoor air, water, and foods. Biomonitoring is a useful tool to evaluate the total internal intake of PAHs; however it is impossible to differentiate the amount of exposure from each pathway by biomonitoring alone. The aim of this study was to investigate the relative contribution of ambient air in total PAHs intake in general population of Tehran, Iran. Urine samples were collected from 222 participants who were living in the urban area of Tehran for PAHs metabolites analysis. Atmospheric concentrations of particulate-bound polycyclic aromatic hydrocarbons (PAHs) were also determined. PAH intake doses were modeled using ambient air concentrations of PAHs and urinary levels of selected PAHs metabolites. Based on the obtained results the mean total internal intake for naphthalene, fluorene, phenanthrene, and pyrene were 12.93, 4.27, 3.68, and 15.75 micrograms per day, respectively. The mean and median of total internal intake from these four compounds were 36.64, and 29.03 μg/day which is higher than those reported in many similar studies conducted around the world. Results showed that the relative contribution of ambient air in naphthalene, fluorene, phenanthrene, and pyrene intake were 4.48%, 5.06%, 4.41%, and 0.07% respectively. The results showed that the approximately 14% of total intake of these selected PAHs was contributed to ambient air which is higher than those reported in similar studies and reveal that ambient air in Tehran is an important source of exposure to PAHs.

Keywords: Air pollution, Biomnitoring, Environmental Toxicology, PAHs.

Isolation and identification of antibiotic resistant airborne bacteria at intensive care units of four teaching hospitals

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Abstract

The importance of the airborne route of transmission in the epidemiology of hospital acquired infection (HAI) has gained much attention in the past two decades.The air transmission may have more effecton intensive care units (ICUs), because the patients who require intensive care haveunstable clinical conditions and are more sensitive to infections.This study aims at evaluating antibiotic resistant airborne bacterial isolates at intensive care units of teaching hospitals. A cross-sectional study was conducted at four teaching hospitals in Isfahan. Air samples were collected by using autoclaved all-glass impingers (AGI).Identification of airborne bacteria was conducted using cultured plates with and without five selected antibiotics. The resistant isolates were analyzed by PCR for the presence of 7most common encoding genes. The prevalences of antibiotic resistance airborne bacteria ranged from 5.93 to 37.34%. The oxacillin resistant isolates had the highest prevalence followed by ceftazidime-, vancomycin-, gentamicin- and cefazolin- resistant bacteria. All selected genes were detected in airborne resistant isolate with the highest and lowest frequency for *OXA23* and *AAC (3) -I*, respectively. A high frequency of *mecA* (21%) and *blaTEM* (34%) genes was detected in isolates.Identification of *OXA-23* along with *OXA-51* demonstrated that the species of *Acinetobacter* were*A baumannii*.methicillin-resistant *Staphylococcus* (MRS) spp were the second most predominant resistantbacteria in all ICUs isolates. The study confirms that hospital air is a potential route for transmission of antibiotic resistant airborne pathogens in ICUs. Identification of *Staphylococcus* spp and *A baumannii* as the most dominant antibiotic resistant bacteria indicated the potential role of airborne bacteria in disseminationof nosocomial infections in ICUs.

Keywords: Airbone, Bacteria, Antibiotic, Resistance, Intensive care unit.

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Macrokinetics of hydrogen sulfide removal in a polyurethane foam/palm fiber-based biofilter under acidic conditions

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Abstract

Removal of hydrogen sulfide (H_2S) from industrial air streams is crucial due to the odor nuisance, toxicity and corrosive action of this compound. Biofiltration is the most common biological treatment technology for the treatment of polluted air because it is environmentally friendly and cost effective. Aerobic bioconversion of H_2S in biofilters is accompanied by bed acidification. This study aimed to analysis the macrokinetics of H_2S removal in a biofilter packed with a mixture of polyurethane foam and palm fiber under acidic conditions. The experiments were carried out on a lab-scale multi-stage biofilter with air flow rate of 6.6 L min^{-1}. It was irrigated once per day with 1 liter of a solution containing essential growth nutrients. H_2S concentration was measured according to EPA Method 11. The experimental data for H_2S elimination capacity (EC) were analyzed by Michaelis-Menten and Haldane macrokinetics. During the operation of biofilter, the pH of leachate dropped to below 2. Under such extreme acidic conditions, a maximum elimination capacity (EC_{max}) of 39.8 g $m^{-3}h^{-1}$ was obtained in the first two sections of the biofilter. The value of R^2 between experimental and calculated EC values for Haldane model (0.98) was more than that of Michaelis-menten kinetic model (0.91). In the other hand, the ECmax calculated with Haldane model (38.9 g $m^{-3}h^{-1}$) compared to that of Michaelis menten model (46.7 g $m^{-3}h^{-1}$) was closer to the experimental EC_{max}. Therefore, the Haldane kinetic model better described the H_2S removal behavior in the biofilter under acidic conditions. Based on the kinetic coefficients of this model, it was found that the "EC_{max} in the absence of inhibition" (116.6 g $m^{-3}h^{-1}$) was far higher than the calculated actual EC_{max}. This study showed that the removal of H_2S in the acidified biofilter well described by Haldane macrokinetic model. This model showed significant inhibitory effect of high H_2S loading rates on its removal within the biofilter. Therefore, though the polyurethane foam/palm fiber-based biofilter efficiently removed H_2S, its performance may be improved through controlling the extreme acidic conditions.

Keywords: Biofiltration, Hydrogen Sulfide, Macrokinetic analysis, Acidic conditions

Measurement of radon concentration in public places of Kahrizak city

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Abstract

Radon is one of the most important sources of natural radiation, which contributes to about 50% of natural exposure of people to radon around the world. According to the World Health Organization (WHO), exposure of people to radon in the world is the second leading cause of lung cancer after smoking. Poor ventilation of closed environments can increase the concentration of radon entering from the ground. This study was conducted to determine the concentration of radon gas and to compare the result with the EPA and WHO standards in public places of Kahrizak City. In this analytical-descriptive (cross-sectional) study, radon gas concentrations was measured in 23 public places using Alpha Track detector equipped with a polymer film CR-39. After three months, detectors were sent to lab for analysis. Findings of this study showed that, the minimum and maximum concentrations of radon were 18.9 and 95.96 Bq/m^3, respectively. Most of the public places had annual doses of 0.8-1.6 m Sv/y. The GIS map of Kahrizak city faults showed that the highest average concentration of radon in the public places was near the faults. In these areas, the average concentration of radon was between 70 and 100 Bq/m^3. On average, 73% of total radon concentration measured in public places was lower than the EPA standard and was in the safe range; but, 26% of this rate was in the low-risk range. The high number of students as well as class renovations had a negative effect on the levels of pollutants. The only solution for these problems is proper design of schools or installation of mechanical ventilation systems for fresh air. In this study, the concentration of radon in all public places was in line with WHO guidelines. Therefore, with increase in credits and people's awareness about hazards of radon gas, precise investigations are recommended on parameters affecting concentration of radon gas in buildings.

Keywords: Radon gas, Lung cancer, Public places.

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Primary DNA damage in Taxi drivers with traffic related air pollution exposure: results of comet assay test

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Abstract

Several studies have shown that DNA damage increase the risk of diseases such as cancer. One of the tests that used to assess the damage to DNA is Comet Assay. In this study, the initial damage caused by exposure to traffic-related air pollution was studied. In this analytic cross sectional study we investigated 104 taxi drivers in Yazd-Iran Peripheral blood sampling was performed. Microscopic analysis was performed under 400 magnification fluorescent microscope. Imagej software was used for image analysis. Data were tested by Kolmogorov–Smirnov test and Mann–Whitney U-test. Correlation analysis was performed. In this study all participants were male. The mean ± SD of age and experience of the study population was 45.8±11.59 and 11.31±8.67 years, respectively. There was no significant difference between smokers and non-smokers in comet parameters. There was no significant correlation between Comet parameters and workload. There was direct and significant correlation between all parameters of comet. Between Tail intensity parameter and age after elimination of the confounding effect of smoking, there was a significant correlation. This study showed that the drivers had to deal with traffic related air pollution in terms of vulnerability DNA are exposed to little risk.

Keywords: DNA damage, Comet assay, Taxi driver.

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Quantifying the health effects of suspended particles PM_{10} using AirQ software in Yazd 2016

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Abstract

One of the most important environmental and health issues in the developed and especially developing countries is air pollution. In Iran and especially in industrial cities, air pollution is one of the problems people and authorities of the city are faced with. Suspended particulate matters have adverse health effects on urban communities in developed and developing countries. Health effects of suspended particles are extensive, but are mostly related to respiratory and cardiovascular diseases. To illustrate the effects of air pollutants on humans, several indicators can be used. One of the most important methods of quantifying impacts is to estimate the effects of each pollutant at any given time and place. One of the most reliable methods for quantifying the effects of air pollution is using AirQ2.2.3 software, introduced by the WHO. The highest proportion of health effects attributable to air pollutants in the city of Yazd is related to particulate matters (PM_{10}). The total deaths attributed to PM10 in 2016, calculated by the mentioned software, were about 305 cases. The results of this study show that the most important air pollutants were suspended PM_{10} particles in 2016. The average 24 hour concentration of suspended particles was 10 times more than the national standard of EPA air quality. The average annual concentration of these pollutants was about 4.1 times higher than the national standard of Iran and the WHO guidance values.

Keywords: Suspended particles, Quantification, AirQ software.

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Special Variations of PM_{10} and Meteorological Parameters as an Alarming Sign for the Occurrence of Severe Dust Storms in Ahvaz

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Abstract

Air pollution is one of the most important issues for all societies in arid areas, imposing deleterious effects on the environment, public health, economy, culture, and other sectors. In this study, we investigate severe dust storms (PM_{10} > 3200 µg m^{-3}) between 2008 and 2012 to characteristic if there are any consistent factors that precede the most severe period of such storms to use as an alarming tool. For the nine cases examined, there was always an 'initial' PM_{10} mass concentration peak (137-553 µg m^{-3}) that was 18-36 h before the 'dominant' peak of the storm (3279-4899 µg m^{-3}). The maximum wind speed over the multi-day periods examined for the dust storms is usually observed ± 3h around the initial PM_{10} peak. The minimum air pressure occurred ~6 h after the initial PM_{10} peak. In general, city managers of this city can announce citizens (especially children and elder people) and industry 19 hr before severe dust event to be ready for emergency situation.

Keywords: Initial PM_{10} peak, Dust storm, Air pressure, Wind speed

Tehran dust storms' classification using hoffman index in 2014

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Abstract:
In recent years, increasing in the concentration of particles smaller than 10 micron in Tehran has been changed to the main problem of air pollution in the city and its main cause may be attributed to the increased occurrence of dust storms in Iran. Dust storms produce large quantities of dust and transfer them to enough distance. They can lead to a rise in the PM concentration and reduce the visibility. The aim of this study was to classify Tehran dust storms using Hoffman index. At first, PM_{10} hourly concentrations' data were analyzed with Excel software. Then, three parameters including wind speed, visibility, and PM_{10} concentration were used to determine the dust stormس by Hoffman indices for Tehran metropolitan during 2014. Later, the results were compared with weather reports by means of sensitivity and specificity analysis tools in R software.Results showed that sensitivity and specificity of Hoffman index were 1 and 0.98, respectively. Therefore, Hoffman method is useful in determining the sensitivity, specificity, and diagnosis of dust storms. It can also be an appropriate indicator of trend over time to forecast the dust storms.

Key words: Dust storm, Hoffman index, PM_{10} concentration.

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The amount of Iron and Copper dust in the underground copper mine

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Abstract

Exploitation of mines is one of the most important human interactions in nature and can cause changes in ecosystems. One of the environmental hazards created in the exploitation of mines is the creation of dust in and around the mine. Copper mines are considered to be the most important mines in Iran. In this study, the amount of copper and iron dust in and around an underground copper mine in southern Khorasan province was investigated. A sample of dust was collected using a MCE gelatin and an analysis of metallization was conducted with an atomic absorption device according to the NIOSH standard number 7300. The results of this study showed that the highest and lowest amounts of iron dust in the crushing and inlet wells were 9.2 and 0.12 mg/m^3, respectively. The highest and lowest amounts of copper dust were in the crushing zone, respectively and campgrounds were 7.3 and 0.21 mg/m^3, respectively. The results of this study revealed that the amount of iron and copper dust in all parts of the mine is higher than the EPA standard environmental standard and can expose residents around the mine to high concentrations of these types of dust. Dust levels were measured in the autumn and given that seasonal winds are higher in this area in summer, the dispersion of this season can be higher. According to the results of this study, it seems necessary to monitor the amount of dust in these mines in different seasons of the year. Furthermore, due to the high amount of dust, it seems necessary to use modern engineering control systems and equipment in these mines.

Key words: Mine, Dust, Air pollution.

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The effect of air pollution on mortality of 13 - 18 year-old adolescents from respiratory diseases in Tehran during 2011 to 2016

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Abstract

Air pollution is the most important environmental problem that has threatened human health in the last century. Tehran, as one of the most polluted cities of the world bears consequences of this problem by cardiovascular diseases, respiratory diseases, and strokes of its residents. This study aimed to estimate the number of deaths from respiratory disease attributable to air pollution in Tehran among adolescents of 13 to 18 years old from. This study cross-sectional study was conducted in Tehran. Data on mortality from respiratory disease were collected during 2011 to 2016 from the Environmental Protection Agency and the cemetery. The collected data were then analyzed by SPSS $_{18}$ software. The results showed that 222 children lost their lives in Tehran during the study period due to respiratory problems. The mortality and morbidity from the studied diseases were also found to be significantly related with air pollution. The highest mortality rate was in 2011 (47 cases) and the lowest was in 2016 (31 cases). There was no significant relationship between the sex of deads and the cause of death (sig = 0.835) and the13 year-old children were less susceptible to air pollution (28 cases). The average age of the deads was 15.67 years; 134 of them were boys and 88 were girls. The highest mortality rate (105 cases) was due to respiratory failure and only two people died of abscesses and asthma. In general, the most correlation between air pollution and different months of the year was related October and March. As the temperature drops, the death rate increases. Given the rapid population growth and the welfare of the community, air pollution can be a serious threat to the health of general population, especially sensitive groups, such as children and the elderly.

Key words: Air pollution, Mortality, Respiratory diseases, Adolescents, Tehran.

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The effect of particle matters (PM) on autoimmune disease (AID)

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Abstract

AIDs are complex disorders that the immune system produces autoantigens against the organism's own. AIDs are a result of interactions between genetic and environmental factors but, lifestyle and nutrition are important too. Meanwhile air pollution especially PM have a key role on AID. But the relationship of air pollutants and AID wasn't investigated compare to respiratory and cardiovascular diseases. Only the relationship between PM and AID identify recently. PM has a role of oxidation and it increases risk of acute and chronic inflammation. Because K, B factors and protein-1 is activated as a result of exposure to PM. These adverse effects relate to size and type of PM. PM_{10} cause Bronchial infection. But other PM with lower aerodynamic diameter penetrates to blood system and it cause systematic inflammation. Among types of PM, the effect of silica are more than others. This fact had taken from animal studies. Silica cause increasing the level of B lymphocytes, CD4 T. In blood serum of exposed mice to silica, the level of TNF-alpha was 1.5 time higher than control group. This particles have toxic effect on macrophages and it effect on increasing CD4 T. Therefore IL and TNF-α increasing then T lymphocytes stimulate and antibodies produce abnormally. Finally it cause AID. The tendency of studies on AID and air pollution commonly had been focused mostly on mechanism and in-vivo or in-vitro studies. Moreover some of biomarkers were identified and several epidemiological studies had conducted in US, Tehran, Sudan and 17 cities in Europa. Results of them show that the risk of Rheumatic Autoimmune was attributed to exposure to silica. This risk varies according to age and gender. So that odd ratio (OR) was 2.2 for younger than 70 years and 2.7 for others. Moreover OR for Rheumatism was 1.31 for women that lived in 50m diameters from highway was comparing to others. Prevalence of rheumatism in children younger than 5 years was 1.6 when they had exposure to $PM_{2.5}$. With regard to above, air pollutants such as PM are identified as a major factor on AID remarkably. Since there is source of PM in urban area of some Iran's large cities and the numerous sensitive age group live in these cities, it seem that more investigates is essential for determination of epidemiological relationship between PM and AID. Then OR in sensitive population and risk assessment should been determined.

Keywords: Autoimmune disease, Particle matters, Odd ratio.

The impact of changing land use on air criteria pollutant concentration an profiles in Shiraz, Iran

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Abstract

Air pollution is one of the most important environmental issues, especially in the developing countries. Land-cover and land-use changes are key factors affecting air pollution in cities. Understanding the relationship between land use change and air pollution is necessary for adopting sustainable strategies to environmental protection. The aim of this study was to investigate the time trend variation of criteria air pollutants including PM10, SO_2, O3, NO2 and CO in Shiraz and the impact of land change use on concentrations of these pollutants. Air pollution data were obtained from 2 air quality monitoring stations located in the city. Land Change Modeler (LCM) in combination with GIS was used to rapid exploration and analysis of land change through time and results were extracted by calculating graphs of gains and losses, net change, persistence and specific transitions. The area of industrial and urban uses on Shiraz map was calculated by thirteen independent polygons in 2008 and sixteen polygons in 2016. Results showed that the overall mean PM10, SO_2, O3, and NO2 concentrations in Shiraz were significantly increased. However the concentration of CO declined between 2008 and 2016. Results of LCM reveal that the industrial and urban area uses has been increased 6.1 and 8.9 percent respectively, whilst the area of garden use decreased by 4.05 percent. During 8 years 18.06 percent of gardens situated on Shiraz have been changed to industrial and bair uses. Results showed that variations of criteria pollutants concentrations were positively correlated with the increasing industrial and urban built-up area, and negatively correlated with the increase in gardens. This applied combination, as a new geographical method, can be used to identify the underlying relationships between air pollutant concentrations and different built-up area and can draw a comprehensive image of the effects of changes in land-uses on air pollution.

Keywords: Air pollution, LCM, Land-use, GIS.

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The Sulfur Dioxide Adsorption Process by Hydrochloric Acid - Modified Zeolite with and without Iron Oxide Nanoparticles

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Abstract

Now a days, very large volumes of sulfur dioxide are dispersed in the environment by various industrial and non-industrial units that have abundance adverse environmental impacts. Therefore, how to prevent sulfur dioxide emissions in the environment is very important. The purpose of this study was to investigate and compare the effects of iron oxide nanoparticles on the adsorption of sulfur dioxide by modified zeolite with hydrochloric acid. In this investigation the modified zeolite was used by HCl with and without iron oxide nanoparticles as adsorbent. Structural characteristics, chemical composition, and specific surface area of adsorbent were determined using the FTIR, SEM, and BET techniques. Glass cylinder filled with zeolite seeds and SO_2 cylinder balanced with N_2 gas was used for experiments. Factors affecting SO_2 uptake process including temperature, contact time, thermodynamics, and kinetics of adsorption were evaluated. Sulfur dioxide adsorption of real sample was taken with both adsorbents. The amount of SO_2 in output current was determined according to the mentioned methods in Standard Methods for the Examination of Water and Wastewater (APHA). Adsorption efficiencies of SO_2 in the synthetic and actual sample were %82.8±5.5 and %67.2±7.21 respectively, by modified zeolite with HCl and iron oxide nanoparticles in the optimum conditions of temperature of 25 ° C and duration 28.5 minutes. The average removal percentage in the synthetic and actual sample were %46.1±4.34 and %35.8±5.85, respectively. To do this, modified zeolite with HCl without nanoparticles in optimum condition of temperature of 25 ° C and contact time of 20.5 minutes were considered.The results showed that the adsorption kinetics of sulfur dioxide by both adsorbent is more consistent with Pseudo-second order kinetics model. ΔH^o and ΔG^o were obtained as negative, which indicates that adsorption is an exothermic and spontaneous process. The use of iron oxide nanoparticles on the zeolite can increase SO_2 removal efficiency from the gas phase with redox process.

Keywords: Zeolite, Sulfur dioxide, Nanoparticles, Iron oxide, Adsorption

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The variation trend of predominant airborne fungi in composting process

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Abstract

In composting process, the organic matters degrade by microorganisms. This situation is suitable for growth of saprophytic fungi that they emit to ambient air during composting process easily. Air sampling was conducted during shredding, separation, turning and screening by Anderson impactor. Then colonies was counted and the predominant species was identified by slide culture. Statistical analysis included mean and Standard Deviation. Data was analyzed by Non-parametric test such as Kruskal-Walis and Mann-Whitney test. In this study, 4 species fungi including Aspergillus flavus, A.fumigatus, A.niger and yeast had predominated during composting process. The trend of variation for A.flavus, A.fumigatus and yeast was similar approximately and they were decreasing. But A.niger had had different trend during composting stages, so that, the highest concentration of A.niger was detected in separation of raw materials. But the highest concentration of others was detected in shredding. The decreasing trend of fungal concentration can be attributed to thermal variation in compost. Due to thermal variation that it is one of the major factors on microbial communities such as fungi. Moreover, the optimum growth condition of some species such as A.flavus and yeast occur in media with activity water higher than 0.6. Since the moisture content of compost mass in initial stages is high and then decreasing, it expected that the concentration of these species decreasing. In the field of safety too, the variation trend of fungi is important. Because, some of stages such as separation of waste were conducted manually by workers. Although the concentration of predominant fungi was the highest in shredding, this stage conducts by automatics machine. Therefore it seems that the risk of occupational disease is low during separation. In other hand, the high concentration of A.niger will develop acute and chronic respiratory allergies. Moreover, in this study the concentration of A.flavus was higher than NIOSH guideline. With regard to this results, the potential risk was high for workers especially in separation and the optimization of occupational condition is essential.

Keywords: Predominant species, Fungi, Composting process, Shiraz, Aspergillus.

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Main Topic:

Solid Waste Management

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A Comparative Study on the Share of Hospital units in the Solid Waste Generation: A Case Study of Karaj Hospitals

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Abstract

Hospitals are the main sources of waste generation. There are different inpatient, outpatient and paramedical units in hospitals that make dangerous and hazardous waste, calling for an effective waste management. A proper management of the waste needs an estimation of waste generation rates. In this study, the quantity of waste generation rate in different units of hospitals in Karaj, Iran was determined by weighing method and the difference between waste generations in different units was evaluated using Fligner, ANOVA and Tukey tests. The total amount of solid waste produced in hospitals was 5.2 tons per day that the shares of infectious and noninfectious agents were 55% and 45%, respectively, showing a high percentage of infectious waste generation compared to World Health Organization reports. Also, the total amount of solid waste per activated beds was 4.1 kg/day. Most of the infectious wastes had been produced by the obstetrics blocks, dialysis, burn, emergency, ICU, and women's surgery units. The ANOVA test results showed that the difference between the per capita of the infectious and total waste generation rate, unlike non-infectious wastes, was significant in different units of the hospitals (p-value<0.05). According to the results of Tukey test, the greatest difference was observed between the dialysis unit and the infants section, and then with the pediatrics unit. According to the above results, it could be concluded that reduction the share of infectious wastes in the permitted range of 10 to 25% requires more systematic planning, especially for the separation of infectious and non-infectious wastes.

Keywords: Waste Management, Hospital solid waste, Infectious Waste

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Estimation of Landfill Leachate Value in Shiraz City Using HELP Model

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Abstract

Solid waste landfilling is the most widely used disposal method in developing countries. Wet waste in landfills produces leachate. Leachate collection and treatment system and estimate the quality and quantity of leachate are necessary to design. In this study, the Hydrologic Evaluation of Landfill Performance (HELP) model is used to estimate the amount of leachate in landfill of Shiraz. To estimate the amount of leachate using HELP model is required to meteorological data, rainfall data and soil properties. Meteorological and rainfall data was obtained from synoptic station in the Shiraz city and soil properties were obtained from soil mechanic tests in the region. This study examined with changes in soil texture in two projects. In the first scheme typical soil and in the second scheme bentonite to improve the soil on landfill ground with a thickness 0.6 cm was used. Finally, the effect of each one was evaluated separately. The results show that in the first and second projects highest rainfall was in third year with 329.20 mm. In the same year the leakage rate and average head in the first and second projects were 67.94, 0.961, 692.3, and 9.5 mm. In the third year, the highest amount of rainfall in August and the highest evapotranspiration in July recorded. Also, 57.6% humidity caused by rainfall due to evaporation and transpiration and 19.5% due to surface runoff does not enter to landfills, so about 23% of the company's significant waste landfill. Therefore, about 23% of rainfall participates in landfill. The results show that rainfall had most impact on increasing the rate of leachate and evapotranspiration had the greatest impact on reduction the rate of leachate. According to the HELP model output average of maximum heads on layer No 3 in the second project was much less than the standard. But the first plan in the absence of bentonite, the average of maximum heads is higher than the standard head. Therefore in the event of rainfall greater than this value, there is a risk of leachate permeation to groundwater. So is the need to install drainage systems.

Keywords: municipal solid waste, landfill, leachate, HELP model

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Changes in Microbial and Chemical Characteristic During Vermicomposting Mixture of Sewage Sludge – Mint Waste

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Abstract

In many countries, disposal and management of various organic wastes is a matter of concern, as human population increase with a concomitant rise of animal husbandry and other agricultural practices. Moreover, the high levels of sewage sludge production are of particular concern. Present study aimed to evaluate the microbial and chemical quality of vermicompost production and compare it with current standards to protect public health and environmental concerns. This experimental study was conducted as a pilot-scale one, in the laboratory of school of Health. The samples included mint waste and wastewater treatment plant sludge that used for vermicompost production. The sewage sludge mixed with mint waste with a ratio of 70 to 30. Microbial and chemical test such as fecal coliform, organic carbon, TKN and pH were carried out during start, processing and curing time whit duplication analysis in 60 days. Totally, a number of 120 samples was analyzed. According to the results of this study, a significant decrease was observed in the number of fecal coliforms in sewage sludge – mint waste so that number of 300000 MPN/g in the row sample decreased to 28 MPN/g within 8-week period. Also, decreased the amount of organic carbon and pH in the final product (Organic carbon: 12.41 percent to 10.2 and pH: 7.57 to 7.12), but the TKN level increased (1.8 to 1.97). The results showed vermicomposting as a feasible method to convert waste into fertilizer human in agriculture, which also enables to achieve to the current standards.

Keywords: Vermicompost, Mint waste, Sewage Sludge.

Cost-Benefit Analysis for Evaluation of Municipal Solid Waste Recycling in Yazd, Iran

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Abstract

In every urban waste management plan, recycling and reuse is considered as an economic pattern. This study aimed for economic evaluation of municipal solid waste recycling in Yazd by cost-benefit analysis in 2015. This research was a descriptive–analytic study in which the data about quality and quantity of municipal solid waste in Yazd city were collected through the sampling and physical analysis and the data about total income and costs from the implementation of waste separation and recycling were collected by interview with recovery officials and field observations and were analyzed through the economic cost-benefit analysis. The results indicated that the mean of waste produced annually in Yazd city was 109679.51 tons per years. The percentage of municipal waste components were organic matter (67%), plastics (7%), paper and cardboard (5%), metals (2%), wood (2%), glass (2%), leather and rubber (1%), textiles (1%) and PET containers (1%), respectively. The implementation cost of waste separation at source on a monthly basis was 768,880,000 Rails and the benefits of it were 904,667,400 Rails and as a result, the amount of net benefit derived from the recycling scheme was 135,787,400 Rails. Considering the economic benefits of waste separation and recycling at source in the city of Yazd, in addition to compensating waste management sector costs and reduced waste disposal and management costs, prevent environmental degradation and pollution of water, soil and air resources.

Keywords: Recycling, Municipal waste, Cost-benefit analysis.

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Determine the efficiency of vetiver plant on Remove Landfill leachate contaminants in Pilot Scale

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Abstract

Natural treatment by plant, with low cost, easy leadership, low power consumption in comparison of other purification methods. One of the special plants for the purification is refinement of water from plants and poultry which has unique morphological, genetic and physiological characteristics. The purpose of this study was Determination efficiency of vetiver plant on removal of land fill leachate in Pilot Scale. This study was experimental for conducted at pilot site of sewage treatment house of Industrial city of Amol city during the spring season of 1396. In this study, two pilot polyethylene were used with dimensions of 60 × 40 × 20 cm. The soil used was a mixture of gravel, sand and clay. The irrigation method was subsurface and continuous system in this study. The first stage leachate Landfill was completely homogeneous with the mixing, and then it was diluted 1 to 10 with pure water. Then stored in 120 liters of the first settle for initial settling, and then in a discharge of 0.7 liters / hr. it arrived at the two valves through the outlet valve. In order to evaluate the Efficiency of this plant for refinery of leachate landfill, the concentration of TP, TN, BOD and COD input and output parameters were measured with using standard methods. Finally, the efficiency of the plant was determined by the table and graph. Based on the findings of this research, The average efficiency of deleting parameters of, TP ,TN, COD , BOD and chloride (CL-) by plant, it was respectively 67, 75, 65,75 and 15 percent. Removal efficiency TP, TN, COD, BOD it has been a lot. But chloride removal efficiency has been low. Consequently according to the standards treated Leachates haven't capable for Discharge to environments. Due to the unique characteristics of the vetiver plant including its high resistance to adverse environmental conditions and its proper efficiency, this plant is recommended for the refine the landfill leachates, and for industrial and agricultural wastewater treatment. However, it is not suitable for the treatment of saline leachates in the landfills.

Keywords: vetiver, Efficiency, pollutants, Landfill leachate

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Efficiency of a Two-Stage Composting System in Remediation of Storage Tank Bottom Sludge

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Abstract

Presence of petroleum hydrocarbons in the environment is of concern worldwide because of its significant impacts on ecosystems and human health. In this regard, the oily sludge generated during the storage process of crude oil called storage tank bottom sludge (STBS) has received increasing attention. In the present study, the efficiency of a two-stage composting system in removal of total petroleum hydrocarbons (TPH) from STBS was investigated. The system consisted of five windrow piles as primary composting (PC) followed by two in-vessel reactors as secondary composting (SC). The initial C/N/P and moisture contents of the experiments were adjusted to 100/5/1 and 50-60%, respectively. Five mixing ratios of STBS to immature compost (IC) including 1:2, 1:4, 1:6, 1:8, and 1:10 were examined in the PC and SC for a period of 12 and 6 weeks, respectively. The efficiency of PC in removal of TPH was in the range of 54.88-84.45%. The removal rates of TPH in the two-stage system (93.72-95.24%) were higher than those in the single-stage one. Although most of the bioavailable and biodegradable TPH was removed during the PC, the radiation of IC enhanced the removal rate of petroleum hydrocarbons during the SC. The study verified that a two-stage composting system is effective in treating the STBS.

Key words: Bioremediation; Petroleum hydrocarbons; Two-stage composting; Storage tank bottom sludge

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Evaluation of Dental Solid Waste Management in Birjand, Iran

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Abstract

One of the most important environmental issues is dental solid wastes due to its high contents of hazardous, toxic, and pathogenic agents. The objective of this study was to determine the quality, quantity, and management of dental wastes in Birjand private dental offices. In this cross-sectional descriptive study, all dental offices in Birjand were selected. From each office 3 samples at the end of successive working day (Sunday, Monday and Tuesday) were collected and analyzed. The Samples were divided into 5 categories of chemical-pharmaceutical, infectious, semi-domestic, sharp material, and toxic wastes. According to the results, total annual waste produced in dental offices in Birjand is 9275.408 kg. percentages of semi-domestic, infectious, chemical-pharmaceutical, sharp material, and toxic wastes were 45.96%, 25.21%, 9.9%, 3.3%, and 1% respectively. Considering the existence of different types of materials with different components and various features in dental wastes, their optimal management must be done based on their specific features which are include plans for generation reduction, segmentation, separation, and recycling of these wastes.

Key words: dental solid waste, infection waste, semi- domestic waste, chemical and pharmaceutical waste, Birjand

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Identification, Classification and Management of Wastes of Power Plants by RCRA (Case Study: Thermal Power Plant Zarand-Kerman)

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Abstract

Waste production is one of the most important environmental challenges of each industrial unit which should be desirably managed to prevent from environment pollution. The main industrial waste regarding the used fuel type is related to steam thermal power plant. The aim of this study is to identify and classify wastes for their management to the last stage of waste management in Zarand thermal power plant. This study was conducted with field method in Zarand thermal power plant and production process, waste production resources, type and volume of produced wastes and wastes discharge period were identified. Moreover, wastes classification based on RCRA law and assigning special codes to each material, wastes systematic separation in the origin and waste management method to the final route was also investigated and implemented. According to the results, most wastes produced in this power plant is fettling result of combustion process which is considered non-recyclable and among special industrial wastes. Also, the most important dangerous waste in Zarand thermal power plant is fettling and main feature of the power plant dangerous wastes is their toxicity. After identifying wastes by RCRA law it was specified that 71.42% of produced industrial wastes is enumerated among dangerous wastes that 42.58% are in list F, 57.14% in list K, also 48% has toxic characteristic, 16% has corrosive feature, 4% are inflammatory and 32% has reactive specification. The amount of industrial waste produced in power plant is 604 g for each MW electricity produced in an hour. Reduction of wastes production rate through improving technology and using advanced equipment includes dried cooling tower and replacing natural gas instead of mazut fuel and accurate present management of wastes through storage in reservoirs and standard dishes and making roofs, concreting the floor, depot roofing and making platform are among the best management approaches which are suggested for Zarand thermal power plants.

Keywords: waste, RCRA, Zarand thermal power plant

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Industrial Waste Management in Special Economic Zone of Yazd

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Abstract

This paper reviews the status of waste management of industries located in the special economic zone of Yazd with the aim of collecting necessary data and presenting a general description of the status of industrial waste in this region. Information on the management of waste production in this area has been gathered according to the objectives of the study by QanaMah, with the presence of industrial units and field observations. The role of information collected in evaluating the performance of the management system is very important**.** By analyzing the results, it was observed that in this region about 16462 tons per month of normal waste, 21254 tons per month in industrial waste, 30 tons per month are produced special wastes, the most waste produced in the special economic zone related to textiles 51% of the total waste is produced. The rate of production of natural gas in the sub-group of chemical industry with 16.13 kg per square meter per year is the highest rate of waste production and the rate of production of special waste in the sub-group of textile products with 0.01 kg per square meter per year in the special economic zone of Yazd. The rate of waste production has been calculated. About 74% of the waste generated in this area is sold and the rest of the waste is repelled by non-standard methods. Unfortunately, in this town, given that most of the waste can be recycled and reused, they are not reused. n general, according to the results, the management of waste in this city seems inappropriate. Considering the development of industry in Yazd province and the existence of numerous industrial towns in this province, it is necessary to study the management of waste in this region and provide appropriate solutions for their management.

Keywords: Waste Management, Special Economic Zone, Waste Generation Rate.

Investigate Awareness, Attitude and Performance of Professional and Public Dentists towards Dental Waste Management Practices

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Abstract

The aim of this study was to investigate awareness and attitude and performance of professional and public dentists regarding to the dental waste management practices in Tabriz, Iran .In this cross-sectional study 125 dentists were involved. The samples were selected using the simple random strategy from among all dentists in year 1394 and responded to questionnaires containing 81 questions about awareness, attitude and practices relating to the dental waste management. The answers were graded and marked and the percentage of correct and incorrect answers for each question was obtained. The findings indicated that 35% of the dentists had weak levels of knowledge and awareness to the dental waste management practices. About 90% of respondents believed that the best practices of waste management is proper separation and separate management. The results also showed that 66% of dentists discarded sharps in the safety box and in more than 80% of clinics, the used amalgam capsules and extracted teeth were disposed into the municipal waste. The results of present study confirm that there is no proper separation of dental waste in the all studied clinics. Then, there is an urgent need to educate all dentists and dental office staffs towards dental waste management practices.

Keywords: Dental waste, awareness, attitude, dental waste management practices

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Investigation the effect of Evaporation-Distillation Process on Reduction of Organic Load of Fresh Leachate

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Abstract

High level of humidity in municipal solid wastes in Iran leads to production of large quantities of fresh leachate in municipal waste collection vehicles. Fresh leachate is a strong wastewater with large amounts of organic and inorganic pollutants, so it is an environmental problem and must be treated efficiently. This study investigated the effect of evaporation-distillation process on reduction of organic load of fresh leachate. Since COD is the most common criterion for measuring the amounts of organic matters in wastewater, the amounts of organic load of research samples were determined using this method. In this experimental study, fresh leachate samples were collected from municipal waste collection vehicles in Gonabad city in Iran. Samples were evaporated with the simplest method at boiling temperature and the boiling was continued until ninety percent of sample size decrement. The vapor from the evaporation process was cooled by a condenser and was later collected at the end of the evaporation-distillation reactor. In order to determine the efficiency of the process, the amount of COD was determined in leachate samples and also in distilled samples. The pH values of the samples and distillated samples were also measured**.** In this process, the efficiency of COD removal was 85.3% which was statistically significant (P-value <0.001) and a significant decrease was observed in the pH of distilled samples relative to leachate samples at the end of process samples at the end of process (P-value < 0.001). The results showed that a part of organic materials of fresh leachate entered into distillate during evaporation. Moreover, the pH value of distillate decreased compared to fresh leachate. This can be attributed to the release of volatile fatty acids into the distillate during the evaporation process due to the availability of high amounts of these compounds in fresh leachate. Although evaporation-distillation process does not provide the required standards of wastewater effluent discharge, considering the high efficiency of COD removal in this method, it can be proposed as a pretreatment for the reduction of organic load in fresh leachate of municipal solid wastes.

Keyword: Fresh leachate, Evaporation, Distillation, COD, Municipal Solid Waste.

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Investigation of Medical Waste Characterization and Management in Hospitals of Bushehr Province

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Abstract

Medical wastes are special type of wastes that thay are very dangrous, because thay are infected and toxic.Therefore, Managment of wastes are important. The aim of this study was characterization and management of medical wastes in hospitals of Bushehr Province. This cross-sectional descriptive study was performed in 10 hospitals in the Boushehr province in during the 24months in 2015-2016, to determine the characterization and management of medical wastes. The required information was collected using a questionnaire, interview, observation, weighing and Laboratory tests. Final questionnaire had 103 questions and it was basised on guidelines of WHO, management planning of medical waste and guidances of Enviroment and work of health centre of hygiene and care ministry. The Results indicate that the amount of daily hospital waste production was (5718.34 kg) which included homelike wastes (59.61%), pathological (2.50%), infected (35.26%), chemical and pharmaceutic (0.6%), spray dishes (0.87%) and sharpy and cutter wastes (1.12%). Any hospitals did not recycle the infected waste. Just 2 hospitals did not perform Safety operations. Also, seperation, codding, and marking dangrous wastes performed in all hospitals. All personnels used protection individul instruments during work .All hospitals had temporary place for keeping wastes. Just 6 hospitals had temporary place of dangrouse wastes and transportaion of wastes in hospitals to final landfill in 5 hospitals were desirable and in 4 hospitals were medial and one hospital was undesirable. Assessment of wastes safty, Bacillus stearothermophilus test and Bowie Dick simulation test performed in 7 hospitals. Just of personnel of 4 hospitals controled against diseases, But personnel of all hospitals vaccinated against B hepatitis disease. According to our findings, there are many problems in management of medical wastes, in sections of separation, transportation, temporary keeping and safty of wastes that, it is necessary to continuos education, suitable waste management system and healty disposal.

Keywords: Medical wastes, Infected wastes, waste Management, Hospital, Boushehr

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Landfill Leachate Treatment by Combined Processes of Chemical Coagulation, Ozonation, and Advanced Oxidation with Oxone Activated by UV

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Abstract

Leachate production and its management is currently known as the largest environmental problem associated with the operation of solid waste landfill. The aim of this study was to evaluate the efficiency of combined processes of coagulation, ozonation, and advanced oxidation with oxone activated by UV in treatment of landfill leachate of Zahedan city. This experimental-laboratory study included chemical coagulation with poly aluminum chloride (PAC), ozonation, and chemical oxidation using potassium proxy monosulfat (oxone). To this end, the effect of critical operating parameters including pH (3-8) and dose of PAC (50-250 mg/L) in chemical coagulation process, time of ozonation (5-20min), pH of solution (2-10), oxone concentration (150-750 mg/l), contact time with oxone (60-360 min), temperature (20-45ºC), and intensity of UV lamp (8,15,30 W) in the oxone oxidation process were investigated to treat the landfill leachate. Overall efficiency rates of the process at removal of total coliform, fecal coliform, total phosphorus, total nitrogen, BOD_5, and COD were 99%, 99%, 97%, 100%, 91.1%, and 85.62%, respectively. The findings were reached under optimum dose of PAC (250 mg/L), pH of 6 at chemical coagulation step, ozonation time of 20 min, and reaction time of 180 min. In addition, during oxidation process, the oxone concentration of 750 mg/L, pH of 5, temperature of 25 ºC, and UV lamp intensity of 8 were met. Furthermore, BOD_5/COD ratio was increased from 0.42 to 0.72 after completion of the treatment processes. Findings of this study showed that application of combined processes of chemical coagulation, ozonation, and advanced oxidation with oxone activated by UV had a high efficiency at removal of major pollutants of solid waste landfill leachate.

Key Words: Advanced Oxidation, Chemical Coagulation, Ozonation, Oxone, Leachate

Modeling of Chemical Oxygen Demand Removal from Compost Leachate in an Anaerobic Migrating Blanket Reactor

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Abstract

Along with the production of waste, there is also an increase in leachate that has high levels of contaminants such as organic materials. To date, several anaerobic and aerobic processes have been used for leachate treatment. Anaerobic migrating blanket reactor (AMBR) system is one of the derivatives of up-flow anaerobic sludge blanket (UASB) system. Nowadays, process modeling methods are widely used to control and predict the performance of anaerobic treatment systems. In the present study, AMBR system was used for the treatment of leachate and conducted modeling of COD eliminated in this process. anaerobic migrating blanket laboratory reactor with four sections was used to reduce and remove COD leachate produced through the composting process; it was also used to determine the kinetic coefficients of COD removal in several different OLRs. The maximum concentration of organic matter entering the reactor was 100000 mg/L and the reactor was under operation for 319 days. First-order model and Stover-Kincannon were used to investigate the kinetics of COD removal via AMBR biological process. The results showed that the COD removal efficiency of (AMBR) for all concentrations of substrate entering the reactor was above 80%. The results obtained from the models showed that the experimental data on COD removal was more consistent with the results obtained from Stover-Kincannon model (R^2=0.999), as compared with the First-order model (R2=0.926). Kinetic constants calculated via Stover-Kincannon model were as follows: saturation value constant (KB) and maximum utilization rate constants (Umax), respectively, were 208600 mg/L d and 172400 mg/L d. We investigated the linear relationship between the experimental data and the values predicted by the models. The evaluation of kinetic coefficients of Stover-Kincannon model showed that with the migration of the leachate flow from section 1 to section 4, Umax value has fallen significantly. The results showed that, as compared with the values predicted by the First-order model (0.909), the values predicted by Stover-Kincannon model (R^2=0.961) were closer to the values measured via experiments.

Key words: Leachate, Kinetics, Solid waste

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Quantitative Evaluation of Medical Waste and Their Sterilization Equipment in Hospitals of Iran University of Medical Sciences in 1394

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Abstract

To good manage of hospital waste, understanding of quantity and type of generated waste in health care institute is so important. Attending to harmful potential of medical waste appear that using of modern method of waste disposal is necessary to don't polluted air, soil, and water resources. In this study, 62 hospital that are under supervision of Iran University of Medical Science was studied. All data achieved from check list and biological test and calibration result of infectious waste sterilizer equipment. All studied hospital divided to easy study in 3 group, governmental (H1), private (H2), and other hospital (H3) that associated other organs. All achieved data was analyzed in Excel 2013. Waste generation rate (kg/bed. Day) is 4.09 in H2, 4.12 in H1, and 4.9 in H3. All studied hospital except of 4 psychiatry hospitals is of infectious waste sterilizer equipment. All H1, H2, and 98% H3 use biological indicator. All H2, H3 and 91.6% H1 use chemical indicator. Biological indicator results is valid in 76.4% H1, 86.4% H2, and 56.2% H3. Attending to this study and other similar studies, medical waste management need to optimize.

Keywords: Hospital waste generation per capita, Infectious Waste, Infectious Waste sterilizer equipment, Chemical and biological indicators

Selection of the Best Management Method for Construction and Demolition Waste Disposal in Tehran with the View of Sustainable Development Based on Analytical Hierarchy Process (AHP)

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Abstract

Environmental pollution caused by the dumping construction and demolition wastes has adverse effects on public health. This study aimed to select the best method for managing construction and demolition waste disposal in Tehran by AHP. In this descriptive study, environmental and waste management experts consisted the research community. Selection of the best disposal method was carried out by environmental, economic and social criteria with taking into account the landfilling, recycling and reuse alternatives. Then, by using Analytic Hierarchy Process (AHP), various criteria were weighted and by Expert Choice 11 software compared and analyzed. The results of this study showed that in the last 6 years, the discharge percentage in the permanent landfills (Kahrizak and Abali) was 68%, in temporary pits was 9% and in recovery centers was 23%. The final priority criteria with respect to the economical criterion were reuse (0.492), recycling (0.274) and landfill (0.235), respectively. Also according to environmental criterion were reuse (0.492), recycling (0.373) and landfill (0.198) were reported and according to social criterion were the landfill (0.5), recycling (0.279) and reuse (0.222), respectively. Based on the results, it can be concluded that the reuse alternative with the weight of 0.439 was the best disposal option, and the recycling option with the weight of 0.312 was the second priority as well as the option of landfill with the weight of 0.250 was selected as the final alternative.

Keywords: Construction and Demolition waste, Sustainable Development, Analytical Hierarchy Process (AHP)

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Survey of Quality and Quantity of Produced Waste in Dental Clinics of Zarrindasht, 2016

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Abstract

For many years clinical waste management is a matter of concern that has been recognized for many years by the environmental health engineers and health care stakeholders. This study aimed to survey the produced wastes in dental offices of Zarrindasht. This study which was carried out in four dentists' offices in Zarrindasht. From each office, three samples were taken for three consecutive days in a week. The samples were manually separated into 12 different components and weighed with a digital scale. In continue, based on hazardous characteristics, the components were classified in four groups. Finally, Data analyzing was conducted applying descriptive statistics, ,SPSS 24 and the Excel software. Total quantity of produced waste was 1231.14 Kg in one year. The share of infectious, semi household, chemical-pharmaceutical and toxic wastes were 38.85, 48.57, 9.23, and 3.35% respectively. The main type of produced waste in dental offices consisted of 14 components which can be considered as more than 80% of the dental wastes. Dentists need education regarding health care waste disposal methods to improve their knowledge. A large proportion of the dentists are not practising proper methods of health care waste disposal. Because the segregation of recyclable parts from dental wastes can lead to reduction of a large amount of wastes and so that the costs of collection, transportation, disposal and disinfecting will be reduced.

Keywords: Zarrindasht, dental waste, waste Management.

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Survey the Quantity of Hazardous Waste and Management in the Industry of Semnan in the spring, 2015

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Abstract

Hazardous waste has produced many problems for human health and the environment. Due to the direct and indirect hazards resulting from the mentioned materials, it is very important to collect information and to conduct proper management of these materials in the country. The purpose of this study was to determine the amount of hazardous waste and its management in the industry of Semnan in the spring, 2015. To do research, at first the list of industries in the city was provided. With the coordination of relevant organizations, active units were identified and after the visit, information about the produced waste of each unit was collected by completing the questionnaire. Then, excel software was used to plot the corresponding charts. The results showed that total hazardous waste production in the studied industries is 15,140 kg per month. Factories produced 8.33% toxic substances, 25% corrosive substances, 41.67% flammable materials and 25% reactive materials, and none of the factories had post-burial control methods. According to the results, it was found that only 41.66% of the industries with special personnel were collecting hazardous waste and 58.33% of the industries did not have special personnel. Therefore, in order to prevent environmental pollution, it is essential to establish an appropriate management system for waste management, as well as recognizing the industries, the raw materials used, products and their byproducts. Moreover, the effects of these materials, in helping the correct management system will be significant.

Key words: Hazardous waste management, Industrial waste disposal, Semnan

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The Environmental and Economical Investigation of the Effectiveness of Waste Management System in the Drilling Equipment of Gas and Oil Wells (Case Study: Fath' 50 and 59 Drilling Rigs of Ahvaz Oil Field

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Abstract

The Present Study Examined the Environmental and Economical Investigation of the Effectiveness of Waste Management System in the Drilling Equipment of Gas and Oil Wells (Case Study: Fath' 50 and 59 Drilling Rig of Ahvaz Oil Field). In this research, heavy metals and parameters such as pH and EC were taken of both the Rigs and the samples measured in the laboratory. Also to evaluate the effectiveness of environmental waste management system, the questionnaires among personnel in the rig distributed and their opinions were collected. Cronbach's alpha calculated and appropriate statistical tests were applied. To compare means of heavy metals and other parameters, Mann-Whitney test was used. Results indicate that the concentrations of Metals in rig 50 with no waste management were higher than rig 59 with Waste Management. Between samples sites in terms of pH, EC, and a percentage of Cd and Ni parameters were significant at the level %5. Although no significant differences in other parameters. Spearman correlation coefficients were calculated. Metals that have the strong correlation had a same Sources of pollutants. Test results of Can Test and Sheen Test demonstrate the proper management in stabilization and Lack of exchange drilling logs with the surrounding environment in retention time in the study area. Economic calculations also indicated that costs in the rig 59 were higher than the rig 50. Reviews the zero discharge management in the two rig, found that there was a significant differences between the two rig in a zero-discharge management (Value=.001 <.05). Regarding the environmental effectiveness, the results suggest that there are were significant differences between the two rig. Environmental effects of the production, storage, transport and ultimate disposal of waste reduces the environmental impact on the area. For better management of the tower and reduce the environmental impact from drilling operations, finally, some suggestions were presented.

Keywords: Environmental Management, Drilling Operations, Heavy Metals, Waste Management, Environmental Effectiveness.

Using Earth Worm for Total Petroleum Hydrocarbon Removal from Drill Cutting with Digested Biosolids by Vermicomposting Process

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Abstract

Toxicity, high levels and complex nature of petroleum hydrocarbons in drill cutting can endanger human health since many of these compounds are among carcinogenic hazardous waste components. This study aimed at comparing the effect of compost and vermincompost processes in removing petroleum hydrocarbons from drill cutting located in Ahvaz oil field with sewage sludge. An experimental study was performed in which the effect of a 1:1. mixture of biological sludge with drill cutting contaminated with TPH, along with sawdust and horticultural waste was examined for composting and vermicomposting. The degradation time was about 60 days in pilot chamber. The TPH, carbon to nitrogen ratio, pH, EC, volatile solids, and temperature levels were measured. To ensure the integrity and accuracy of measurements testing was done in 3 iterations. The mean TPH level in the drill cutting in Ahvaz oil field was 42.004 g/kg that reduced to 11.31 and 18.77 g/kg during two months treatment by vermicomposting and composting withbiological sludge, respectively. The removal efficiency of TPH in drill cutting in vermicompost pilot was 73.06% while it was 55.30%. in compost pilot. In this study, vermicompost process to be highly capable of removing TPH from oil-based drill cutting.

Keywords: drill cutting, petroleum hydrocarbon, sewage sludge, vermicompost, compost

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Using VetiveriaZizanioides For Total Petroleum Hydrocarbons removal in Soil Contaminated with oily drill wastes in Ahvaz and Microbial Population Changes

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Abstract

Petroleum hydrocarbons are one of the most common persistent organic pollutants in the environment. Phytoremediation is a new technology in which the resistant plants are used to remove or reduce organic and mineral contamination and hazardous environmental substances. The purpose of this study was to evaluate the effect of *Vetiveria Zizanioides* plants on total petroleum hydrocarbons (TPH) removal in soil contaminated by oil in different concentrations of oil pollution in Khuzestan industrial area. The soil samples were collected from the areas around Ahvaz oil field and were contaminated by oil in different concentrations (5%, 7%, and 10 % w/w). TPH measurement was done (and repeated twice) during four months in five retention time. Determination of TPH concentration in GC was performed using FID detector. According to the results, the best efficiency of *Vetiveria Zizanioides* in removal of TPH was found in treatment with 5% oil pollution (91%) during 120 days. Most changes in microbial population occurred in 7% oil pollution (106 × 9.78 CFU/g) in 120 days. *Vetiveria Zizanioides* showed to be highly capable of removing TPH from contaminated soil.

Keywords: Vetiveria Zizanioides, oil pollution, petroleum hydrocarbonsoily drill wastes

Main Topic:

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A Review of Microplastics, Threat to the Environment and Human Health

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Abstract

Generation of plastic has accelerated in the world widely since the 1940-50 and annually 290 million tons of plastic is produced. Plastic particles with diameters less than 5 mm are known as Micro-plastics, although some sources have suggested plastic particles less than 1 mm for the appellation of Micro-plastics. The purposes of this study are a review on the Micro-plastics topic and its health problems and review the latest research on this issue. This Study was conducted by documentation review and analysis of existing data sources. Internet search of articles published in international journals in Pub Med, Science Direct and Google Scholar databases were used to find the related studies in the world. Due to the physical properties of plastics and high surface to mass ratio is usually low weight mass that Causing them to levitate and have abilities of transfer to water resources such as rivers, ponds, dams and natural lakes and even there is the possibility of entering to the underground waters. In recent studies on the micro-plastics and their entrance to the freshwater and ocean resources, observations show that the volume and diversity of micro-plastics in these resources were increased even in aquatic organisms. If this situation keeps continuing, environmental diversity and structure of organisms and consequently the people's health will be changed.

Due to the importance of the micro-plastics issue at the last world workshop of Global Water Research Coalition (GWRC) at June 2015, research on micro-plastics is ranked as a priority under consideration by Technology Center water. So for reaching to a proper understanding of the micro-plastics and its effects of we need extensive studies in the country.

Keywords: Micro-Plastics, Environment, Fresh Water Resources, Threat

A Survey on Farmers' Knowledge about the Impact of Pesticides on Human Health in Rural Areas of Babol in 2016

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Abstract

The consumption of pesticides in our country is between 20-25 thousand tons per year and about 0.5 percent of global consumption. Occupational exposure to pesticides has adverse effects on health. Therefore, the present study was conducted to investigate farmers' awareness of the effects of pesticides on human health in rural areas of Babol. This descriptive-analytical study was carried out through a questionnaire of 27 questions including demographic characteristics, questions about farmers' work environment, type of product, amount of pesticide use per year, type of pesticide, number of spraying per year, type of protective equipment, rate of infection Occupational diseases, and awareness of pesticide-related diseases. Easy sampling was done among 100 farmers in 5 villages of Babol. Data were analyzed by descriptive statistics.

57 percent of the farmers were aged 31-40 years old, 67 percent were men, 43 percent had high school education, and 80 percent had more than 10 years of farming. 73 percent of farmers said they spray more than 10 times a year. 83 percent said they suffered from burning and irritation, burning eyes, headache and dizziness, nausea and vomiting during spraying. 42 percent were aware of the effects of pesticides and spraying, and 59 percent acknowledged that they used protective equipment during spraying. Statistical tests showed that there was a significant relationship between the level of education and gender and the rate of spraying ($p < 0.05$). The findings showed that about three quarters of the studied farmers had spray complications. Therefore, it is recommended to promote the health awareness of farmers about the risks of unauthorized pesticides, personal protective equipment, and environmental issues through the implementation of appropriate training programs through health experts.

Keywords: Pesticides, Spraying, Farmers, Rural Areas.

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A Survey on the Knowledge of Women's Hairdressers on Disinfectants in Mashhad 2016

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Abstract

Barbershops as one of the public places can play an important role in transferring various diseases, who often disregard Principles of health and use contaminated supplies. The correct disinfection of labor tools as one of the most important ways to prevent will play a significant role in their control. The present study aimed to determine the level of knowledge of women's hairdressers in disinfectants. The present research is cross-sectional study and conducted on 600 registered women's hairdressers.The data were collected using a questionnaire including demographic information and related information about the type and use of disinfectants used, then analyzed using SPSS Version16. The results showed that the highest score of knowledge is for the age group above 40 years old and the lowest related to the age group, 30 years old. Barber's knowledge is not related with their education and the average score of those with a certificate is (total scores=26) 22.22 ± 086.26 and an unmarried 19.2927 ± 2.760. The most used disinfection for plastic tools was sodium hypochlorite, Savlon and alcohol 30%, 28.3% and 25% respectively. For disinfection of textile materials, the most content was sodium hypochlorite and Dettol 86.7% and 5% respectively .also for sterilization metal tools 61.7% of hairdressers used alcoholic beverages, 16.7% of autoclaves, 3.3% of oven and 18.3% of UV devices. Barbers' Knowledge in the study was optimum, work experience and education did not affect the level of knowledge. Also there is a significant relationship between the level of knowledge and health certificate, and those with a health certificate have a better knowledge than those without a health certificate. Therefore, the requirement to attend training courses and courses for those who have completed these courses can be an important occasion to increase the knowledge of hairdressers.

Keywords: Knowledge-Barber- Disinfection

An Investigation of the Physicochemical and Microbial Quality of Public Swimming Pool and Jacuzzi in Birjand in 2016-2017

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Abstract

Control of the health status of indoor swimming pools and Jacuzzis is one of the most important parts of environment health in the country and because of their direct relationship with different human population groups with different levels of individual and general health, they can be a potential source of transmission and spreading of microbial and fungal infections. Therefore, physicochemical and microbiological tests of swimming pool are essential for determining the water health and hygiene. In this descriptive-analytic study, 6 pools and Jacuzzis were sampled for 6 months and 2 times per month and physicochemical parameters including temperature, pH, turbidity and free residual chlorine, and microbial indices including total coliform, fecal coliform, Pseudomonas aeruginosa, fecal streptococcus and heterotrophic bacteria population were tested according to Standard Methods for the Examination of Water and Wastewater. Based on the results, average pH, free residual chlorine and turbidity were 8.14, 2.53 and 0.47, respectively. 65.2% of samples had fungal contamination. Total coliform, fecal coliform and heterotrophic bacteria population were undesirable in 37, 23.9, 12.3% of sample respectively. Fecal Streptococcus and Pseudomonas aeruginosa were also reported undesirable in 0.7% and 11.6% of the samples. Statistical analysis of the data showed that there is a significant relationship between pH, total coliform, and fecal coliform (p-value <0.05). Based on the results, the remaining free residual chlorine, pH, temperature, total coliform and fecal coliform had the lowest compliance with the standard. Therefore, observing with health principle, the using of updated chlorination systems and continuous monitoring of water pools will have a significant role in preventing the spread of waterborne diseases.

Keywords: Swimming Pool, Jacuzzi, Physicochemical Quality, Microbiological Quality, Birjand

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An Investigation of the Relationship between Environmental Factors and Hormonal Abnormalities Associated with Down Syndrome in Pregnant Women

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Abstract

The process of industrialization and people's change of lifestyle have gradually exposed human societies to a larger number of environmental risk factors, which may cause hormonal abnormalities and congenital anomalies. The current study aimed at investigating the relationship between environmental factors and hormonal abnormalities associated with Down syndrome among pregnant women in Yazd, Iran. One hundred participants were randomly selected from among pregnant women in whom the risk of Down syndrome was sufficiently high according to the screening tests performed in the genome clinic in Yazd. A questionnaire was used to collect data about the degree of the participants' exposure to three environmental factors, namely exposure to pesticides at home, use of canned foods, and consumption of greenhouse fruits. MoM values for AFP, free β-HCG, uE3, PAPP-A, and inhibin-A were extracted from the participants' genetic files. The collected data were analyzed by SPSS. The mean of MoM for inhibin-A was significantly higher among pregnant women who often or always used pesticides and insecticide at home compared to those who never used them (p=0.047). In addition, the mean of MoM for free β-HCG was significant higher among pregnant women who rarely or always used canned foods compared to their counterparts who never consumed these foods (p=0.024). Finally, the mean and standard deviation of MoM for uE3 (1.85±1.30) was significantly higher among pregnant women who never used greenhouse fruits compared to their counterparts who rarely, often, or always used these fruits (p=0.003). Therefore with improving nutritional pattern, minimizing the consumption of greenhouse fruits (use of organic fruit and products) and reducing the intake of canned foods (consumption of fresh and non-additive foods and dietary with B-group vitamins) can be reduced the environmental exposures affecting hormonal abnormalities in the pregnant women.

Keywords: Environmental factors, Hormonal abnormalities, Down syndrome, Congenital anomalies, Pregnant women

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Application of Photocatalytic Process Using UV/Tio$_2$ for Degradation of Cefepime

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Abstract

Cephalosporin is a group of β-lactam antibiotics that has a wide antibacterial ability, so its therapeutic use is high. Although much research has been conducted about the fate of antibiotics in an aquatic environment, little investigation has been done about the removal of cephalosporin. In this study, Cefepime, a fourth-generation cephalosporin antibiotic was selected and different tests such as UV/TiO_2, UV, TiO_2 under darkness and TiO_2 under sunlight were applied to determine whether these methods are effective ways to remove Cefepime from aqueous solutions or not. Different amounts of catalyst and different pHs were used as effective parameters on degradation efficiency and were optimized. The Cefepime removal was measured by HPLC. The mobile phase was comprised of 10:90 Acetonitrile: water with flow rate of 1 mL/min. The detected wavelength was 212 nm. Maximum removal efficiency (92.9%) for 20 mg/L Cefepime in neutral pH and catalyst dose of 70 mg/L after 120 min irradiation was observed. At the same conditions, the degradation efficiencies for UV, TiO_2 under sunlight, and TiO_2 under darkness were determined 77.65%, 53.24% and 15.12% respectively. Also, the reaction rate constant was increased from 0.0054 to 0.0279 (min^{-1}) for photolysis and photo catalysis, respectively. This work was economically compared with photolysis and the result showed that the E_{EO} for the UV/TiO_2 process was five times lower than UV processes. UV/TiO_2 process could be an efficient method to successfully remove the Cefepime antibiotic from aqueous solutions.

Keywords: Cefepime, HPLC, Photolysis, Photocatalysis, Titanium dioxide

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Assessment of Health Risks of Zahedan City Gasoline Stations

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Abstract

Fuel stations are recognized as the most important part in distribution and supply of fuel .Working at a fuel station will affect the health of their employees in acute and chronic forms. This study aimed to assess the health risk of fuel stations as well as determine the health status of them in Zahedan in 2014. In this study, to assess the health risk and health status of fuel stations the FMEA method and man-made checklist was used respectively. The checklist is prepared based on HSE guidelines, national and international standards and Iranian Oil Products Distribution Company's law. In this cross-sectional study, after the necessary coordination with the relevant units, two governmental stations and six active private stations were evaluated. As a result of risk assessment in fuel stations, 27 health risks were identified. Among all the identified risks, 14 risks had an RPN less than 91, 10 risks had an RPN ranging between 91 and 201, and 3 risks had an RPN over 201. The findings of the study indicated that the rate of compliance with the HSE requirements in the area of health was 51.85%. To maintain the health of the workforce in fuel supply and sanitation, reducing the number and level of risks and increasing compliance with the requirements are necessary.

Keywords: Gasoline station, Health, Risk

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Assessment of Physical, Chemical, and Microbial Quality of Public Swimming Pools Water in Yazd, Iran

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Abstract

Swimming in pools is one of the most popular exercises in Yazd. Considering the large number of swimming pool users in Yazd and the importance of water quality on swimmers health, in this cross-sectional study, the physical, chemical and microbial quality of water in swimming pools in Yazd was investigated. During July to September 2017, five out of fifteen public swimming pools in Yazd city were selected according to the type of their water treatment system. Three samples were taken from each pool. In all samples, temperature, pH, free residual chlorine, turbidity, alkalinity, total dissolved solids, total coliform, fecal coliform, Pseudomonas aeruginosa, Staphylococcus aureus and heterotrophic bacteria were measured according to the standard methods. The results showed that the water temperature was higher and alkalinity was lower than standard range in all pools. In all samples, total coliform and fecal coliform were in accordance with the standard. In just one sample the free residual chlorine was out of standard range. According to the results, pH, total dissolved solids, turbidity, heterotrophic bacteria, Pseudomonas aeruginosa and Staphylococcus aureus in 73.4, 73.4, 46.7, 86.7, 86.7, and 100 percent of samples were in the standard range, respectively. Based on the findings, swimming pools water quality parameters in the most of samples were in the standard range, but for improvement of water quality more inspections and surveillances on the performance of swimming pools water treatment system are necessary.

Keywords: Water Quality, Public Swimming Pool, Yazd

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Assessment of Public Gamma Radiation, Annual Effective Dose Rate and Life Cancer Risk in Iran

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Abstract

We are continuously exposed to ionizing radiation. To evaluate the health hazards, background radiation measurements in most countries have special importance. This study was conducted in the South Khorasan province and reported most other Iran provinces measured data of background Gamma dose rates. The indoor and outdoor dose rates, and the annual effective dose and excess lifetime cancer risk to the residents were measured and reported for 17 provinces in Iran. The maximum and minimum of annual effective gamma dose were 0.84 and 0.27 in Hamedan, and Chaharmahal and Bakhtiari provinces, respectively. The average annual effective dose was 0.60 mSv, and the average estimated excess lifetime cancer risk was 2.11×10^{-3}. These results were higher than the amounts of world average.

Keywords: Background Gamma, Dose Rate, Annual Effective Dose, Excess Lifetime Cancer Risk, Expose.

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Bacteriological Evaluation of Toys in Kindergartens of Bushehr City-2015

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Abstract

The presence of children in kindergartens and child care facilities has increased the chance of getting infectious diseases and pathogenic microorganisms. This study was conducted to evaluate the bacterial contamination of toys in kindergarten of Bushehr city in 2015. The present study was a descriptive-analytical study. Six kindergartens were selected randomly from 24 existing kindergartens in Bushehr city. Then, 10 microbial samples from each kindergarten toy's surface (totally 60 samples) were examined using standard sterile swab method in 10×10 cm^2 area and followed bacterial tests were performed. A researcher-made checklist containing basic information about kindergartens was also used and the environmental health status of the kindergartens was also assessed according to the Ministry of Health Regulations. Data were analyzed by SPSS-V19 software. Half of the toys (50%) were contaminated at least with a kind of investigated bacteria. The contaminations were contained to Total Coliforms and Antrobacteriace (48.3%), Ecoli (6.7%) and Staphylococcus aureus and Streptococcus (1.7%), respectively. There was no meaningful relationship between the basic information of each kindergarten (frequency of washing and disinfection, having separate play rooms, private or governmental) with bacterial contamination of toys ($p>0.05$); however, there was a significant relationship with the environmental health status of the kindergartens ($p <0.05$). Although washing with soap and water and disinfectant could not reduce the bacterial load of toys, the potential of toy contamination by pathogens in kindergartens, lack of specific rules or guidelines in the country to check and control the microbial contamination of the toys, and lack of proper method of washing and disinfecting them (as a high-touch surfaces) revealed the need for developing a practical informational protocol in this field.

Keywords: Bacterial Contamination, Bushehr, Child Care Facilities, Kindergarten, Toys

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Bioremediation of the Soils Contaminated with Lead and Zinc by the Earthworm Eisenia Fetida

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Abstract

One of the most important environmental problems in the world is the soil contamination by heavy metals in the industrial areas, especially contamination of the agricultural lands. The use of earthworms to bio remediate the soils results in reducing the pollutants' concentration through a bioaccumulation mechanism on the contaminants in the earthworm's body. This study was conducted in batch experiments to investigate the concentration of lead in soil. In this regard, 50 mg/kg and 100 mg/kg and for zinc 40 mg/kg and 80 mg/kg respectively. 30 worms with were added to each 500 g soil samples. The concentrations of lead and zinc were measured in the soil and in the body of worms at two time periods of 14 and 28 days. Atomic absorption spectrometer model Varian 240 was used to measure the concentrations of lead and zinc. The data were analyzed using SPSS version 23 and Design-Expert 7.00 software. There was a significant correlation between the reduction of lead and zinc metals in the soils and the accumulation of lead and zinc metals in the worm's body. A significant reduction of lead and zinc concentrations in soil at day 14 and 28 during the study compared with the initial concentration. Results showed that Eisenia fetida earthworm with the ability to bio accumulate of contaminants in its body, optimal performance in lead and zinc from contaminated soil is removed.

Key words: Lead, Zinc, Eisenia fetida, Bioremediation, Soil

Comparison of Knowledge, Attitude of Relief Personal, about Response Health Action in Emergency Situations Larestan

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Abstract

Emergencies and natural disasters affect all areas of the earth and result from unexpected accidents or disasters. Accessing to health care is very important in the early stages of crises for survival. Crises almost always have an important impact on public health and the welfare of affected populations. Emergency advised measures are the same as health measures in normal situation which have become a little simpler.

In this investigation we have studied the comparison of knowledge and attitude of relief personnel level including Red Crescent, health center, hospital, emergencies, military and Police forces and Rescue Students of Larestan Township about emergency health measures during 2014. This is a descriptive cross-sectional study. The target sample is 259 Larestan relief personnel. Data collection was carried out by using a questionnaire in three sections. First part of the study is demographic information, the second part consists of 10 questions of knowledge level and the third part consists of 10 questions of attitude. Data are analyzed by using SPSS16 software. The descriptive statistics of the level of awareness and attitude of the emergency relief personnel about emergency measures showed the knowledge level with the average of 5.54 ± 1.573 and the attitude level was 29.05 ± 4.677. Also, Pearson correlation coefficient between age and knowledge level and attitude of participants were statistically significant ($p = 0.022$, $r = 0.142$) and ($p < 0.001$, $r = 0.224$) respectively. Training and retraining of environmental classes and the inclusion of emergency health measures units for emergency relief students, public education and increasing the use of the capacity of mass media, audio and video and cyberspace to increase public awareness and attitudes, increase participation, volunteers, charities, and NGOs on emergency health measures and the approval of inter and institutional coordination in provinces between relief agencies with regard to identifying the strengths and weaknesses of each organ in terms of knowledge and attitude require specific planning for each organization in terms of targeted education

Keywords: Knowledge, Attitude, Health Action, Emergency, Larestan.

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Comprehensive Review to Determine Proportion of Climate Change and Anthropogenic Agents in Lake Urmia Dryness: Health and Environmental Outcomes and Disclose Restoration Solutions

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Abstract

Urmia Lake is one of the most influential and valuable aquatic ecosystems in Iran and one of the largest saline lakes in the world. The lake registered as UNESCO Biosphere Reserve. The lake basin, as a socio-ecological region, faced extreme water shortages in the recent years. Due to many natural and manmade reasons such as climate change, dam constructions, extra agricultural water consumption and improper management of the water resources, the water level of the lake has been decreased since 1997 and thousand hectares of emerged salty land has made numerous ecological and environmental problems. In this study any literatures related to the study of Lake Urmia basin were analyzed from the aspects of climate change and anthropogenic impacts on the rapid shrinkage of the lake. In this paper we investigated the factors which caused the crisis and tried to understand what kind of outcomes and disadvantages will be encountered with, if the current situation continues. Our results demonstrated that the main factors for the dryness of the lake are anthropogenic agents (The shares of overuse of surface water resources and water resources development projects (i.e. dams) in recent lake inflow reduction are estimated at 40-65% and 15-25% respectively). And finally possible solutions for this environmental disaster were investigated and the best method to control the outcomes were suggested. We hope that this article would increase social and governmental awareness for this environmental crisis and provide information to control and decline the environmental and health consequences.

Keywords: Lake Urmia, Climate Change, Anthropogenic Factors, Environmental Disaster

Dermal Stochastic Health Risk Assessment of Heavy Metals in Chemical Hair Dyes

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Abstract

The presence of heavy metals in widely used hair dyes threatens consumer's health. Therefore, the current study investigated the concentrations of heavy metals in different hair dyes and evaluated their non-carcinogenic effects. The most commonly used hair dyes were determined via questioners and 32 samples were collected from Tehran market. The concentrations of 10 heavy metals such as Ag, Cr, Ba, Cd, and Pb were determined using ICP-MS. The risk of non-carcinogenic effects was also specified using two indexes of hazard quotient (HQ) and chronic hazard (HI). Results indicated that the concentrations of Al, Ba, and Fe were 0.54, 0.86, and 1.19 mg/kg and those of Cd, Cu, and Pb were 0.45, 61.32, and 185.34 µg/kg, respectively. Pb with HQ of 7.46e-4 had the highest risk and Fe with HQ of 3.4e-6 had the lowest level of risk. Among the investigated dyes, the ones made in Iran with dark brown color and HI=2.8e-4 and=1.93e-4 had the highest level of risk among all the studied samples, respectively. Two indexes of HI and HQ showed that heavy metal contents in the investigated samples did not have risks for the consumers of these products.

Keywords: Chemical hair dyes, Heavy metals, Risk assessment

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Determination of Heavy Metals (Lead, Cadmium, Nickel and Chromium) Concentration in Liquid and Solid Lipstick Supplied in Kashan (Spring 2016)

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Abstract

Heavy metal toxicity has proven to be a major threat and there are several health risks associated with it that causing considerable health problem to humans as well as to ecosystems.Cosmetics, especially lipstick containing *heavy metals* are *one* of the main *ways* in which these elements enter the *human body*. This study aimed to determine the heavy metals (lead, cadmium, nickel and chromium) concentration in lipsticks of different price categories sold in the Kashan market and evaluate the potential health risks due to daily ingestion of heavy metals in lipsticks. This descriptive study was performed during March to April- 2016. Four types of solid lipstick and four types of liquid lipstick in the cosmetics stores of Kashan were randomly sampled in 24 samples. After preparation of samples by standard method, ICP-OES was used to analyze the lipstick samples. *The results of this study showed that* nickel and lead contents were less than chromium and *Cadmium content* of *all* the four *samples* was less than *measurable quantities*. There were a significant difference between the concentrations of nickel, chromium and lead in products ($p < 0.001$). Although the amount of lead and nickel in selected brands lipstick in this study was lower than the permissible safe limits for human use, but their low concentration compared to the results of previous studies can exert its own adverse effects through serious risks to human health and the possibility of developing or exacerbating various diseases, including allergies, inflammation, skin diseases. Therefore, due to the potential effects of heavy metals on human health, It is essential to control sale of these products and prepare national standards for cosmetics in the country.

Key words: Heavy metals, Cosmetics, Lipstick, Kashan

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Effective Removal of Trinitrotoluene (TNT) from Contaminated Soil by Induced Aerobic Process: Kinetic and Chemical Byproduct

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Abstract

Decontamination of polluted areas is a major concern. One of the practical methods for elimination of this contamination is lanfarming. This study was designed to evaluate aerobic explosives removal by using induced aeration. Five plastic reactors were used. 3 kg of soil were used in each of reactors. For increasing soil porosity, sawdust was added to soil. In addition activated sludge was added to soil. TNT at the concentration of 1000 mg/kg of soil and Rhamno lipid bio surfactant at the concentration of 60 mg/L were then added. Aeration interval was every 3 to 5 days. Every two weeks, sampling of soil were done to analyze the explosives. Samples were analyzed by HPLC. The results showed that, TNT removal efficiency in reactors containing sludge and bio surfactant was 98 percent at the end of 120 days. COD removal efficiency in reactors which amended by rhamnolipid was 58 percent and in reactors that rhamnolipid was not added was 41 percent. Conducted kinetic studies showed that explosives removal follow the pseudo first order reaction. The pseudo first-order rate constants of the rhamnolipid amended experiments were at least 3 orders of magnitude higher for TNT than those found for not amended rhamnolipid experiments. Application of bio surfactant could be effective in explosives remediation. Activated sludge can decrease the required time for removal of explosive. Growth of bacteria and degradation of explosives showed that explosive have been used as a sole source of nitrogen.

Keywords: TNT, Sludge, Rhamnolipid, Induced Aeration.

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Effects of Organochlorin and Organophosphate Toxins on Human: A Review Study

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Abstract

Organochlorin and Organophosphate toxins are two group among chemical toxins that are dangerous for human health. physiologic effects of Organophosphate and Organochlorin residue are the hygienic difficulties in present and requires continuous monitoring. Therefore,the present article review due to the increasing use of this toxins and their Acute and chronic effects in human samples has been investigated. In this review databases including Google Scholar,Pub Med and SID were searched for keywords related to Organochlorin and Organophosphate in both English and Farsi languiges. All articles which had evaluated this toxins were included. Data including the research data,biologic sample,article title and kind of toxin. Totally 48 article were found of which 38 article met the inclusion criteria. According to this stadies the most effects of Organochlorin compound is their residue in human tissue and the most effect of Organophosphate compound is poisoning mainly happened due to occupational exposure in workers and inadvertently and intentionally confronting. This review study showed mainly reason of confronting whit Organochlorin and Organophosphate toxins is due to lack of consumer awareness about this chemical and their complication. Human exposure to this taxins has been significant especially in Iran. Therefore, inorder to prevent taxes, education to families, related workers and society various trades is the most effective method.

Keywords: Organochlorin, Organophosphate, Pesticide, Toxicity, Human

Environmental Health in Dehdasht Primary Schools in 2017

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Abstract

The school is a special social space that educates and develops the personality of today's children who are the tomorrow's community. They are founded and managed in exchange for proper and appropriate training, and favorable psychological and physical environments. A large portion (more than 25%) of our population consists of students, paying attention to their health and improving their educational environment's health is an investment for future generations. Purpose: The purpose of this study was to investigate the health and safety of the environment in the primary schools of Dehdasht city in 2017. This was a descriptive cross-sectional study conducted in the academic year of 2014. The studied population consisted of all Elementary school students in the city of Dehdasht. Sampling was done by census method. Data were then collected from the checklist of the health regulations of the schools and the criteria for modernizing and equipping schools of country. This checklist has 40 questions that was completed through referrals to schools, observation, interviews, and surveys. The collected data were entered into the $SPSS_{22}$ software and analyzed with the help of descriptive indexes and dispersion. There are 33 primary schools in Dehdasht, students of which consist of 45.5% (15 schools) girls and 54.5% (18 schools) boys. The results showed that in these schools, the health condition was 3.73 ± 24.6% and the safety of these schools was at the best in 23.81%. According to this situation, the health and safety of the environment and safety in these schools are inappropriate and undesirable. It is suggested for the officials of Dehdasht's education system to have sufficient supervision over the health and safety of the schools in terms of environmental health, upgrade safety standards, and keep all items of the country code as high as possible in these schools so that students can grow their talents well.

Keywords: Environmental health, Primary schools, Iran

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Environmental Impact Assessment of Kaveh Steel Company (Kish) in 2017

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Abstract

Environmental management is a kind of limiting and regulating unfavorable economic activities for the environment in an acceptable framework. Each industrial project has three stages of construction, operation and capacity development. Kaveh Steel Company is an operating industry. The purpose of this study was to evaluate all of the environmental factors of Kaveh Steel Company at the exploitation stage and compare it with the standards. The site of this project was Special Economic Zone of Hormozgan Mineral and Metal Industries. In this study, the effects of the plan on the environment were evaluated quantitatively using the Leopold matrix and qualitative checklist. Research variables were all environmental factors such as water, air, soil, noise, and so on. In a period of four months, the environmental components of the area, including physico-chemical, biological and human environments, were identified to provide a scene of the environmental components of the study area. The results of the study by the Leopold matrix and the checklist showed that the implementation of the plan had positive effects (economy,) and negative effects (more on the physico-chemical environment) on the environment. The survey of the exploitation phase showed that the positive effects of the project (in each of the five units) were almost twice the negative effects. The evaluation process by the Leopold matrix showed that the most impacts of the project in weight were the long-term positive effects, indispensable. The main negative effects of the project were controllable. In this way, the plan was able to be implemented and its performance was evaluated as a positive - strongly. By applying management and technical methods such as providing environmental programs to reducing harmful effects and monitoring environmental factors, the negative aspects were reduced and positive aspects could be strengthened. The result of this approach is to achieve the country's major goals, producing significant steel in order to sustainable development (with environmental protection).

Keywords: EIA, Steel Factory, Environment.

Evaluation of Ecological Indicators of Girls Primary Schools in Yazd in 2017

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Abstract

School, as a reliable place in student's education, has an important role in training. It plays a very important role in providing a healthy and happy life, and educating people with healthy behaviors. Therefore, the aim of this study is evaluation of ecological indicators of Girls primary schools in Yazd. This research is a descriptive study that was carried out in Yazd ,2017. The research population was 45 Girls primary Schools. The data was collected by a researcher-made checklist through direct observation. Data was analyzed by SPSS24 software. Based on the results, 23, 52 and 25 percent of the studied schools had favorable, moderate and poor conditions in terms of ecological conditions, respectively. Generally, nongovernmental schools were significantly better than public schools. Based on the results, the ecological status of schools is far from the desired level, and Considering the sensitivity of the subject about the health of future country makers, Investing and planning to improve the existing situation seems necessary.

Keywords: Ecologic Indicator, Primary School, Girls, Yazd.

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Evaluation of Microbial and Fungal Contamination of Kleenex and Toilet Papers

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Abstract

Kleenex and toilet papers are cellulosic products that have been used widely and can cause different infectious diseases among people. The aim of this study was to determine the possibility of microbial and fungal contamination of Kleenex and toilet papers in Tabriz. A descriptive research was conducted to investigate the bacterial and fungal contamination of 60 Kleenex and toilet paper samples, including 8 different brands of Kleenex and 8 different brands of toilet papers.

The existence and the amount of microbial and fungal contamination of the samples have been examined using the Standard methods (membrane filtration). At the end, statistical analysis was performed using Mann-Whitney analysis method and SPSS statistical software to determine the differences through samples. Bacterial culture illustrated that all of the samples (100 %), Kleenex and toilet papers, had bacterial contamination. Dominant bacterial species was different species of spore Bacillus in the Kleenex samples; while no fungal contamination found. Unlike toilet papers, it was not observed any cocci bacteria in the Kleenex samples. Finally, it was not observed any gram-negative bacteria in the all Kleenex and toilet paper samples. There was no significant difference (p-value >0.05) among the amount of bacterial and fungal contamination through variety brand of the Kleenex and the toilet paper samples. By considering gram-positive Bacillus as the predominant contamination among the samples and presence of them in the soil, it is concluded that Kleenex and toilet papers might be contaminated during production process due to indoor air pollution of halls. So, it is suggested production halls should be isolated perfectly and avoided from entrance of outdoor microbial pollution to the inside.

Keywords: Bacterial Contamination, Fungal Contamination, Kleenex, Toilet Paper

Evaluation of the Safety and Environmental Health Status in the Schools of Evaz County (Iran) In 2017

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Abstract

The school is considered as a safe place for students' education which can play a very worthy role in providing a healthy and hilarity life, and also educating people. However, in lack of the principles of environmental health and safety at schools, students may be exposed to various dangerous and high risk situations. Regarding the importance of this issue, the present study aimed at evaluating the safety and environmental health conditions of the schools of Evaz County (Iran) in 2017.This descriptive cross-sectional study was conducted in 2017. In this study, the conditions of environmental health and safety of 16 schools in elementary, secondary and high schools were studied in Evaz County. For this aim, a checklist with 48 questions was prepared, based on the regulations of the Schools Environmental Health in Iran and the standards of the Organization for Renovating and Equipping Schools, completed by visiting the schools using the methods of observing and interviewing the authorities. Data were analyzed using SPSS software version 16. The conditions of the schools were in an unfavorable status in terms of: Healthy storeroom (50%), controlling insects and rodents (68.8%), installation of safety flooring under the electrical panels (81.2%), installation of hand washing guidance (87.5%). The results showed that there were no pool and fountain (100%), laboratory and workshop (56.2%), balcony and terrace (62.5%) in some of those schools. The present study showed that there was a significant correlation between the school area, and the places for fuel storage and teachers' rest ($p = 0.03$). Based on the results of this study, there are some defects in environmental health conditions of studied schools. Therefore, in order to protect and preserve students' health as a major group of society, more attention is needed to improve and promote the health conditions of schools by relevant authorities.

Keyword: Environmental health, School safety, Students

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Factors Affecting Academic Motivation for Continuing Education from the Perspective of Environmental Health Engineering Students

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Abstract

Among the various individual and environmental factors affecting on learning, students' motivation plays an important and effective role in their academic achievement. It is one of the most important challenges facing universities because it directly affects the goals of educational systems. The aim of this study was to explore the factors affecting on academic motivation for continuing education from the perspective of environmental health engineering students. This is a qualitative study which based on the nature of the collecting data has done as a qualitative content analysis; Data gathering was done by a Focus Group Discussion (FGD) method and criterion-based sampling. The participants were consisted of four groups of first to fourth year undergraduate B.S students and two groups of discontinuous undergraduate B.S students in Environmental health engineering, with a total of 36 students of Bushehr University of medical sciences in 2017. After coding and categorizing data from interviews, the academic motivation for continuing education from students' point of view was summarized in three main categories: ambiguous future job position, which refers to employment problems after graduation and gender discrimination for being employed; Disrupted professional identity, Returning to the lack of a common story with other medical students at the university, a poor knowledge of the field by non-specialized professors teach them and unknown field of study in the community, and a poor fitness between their curriculum and the expected tasks at their works. The dual nature of this discipline, both health and engineering aspects, seems to be the major problem raised by students regarding their motivation for continuing education in higher education level. It seems with improving the attitude of the team of health care, as well as the community view points, the motivation for continuing education in environmental health students could be improved.

Keywords: Qualitative content analysis, FGD, Environmental Health Student, Motivation, Continuing education

Health and Environmental Impacts of Qom Thermal Power Plant

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Abstract

Power plants are stationary sources of air pollution. The particulate and gaseous pollutants from this source have bad effects on the health of receptors' surrounding and environment. The external health and environmental damage costs of the combined cycle natural thermal power plant of Qom were investigated via the Impact Pathway Approach (IPA). Gaseous (NO_x, CO, and SO_2) and particulate matter (PM_{10}) pollutants from the power plant stack were measured with direct portable analyzer. The health effects and related costs of power plant emissions were estimated according to emission factors, population density of receptors, the slope of ERF, meteorological and stability data, depletion velocity of pollutants, and proposed unit costs related to each health effects with advance QUERI version from the AirPacts model. Environmental effects and costs, according to temperature, humidity, agricultural products, and building materials of domain were estimated with AGRIMAT model. The results showed that the main health effect was assigned to the nitrate as Restricted Activity Days (RAD) and the maximum health damage costs were related to long-term mortality (L.YOLL). The annual health damage costs were approximately US $ 5.78 million, with the cost being 0.117 US-cents per each kWh of generating electricity. The estimated damage for building material was 153.35 m^2/year with a cost of 9488.14 US$ as 1.92×10^{-4} US-cents per each kWh. According to the health and environmental damage costs of this power plant and population density around that, it seems essential to consider the health and environmental damages and focus on the emission control strategies, particularly in site selection for establishing new power plants and expanding the current ones.

Keywords: Power plant, Air pollution, Health and environmental effects, Damage costs

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Investigating Environmental Factors Affecting the Incidence and Prevalence of Cancer in the North of the Country

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Abstract

The pollution of the workplace with chemicals, and use of contaminated food with chemicals and heavy metals are the causes of cancer. In north of the country, with the increasing polluted water, soil and air, the prevalence and incidence of cancer are increasing. Therefore, the present study was conducted to investigate the environmental factors involved in the incidence and prevalence of cancer in north of the country. This descriptive cross-sectional study was conducted through questionnaires of 20 questions including demographic characteristics, dietary habits, exposure to chemicals, tobacco and stressors. Sampling was made available and easy among 200 inhabitants of Babol city in 2015. Data were analyzed by descriptive statistics. 29 percent of the subjects stated that they were exposed to direct sunlight because of their occupation. All subjects reported that they were exposed to chemicals such as detergents, bleachers, pesticides and chemical paints in their work environment and in their lives. 76.5 percent of stress-related reactions were anger, agitation and anxiety and fatigue. 41 percent said they used tobacco and hookah during their lives. 58 percent experienced fast food, and 36 percent had overweight and obesity. 29 percent had information about the environmental factors of the incidence of cancer. The findings showed that all subjects experienced at least one incidence of cancer in their living and working environment and are living with it. Therefore, it is recommended that training be given on reducing and preventing the occurrence of cancers in residents of different cities, especially through national media and health experts and doctors.

Keywords: Cancer, Environmental Factors, Lifestyle

Investigation of Environmental Health and Safety Indexes of Schools in Andimeshk, Khuzestan in 2017

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Abstract

School, as a reliable place in educating students, has a substantial role in teaching. There is a vast variety of environmental health indexes influencing students' health status like the quality and quantity of drinking fountains, drinking water condition, toilets, removing sewage system, waste management, green area, sport grounds and safety. This research was carried to investigate environmental health indexes and safety of school in andimeshk of Khuzestan province, Iran in year 2017. In this descriptive and cross- sectional study, environmental health and safety indexes of 60 schools including primary, secondary and high school was evaluated in andimesk county. Data collection tools were a standard questionnaire that was completed by environmental health practitioners through interviewing with principal and direct observation inside the schools. After that, data were analyzed with SPSS software. The results showed that the quantity of drinking fountains (87%), Existence of Emergency Way out (88%) healthy collection of solid waste (92%)and firefighting system (85%)were suitable. 81.5% of windows had no net and 66% of the school buildings were dilapidated. According to results of this study, 9 schools (15%) were in excellent health indexes, 12 schools (20%) in good indexes, 12 schools (20%) in moderate and 27 schools (45%) in weak indexes. There was significant difference between possession of schools (state or non-profit) with standard quantity of drinking fountains (P<0/05), the environment of schools (P<0.05) and safety of schools (p<0/05). The studied Schools were somewhat healthy places; This needs more attention of the authorities to the necessity of Development and Improvement of the hygienic status of schools.

Keywords: Environmental Health, Education, Safety, Schools

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Investigation of Organochlorin Pesticide Residues in Human tissues in Isfahan

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Abstract

The presence of organochlorin pesticides in the invironment is a serious threat to human health and requires continuous monitoring. Residue of this compound in water, we there, food and in human & animals has been create the healthy and environmentally effects. Therefore, is due to long effects of this toxins and their cumulative property particularly in fatty tissue. The residue of organochlorin pesticides in fatty, hair and maternal milk in the selected samples of Isfahan has been measured in winter and spring 2017.

Accidental samples of fatty, hair and maternal milk tissue has been collected. Due to measure of important organochlorin compound such as DDT,BHC, HCH, HCD, and their derivatives and other compound such as Epoxide, Heptachlor, Deldrine, and Lindan in mentioned tissues has been sued from Gas chromatography(GC) with3% OV17column and Ni63 ECD (Electron capture Detector). Samples were prepared by liquid-liquid extraction for liquid samples Acidic digestion for solid samples. All samples analyzed by (GC) and thin layer chromatography (TLC). The total samples in this study were 642 that 137 cases were men. Generally, total concentration of DDT derivation in two groups of women ؛up to 25 years & less than 25 years ؛has not been significant difference. Also, the most contamination has been related to PP-DDE about98.19 percent and HCH about 59.38 percent. Also the least percent of contamination has been related to DDT and their derivation about 10.94 percent.

According to results, all samples containing one or more toxins among selected toxins. There were significantly difference among age and toxin concentration in selective tissue but there were not significant difference between sexuality and toxin concentration. This research showed that is due to limitation of consumption of DDT in Iran, this toxin amount has been less other than toxins significantly. Although human exposure to organochlorin toxins has been significant in Isfahan.

Keywords: Organochlorin, DDT, Pesticides, Human Tissue

Investigation of Total Pyrene Intake among Primary School Students in Shiraz, Iran

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Abstract

Polycyclic aromatic hydrocarbons (PAHs) are an important group of organic pollutants with two or more benzene rings. Among these compounds, Pyrene is identified as toxic, carcinogenic and mutagenic one and is considered as a concern for human health. Human are exposed to these compounds from a variety of routes, including breathing air pollutants or inhaling cigarette smoke, dietary PAHs intake, as well as dermal absorption through soil, air and skin. Bio monitoring is used as a powerful tool for assessing the total internal intake of PAHs from all routes and the total exposure to these compounds, but it should be noted that it is not possible to distinguish between exposure levels from any route using this tool alone. Therefore, the present study aims to assess of total pyrene intake among primary school students and the relative contribution of ambient air in urban and suburban areas in Shiraz, Iran. Sixty ambient air samples were collected in the urban and suburban areas every 3 days during the spring of 2015 and atmospheric concentrations of particulate-bound PAHs were determined. Moreover, 120 urine samples were collected from randomly selected students from two primary schools in an urban and a suburban area to measure the concentration of 1-hydroxypyrene as the metabolite of pyrene. The intake dose of PAHs was modeled using ambient air concentrations of PAHs and the measured levels of 1-OHP.

Findings of this study indicated that the mean total internal intake for pyrene were 4.31 and 5.30 micrograms per day in urban and suburban areas, respectively. In addition, the results showed that the relative contribution of ambient air in pyrene intake were 0.88% and 0.71% in urban and suburban areas, respectively. In conclusion, the results show that ambient air in Shiraz is not an important source of exposure to Pyrene.

Keywords: Air pollution, Biomnitoring, PAHs exposure, 1-Hydroxypyrene, Pyrene

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Investigation the Noise Pollution of Mosques During Muharram (Case Study: Mosques in Sari City) in 2017

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Abstract

Long or repeated exposure to sound above safe noise level can cause hearing loss. The purpose of this study was to investigate the noise pollution of the mosques during the time of the year. The aim of this study was to investigate the noise pollution of mosques during the time of the year. Muharram (case study: mosques in Sari city) is 2017. This descriptive research is a kind of analytical-targeted research in terms of its purpose. The statistical population of this research is the total number of mosques in 4 urban areas of Sari. Using a route map based on the intersections and the density of critical points, four mosque blocks were identified at 4 different area. Mosques selected based on the different usages i.e. residential, therapeutic, commercial and general area. All measurements carried out during the first decade of Muharram and on working days during peak traffic hours between 8 and 10 nights. Data gathering in this study collected by the testo 815 meter made by Germany and calibrated the machine before usages. This study showed that the noise pollution of mosques in Sari during the Muharram period at all station is more than Safe Noise Level for the public, residential, therapeutic, commercial use. Controlling the sound levels in mosques meeting in all programs is necessary that have to consider by all authorities of the centers, especially during Muharram and Ramadan decades.

Key words: Noise Pollution, Mosques, Muharram

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Lead Concentrations in Vegetables Irrigated with Effluent Produced from Alborz Industrial City

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Abstract

Vegetables are one of the most important sources of human diet that can be contaminated with various heavy metals through irrigation with industrial wastewater. This study aimed to determine the concentration of lead in vegetables irrigated with effluent produced in Alborz industrial city. This experimental study was conducted during the summer of 2015. Totally, 20 samples (including Chives, radish, sweet basil, green onion, and cilantro) were randomly collected from five farms irrigated with wastewater. Vegetable samples were measured by the atomic absorption spectrophotometer. The average concentrations of lead in Chives, radish, sweet basil, green onion, and cilantro were 0.002, 0.014, 0.013, 0.012, and 0.009 mg/Kg, respectively. According to the results of this study, the concentrations of lead in the vegetables were lower than those recommended by the WHO/FAO and Iranian standards. But, because the volume of wastewater is increasing, regular monitoring of heavy metals concentration in crops irrigated with wastewater is necessary.

Keywords: Heavy metal, Vegetable, Industrial wastewater

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Mercury and Vanadium Concentration in Cynoglossus Arel Fish in Musa Estuary, Persian Gulf, Iran

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Abstract

Musa estuary located in the northern coastal area of Persian Gulf has a semi-enclosed ecosystem. Pollution in this area is caused by the drainage of large amounts of wastewater from the major petrochemical industries and ships landing in Imam Khomeini port. Heavy metals with high bioaccumulation capacity are considered as important contaminants that may be available in high concentrations in the environment and biota samples. The main aim of this study was to determine the concentration of mercury and vanadium in Cynoglossus arel fish in Musa estuary. In this regard, 67 fish samples were collected from Musa estuary during 5 intervals of 15 days in the summer of 2013. After biometric measurements, the concentrations of mercury and vanadium were measured by DM- Analyzer and Graphite furnace atomic absorption spectrophotometer, respectively. The mean concentrations of mercury and vanadium in muscle tissue of fish samples were 0.9704 ± 0.486 and 1.431± 1.526 mg/kgw.w, respectively. The GLM analysis showed a significant positive relationship between metals' concentration and length. In addition, there was a significant positive relationship between metals concentration and fish weight. Mercury concentration exceeded the allowable standards of WHO and FDA in Cynoglossus arel. It is therefore recommended to consult with the nutritionists about using this fish from this area, especially in vulnerable groups.

Keywords: Mercury, Vanadium, Cynoglossus arel fish, Persian Gulf, Musa estuary.

Role of Environmental Health in Controlling the Risks of Transmission of Communicable Diseases in Disasters

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Abstract

In the world, 40 types of natural disasters are known, of which 32 are occurring in Iran, which is among the top 10 blasphemous countries in the world. Following natural disasters, the spread of contagious diseases increases, which can increase the damage and even the deaths of injured people. Therefore, should take timely action to control these diseases. In this regard, the role of environmental health in the implementation of the necessary measures to maintain health is important, which is discussed in this article. This research study is a review by searching in the library, theses and online databases: SID, Google Scholar & Magi ran has been done. After natural disasters and urgent priorities, health measures and improvement of the environment are necessary to achieve a sustainable and desirable situation and to prevent the spread of contagious diseases. Given that the major means of transmitting diseases that we face in disasters, through contaminated water and food, are transmitted by insects and carriers. Therefore, provision of the basic principles of environmental health, which is the provision of safe and healthy drinking water, the provision of healthy food, the collection and disposal of sanitary sewage, the construction of sanitary toilets and the improvement of the environment for the fight against insects and carriers, which should be these accurate and serious measures to control illnesses and to provide people with health during disasters in order to protect the health of displaced and elderly people. Since the provision of public health can't be done without the establishment of a sanitary environment, it is clear that one of the most important needs during disasters is environmental health measures. Therefore, paying particular attention to environmental health factors after relief and rescue operations and rapid action is one of the most important priorities of health authorities after the crisis, which will have a significant impact on improving the existing conditions and preventing the spread of contagious diseases.

Keywords: Environmental Health, Communicable Diseases, Disasters

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Scientometric Analysis and Mapping of Environmental Health Research Based on Publications in PubMed (A 20-year period)

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Abstract

With graphical mapping of a scientific field, better and more accurate way to identify those branches of human knowledge and transform the concept of abstraction to smooth the more objective concept. Environmental health is the branch of public health that is concerned with all aspects of the natural and built environment that may affect human health. Health is the science, practice, and study of a human's well-being and their health and preventing illnesses and human injuries. No systematic research has been previously performed to analyze the researched published on environmental health. The aim of this of this research is to review and analyze scientific productions recovered in Environmental Health field during 1997-2016 (a 20-year period) on PubMed database and also to map the structure of science using hierarchical clustering in order to identify outstanding subjects in the discipline. This is a descriptive and applied research analyzing the content of literature through hierarchical clustering. To obtain data, a search for the keyword "Environment health" as a Mesh term in PubMed was conducted, on 21/04/2017, for papers published in 1997-2106 (a 20-year period) . Descriptors were extracted from the journal articles (5613 no.) retrieved, and data were analyzed using Ravar Matrix, Ucinet and SPSS 20.

According to the findings, the size of scientific literature in the area of environment health increased during the period under the study. Most of the science products belonged to the United States, England and German respectively. Subject clustering led to the identification of most widely used topics, including "SANITATION", "EPIDEMIOLOGY", and "PUBLIC HEALTH, etc. Through thematic analysis of documents (descriptors), a wide range of dispersed topics were grouped into 13 clusters. The members of each cluster had common characteristics and they were structurally interrelated. The main concern of researchers, as indicated by descriptors in these 13 clusters, were on Water and Wastewater aspects of the issue. Eventually Knowledge and insight gained through analysis of thematic maps is useful for policy makers to make appropriate decisions for the promotion of scholarly products such as environment health.

Keywords: Environmental Health, Co- Word Analysis, Clustering, Subject Analysis, Pubmed

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Sequenced Bioremediation - Modified Fenton Oxidation Using α-FeOOH Nanoparticles for Decontamination of Phenanthrene-Contaminated Soils

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Abstract

Polycyclic aromatic hydrocarbons (PAHs) are persistent contaminants resulting from natural or anthropogenic resources. The harmful effect of PAHs is mainly related to their hydrophobic nature, which increases toxicity in humans and the environment. Therefore, PAHs are easily adsorbed into the soil matrix and make tight bindings with soil organic matter. The effect of modified Fenton oxidation using synthesized α-FeOOH nanoparticles and sodium pyrophosphate as a chelating agent was investigated for the pretreatment of phenanthrene -contaminated soil in a sequence with bioremediation. The phenanthrene -degrading bacteria, Pseudomonas, and Staphylococcus were isolated from hydrocarbon-contaminated soil and used as inoculums for the bioremediation. A sequence of modified Fenton oxidation bioremediation using a synthesized α-FeOOH nanoparticles dosage of 20 mM and 200 mM concentration of H_2O_2 significantly enhanced the phenanthrene removal rate from 70%, 51%, and 33% to 95%, 87%, and 80% obtained during the MF oxidation alone for synthetically fresh, aged, and naturally contaminated soil with initial pH 7, respectively. The results of this study showed that a sequence of modified Fenton bioremediation can effectively remediate polycyclic aromatic hydrocarbon contaminated sites in a shorter reaction time than MF oxidation alone.

Keywords: Soil Contamination, Bioremediation, A-Feooh Nanoparticles, Phenanthrene

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Sick Building Syndrome among Students of Yazd University of Medical Sciencesin Relation to the Dormitory Environment

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Abstract

There is an increasing concern about sick building syndrome in different environments, such as offices, residential buildings, dormitories and schools. Therefore, the aim of this study was to evaluating the sick building syndrome in students of Yazd University of Medical Sciences in relation to the dormitory Environment. A cross-sectional study was conducted at 4 different dormitories in Yazd University of Medical Sciences. In this study used a researcher-made questionnaire that was completed by 177 students. To evaluating the syndrome symptoms, demographic characteristics, duration of stay in the dormitory and some environmental factors was investigated. Data were analyzed by SPSS software, using Chi Square and Mann-Whitney tests. Results with a p-value of less than 0.05 were considered statistically significant.. Based on the results, the frequency of sick building syndrome symptoms was 85.3%. The most common symptoms noted by students were distractibility due to environmental factors (53.1%), chronic fatigue (52.5%), headache (45.8%), unpleasant odor (45.8%) and feeling heavy head (37.5%). There wasn't significant correlation between the prevalence of syndrome symptoms with age and sex but there was a significant correlation between this symptoms with intense light (p-value= 0.017) and the crowded rooms (p-value= 0.014). According to the results of this study, the frequency of syndrome in students was high and environmental factors affected the prevalence of these symptoms. Therefore, eliminating the environmental factors especially insufficient space in dormitories is recommended.

Keywords: Sick Building Syndrome, Students, Yazd City.

Status of Environmental Health Indicators Evaluation in Diagnostic and Therapeutic Areas of Imam Reza Hospital, Mashhad, Iran, 2016.

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Abstract

In order to reduce hospital infections, it is very important to observe the Environmental Health Index (EHI). Since EHI in hospital has a critical and important role in reducing hospital infections, this study focused on status of EHI in the medical departments of IMAM REZA Hospital. This cross-sectional descriptive study was conducted during March, 2016 to March 2017. Target population includes 38 Depts., 918 beds and 3,000 permanent staff of diagnostic and therapeutic departments of Imam Reza Hospital. A health check-up checklist was used to collect data by interviewing and observation method. Mentioned checklist includes 58 questions and designed in 3 index; Physical Standard, Health Facilities and Personnel Performance. Data analysis was performed by appropriate software and descriptive statistics. The Physical Standard, Health Facilities and medical departments Personnel Performance Index results 72.94%, 76.66% and 74.49%, respectively. In both Physical Standard and Personnel Performance index, the Nephrology section was in top and Gyniatrics Section was top only in Health Facilities. Renew and building improvement in accordance with hospital environmental guidelines was the main reason for nephrology department top rank. In order to improve the health status of hospitals, it is recommended to redesign and reconstruct all diagnostic and therapeutic departments of the hospital in accordance with relevant environmental health standards and under supervision of environmental health experts.

Keywords: Environmental Health Index, Diagnostic and Therapeutic Areas, Imam Reza Hospital

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Survey Nano Catalyst Magnetic Iron Oxide (Fe_3O_4)Efficacy for Removal of Pyrene in Soil by Electrokinetic-Fenton Process

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Abstract

Pyrene is a very stable polycyclic aromatic hydrocarbon. Due to widely distribute in the environment and carcinogenic and mutagenic properties is the most important pollutants of this group. EK-Fenton process applied as an effective technology for the remediation of organic contaminated soil. The application of an electric field creates favorable conditions for redox reactions to occur in the soil between the electrodes. The aim of this study was to increase the treatment efficiency of pyrene from soil using nano catalysts magnetite iron oxide (Fe_3O_4) and combined with electrokinetic. Soil provided with 100 mg/kg concentration and removal of pyrene done with EK-Fenton process. Nanocatalyst was synthesized via a facile co-precipitation method and characterized by FTIR, XRD, SEM, EDX techniques. The effects of some operational parameters like catalyst dosage, pH, hydrogen peroxide concentration and voltage on the removal efficiency were studied. The results of the SEM and FT-IR analyses demonstrated favorable Fe_3O_4 nanoparticles. Under optimal conditions: pH= 3, nanocatalyst dosage= 1 g/L, H_2O_2= 10mM and voltage 30 V, 87% of Pyrene was removed after 48h. As the nanocatalyst dosage and H_2O_2 concentration increased up to 1 g/L and 10mM the EK-Fenton degradation increased. Electrokinetic Fenton process can be as efficient and effective method for the removal of pyrene from contaminated soil using Nano Catalyst Fe_3O_4 introduced in optimal conditions.

Keywords: Electrokinetic Fenton Process, Soil, Fe_3O_4 Nanoparticle

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Survey of Fungal Contamination in Indoor Swimming Pools in Gonabad County in Iran

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Abstract

Given the presence of pathogens such as fungi in indoor swimming pools and inappropriate use of purification and disinfection systems in such indoor places, this study sought to determine fungal contaminations in indoor swimming pools of Gonabad in 2017. In order to conduct this descriptive study, fungal contaminations in two indoor swimming pools were surveyed in the middle of spring using nine samples of water and nine samples of lateral facilities of each pool by membrane filtration technique and sterile carpet. The final diagnosis of genus and species was carried out using slide culture and special media techniques and the results were analyzed using descriptive statistics. The results substantiated that the pools were contaminated with *Dermatophyte* (*Trichophyton mentagrophytes* and *epidermophyton flucosomes*), *yeasts*, and more with opportunistic saprophytic fungi. 24.8%, 22.7%, 16.9%, and 11.4% saprophytic fungi were separated from pool side, locker room, pool water, and shower positions, respectively. 7.4% and 3.2% of Yeast fungi as well as 0.23% and 0.2% of dentofacies of causative agents of tinea were separated from the pool water and showers as well as locker room and shower positions, respectively. The swimming pools in Gonabad are contaminated with fungal contaminations and can cause fungal infections, asthma and allergies in dealing with prone hosts in certain circumstances.

Keywords: Swimming Pool, Fungal Spores, Dermatophyte, Saprophyte, Gonabad

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Survey of the Role of Bioclimatic Factors in the incidence of Cutaneous leishmaniasis in the South of Ilam Province by GIS between 2010-2014

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Abstract

Leishmaniasis is a common diseases of humans and animals and is present in most parts of the world. Like many diseases, its distribution is influenced by climatic and environmental conditions. This study was investigated the relationship between some of the climatic elements and the incidence of cutaneous leishmaniasis in Ilam province. In this research, data on disease gathered from the health center of Ilam. the relationship between the climatic factors and the occurrence Seasonal cutaneous leishmaniasis has been investigated using GIS. The Results showed a reverse correlation between relative humidity and precipitation and a positive correlation between sunshine hours and temperature with disease.

Keywords: Cutaneous Leishmaniasis, Incidence, Climate Data

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Survey of Workplace Surfaces Contamination in Restaurants of Yasuj City: a Study Using Ultrasnap ATP Swab to Luminometer Method

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Abstract

Controlling and keep the cleanliness of the working environment is very important at the food preparation and distribution centers. Providing lack of health principles observance in the preparation of workplace surfaces tools and equipment are a good place for the growth and proliferation of microbial agents that cause food contamination. The aim of this study was to determine the contamination amount of working environment surfaces in restaurants of Yasuj city. In this descriptive cross-sectional study, 33 restaurants were surveyed. Totally, 264 samples of workplace surfaces that were clean, ready-to-use taken in restaurants of Yasuj city. In this research, were evaluated the workers hand, tools and equipment work, worktop, chopping board, spoons and forks, plates and kebab skewers. Each sample was drawn with a swab on the desired surface (a square of 10cm×10cm) and then they were read in a luminometer device (manufactured by Hygenia company in the UK) by measuring the enzymes to identify the bacteria, maintain health and contamination control. The unit for measuring this device is RLU (Relative Light Unit). The results of this study showed that in terms of workplace cleanliness, workers hand, worktop, kebab skewer, plates, meat grinder, chopping board, tools and equipment and spoon and fork were 0%, 0%, 6.1%, 30.3%, 0%, 12.1%, 15.2% and 6.1% respectively. From the aspect of foodstuffs contamination surfaces, for worktop and workers hand, the average as 1548.6 RLU and 1428.8 RLU and for plate, the average as 83.2 RLU were the highest and the lowest of contamination surface at restaurants respectively. Generally, worktop and workers hand have been the highest percentage of contamination surfaces due to sensitivity and was identified as the uppermost surfaces of contamination in the transmission of microbial agents. According to the findings, it is necessary training workers, personal hygiene respect, and regard to health principles in monitoring and preparing tools and equipment in food preparation and distribution centers, especially restaurants.

Key words: Surfaces contamination, Luminometer, Ultrasnap ATP, Restaurant, Yasuj

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The Assessment of Pesticides Residues in Cucumbers Grown in Greenhouse and the Effect of Some Procedures on their Residues

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Abstract

The aim of this study was to determine the residual concentrations of ethion and imidacloprid in cucumbers grown in greenhouse. The effect of some simple processing procedures on both ethion and imidacloprid residues were also studied. Ten active greenhouses that produce cucumber were randomly selected. Ethion and imidacloprid as the most widely used pesticides were measured in cucumber samples of studied greenhouses. Moreover, the effect of storing, washing, and peeling as simple processing procedures on both ethion and imidacloprid residues were investigated. Results showed that one hour after pesticide application; the maximum residue levels (MRLs) of ethion and imidacloprid were higher than that of Codex standard level. One day after pesticide application, the levels of pesticides were decreased about 35 and 31% for ethion and imidacloprid, respectively, which still were higher than the MRL. Washing procedure led to about 51 and 42.5% loss in ethion and imidacloprid residues, respectively. Peeling procedure also led to highest loss of 93.4 and 63.7% in ethion and imidacloprid residues, respectively. The recovery for both target analytes was in the range between 88 and 102%. The residue values of ethion and imidacloprid in collected samples one hour after pesticides application were higher than standard value. The storing, washing, and peeling procedures lead to the decrease of pesticide residues in greenhouse cucumbers. Among them, the peeling procedure has the greatest impact on residual reduction. Therefore, these procedures can be used as simple and effective processing techniques for reducing and removing pesticides from greenhouse products before their consumption.

Keywords: Ethion, Imidacloprid, Greenhouse, Cucumber, Residuals

The Effect of Applied Styrene in Disposable Containers on Hearing Loss in Rats

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Abstract

Environmental issues have made European countries to move many of the petrochemical plants to the third-world countries or plan to cease their increasing production capacities. Styrene is one of the major chemicals used to produce different types of disposable tableware, especially disposable glasses which are transparent, opaque, or spongy. This empirical study was conducted on 16 three-month-old male Wistar rats divided into two groups (control and intervention). The mean of their weights was 325±25 grams. The Distortion Product Otoacoustic Emissions (DPOAEs) of rats were measured before and after the intervention in which the concentration of styrene was 1000±100 ppm. Then, the DPOAE signals of their ears were recorded. After extracting the relevant data, they were analyzed before and after the intervention by conducting the statistical paired *t*-test and the Willcaxon test in the DPOAE statistical software. One-way ANOVA and the Tukey's range test were carried out to compare the means. The mean differences were compared before and after measurement by conducting the paired *t*-test in each group. The significance level was set at $P<0.05$. The mean of amplitudes in the DPOAEs of rats, which were in contact with styrene, indicated a severe damage in all hearing ranges, especially between 5000 and 6000 Hz. Thus, there was a significant difference between the means of control and intervention groups. According to the research results, exposing rats to styrene decreased the amplitudes of DPOAEs at all frequencies. There were more substantial reductions at higher frequencies.

Keywords: Distortion product otoacoustic emissions (DPOAEs), Styrene, Hearing Loss, Rat

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The Effect of Combined Exposure to Styrene and Noise on Hearing Loss by Distortion Product Otoacoustic Emissions in Rats

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Abstract

Industrialization increased work force exposure to different harmful agents. Increase of sound pressure level and styrene concentration more than the standard a level has adverse effects on human health. On the other hand, these two harmful agents together are produced in the industrial process. This experimental study was conducted on 36 Vistar male rats with three months old and 325±25 gr weight in 6 groups consisting of three control groups and three exposure groups (Groups exposed to noise, styrene vapor, as well as noise and styrene together). The rate of ear distortion response in the rats was measured before and after exposure. The mean scores of parameters for the exposed groups were calculated by one-way Anova and tukey test. Mean differences were compared before and after measurement in each group by paired T-test. The mean of noise emission amplitude resulted from ear distortion in the exposed rats showed sever damage in all hearing frequencies especially in 5000-6000Hz. There was a significant difference among mean scores of the control and exposed groups ($p<0.001$). Rat exposure to styrene and noise individually or together caused decrease in response amplitude of noise emission induced by ear distortion in all frequencies.

keywords: Styrene, Noise, Rat, Sound emissions

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The Effects of Application of Indole Acetic Acidon Improvement of Phytoremediation of Pyrene Contaminated Soils

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Abstract

Polycyclic aromatic hydrocarbons (PAHs) refer to a wide group of soil contaminants whose presence in the environment is a cause of concern. The present study aimed to evaluate the effects of Indole Acetic Acid (IAA) on the phytoremediation activities of sorghum bicolor and increase in pyrene removal efficiency in the soil. The initial concentration of pyrene was 150,300 mg/kg in this experiment. The treatments included unplanted soil (T0), planted soil with sorghum (T1), planted soil with application of IAA (T2). The pyrene removal rate in the soil was measured every 30 days. Moreover, plant biomass and soil bacteria were measured after 90 days. The results showed that pyrene removal rate significantly increased in the planted treatments compared to the unplanted ones. After 90 days, at the initial concentration of 150-300 mg/kg, pyrene removal efficiency was 52-92% in T1-T2 and 35-47% in the unplanted treatment (T0). Application of IAA significantly increased plant biomass, soil bacteria, and pyrene removal rate in T2, compared to T1. Therefore, application of IAA in the planted treatments with sorghum could have a significant effect on increasing the removal efficiency of pyrene.

Keywords: Sorghum Bicolor, Pyrene, Phytoremediation, Indole Acetic Acid

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The Effects of ICT on the Value Chain of Environmental Health Economy

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Abstract

Nowadays, in the era of global competition, Information and Communication Technology (ICT) is a development platform, in which individuals, organizations and modern societies could not escape from its usage. Modern global realities, certificate that ICT has penetrated in all areas of human activity from manufacturing to art and family. One of the areas which are affected by ICT is economical system and furthermore the "Environmental Health Economy" as a part of this system is also affected by this phenomenon. Therefore, this study was conducted to evaluate "the effects of ICT on different aspects of the value chain of environmental health economy". In this practical and descriptive survey, data is collected with the man- made questionnaire, which it's validity and reliability has been approved by the experts (especially supervisors and referees) and calculation of Cronbach's alpha coefficient, respectively. The results showed that ICT has significantly positive effect on dual dimensions of value chain of environmental health economy contain "primary activities" and "Support activities" with its triple effects which contain "automation effect", "notification effect" and "transform effect". The main conclusion confirms the potential effects of ICT in achieving the goals of environmental health and sustainable development. Finally, in order to apply the research findings, some suggestions presented in two level of research and practical.

Keywords: Information and Communication Technology (ICT), Value chain, Environmental Health Economy, Sustainable Development

The Effect of Life Satisfaction and Demographic Factors on Rural-to-Urban Migration by Using the Logit Model in Rafsanjan City

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Abstract

Lack of control over the massive rural-to-urban migration has caused many problems in direction of sustainable development for cities and for villages that have been evacuated. Satisfaction with life plays an important role in the survival of villagers. In order to achieve sustainable development, it is necessary to study the effect of life satisfaction and demographic factors on these migrations. This descriptive cross-sectional study was conducted to determine the effect of the factors (age, gender, level of education, satisfaction and income) on the migration of villagers into the city of Rafsanjan city on 500 people (250 in each group: immigrants and residents of rural areas) in 2016. Data were collected using standard life-satisfaction questionnaire (SWLS). The data were analyzed using software SPSS 19 and Microfit 4 and logit model. According to the results, immigration is affected by the variables of satisfaction from life, education level, income and age. In this way, Increasing one unit in education will increase the probability of immigration by 0.82, and by increasing one unit in age, the income and satisfaction of individuals decreases the probability of migration by 0.04, 0.85 and 0.64, respectively. Gender did not have a significant relationship with immigration.Immigration in young and educated people is higher than others, and the decrease in the satisfaction of life increases the probability of immigration. To reduce immigration, implementing support policies, including entrepreneurship, providing adequate facilities for leisure of young people, and promoting welfare, education, and health are essential.

Keywords: life satisfaction, rural migration, Logit regression, Rafsanjan

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The Indicators and Causes of Environmental Health Inequalities (Ehis)

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Abstract

Environmental health inequalities (EHIs) refer to the general differences in environmental health conditions. The aims of this research were to introduce the EHI indicators and to suggest the general recommendations to improve the environment health and to reduce the observed inequalities.

This research is a review of WHO reports in various regions. To undertake the assessment, a set of 14 EHI indicators was developed, categorized into three inequality dimensions including housing-related inequalities; group injury-related inequalities; and environment-related inequalities. The housing-related inequalities include six indicators such as inadequate water supply; lack of a flush toilet; lack of a bath or shower; overcrowding; dampness in the home; inability to keep the home; and adequately warm. The injury-related inequalities include four indicators such as work-related injuries; fatal road traffic injuries; fatal poisonings; and fatal falls. The environment-related inequalities include four indicators such as noise exposure at home; lack of access to green/recreational areas; second-hand smoke exposure at home; and second-hand smoke exposure at work.

The literature reviews show that EHIs exist in all countries, and are most often suffered by disadvantaged population groups. The magnitude of inequalities and the distribution of inequalities can be very diverse between countries and also depends on the socioeconomic or demographic variable used for stratification. The socioeconomic and demographic inequalities in exposure to environmental hazards exist everywhere and can be expressed in relation to factors that may affect the risk of being exposed, such as income, education, employment, age, sex, race/ethnicity and specific locations or settings. In addition to these differences in exposure, environmental health inequalities are also caused by social or demographic differences in vulnerability towards certain risks. Finally, it is recommended that design the study for an initial assessment of EHIs in Iran.

Keywords: Environmental Health Inequalities, Inequality, EHI, Procedural Justice, Distributive Justice

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The Relationship between Use of Plastic Containers and Incidence of Cancer

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Abstract

In the present century, one of the causes of death in advanced industrial societies is cancer. Carcinogens are in fact chemical, physical, and biological factors causing various cancers. Iran is among the top 10 countries consuming disposable containers. Toxic and carcinogenic substances present in these containers release at 40 ° C, solve into foods, and endanger the consumers' health. Using the keywords of "disposable containers", "polyvinyl chloride", " bisphenol A", "phthalates", "plasticizer", "dioxin", "polystyrene", and "cancer" the articles published from 2000 to 2017 were extracted and studied. Considering the above mentioned keywords, a total of 73 articles were found. After removal of the unrelated articles, 51 papers were reviewed. Studies suggested the impact of using these containers on blood platelets and cells, body cells, as well as incidence of various cancers. In this study, bisphenol A was found to be associated with 15 cases of breast cancer, 8 cases of ovarian cancer, and 7 cases of prostate cancer. In most of these cases, participants used plastic containers to serve hot food or store food for long periods. The relationship of PVC-based plastic containers with liver, testicular, and lung cancers was mentioned in 10 studies. Furthermore, 4 papers were found dealing with the association of bisphenol A with intestinal and lung cancers. The relationship between testicular cancer and gastrointestinal cancer was also investigated in 3 articles. In most of these studies, release of petroleum materials and dioxins caused the occurrence of such cancers. In the above studies, only one study discussed the effect of phthalates on breast cancer and one case pointed to effect of plasticizers on the incidence of lung cancer. Plastic containers based on PVC, PS, and PET granules are found toxic and hazardous. The mentioned monomers and polymers migrate into the foodstuffs and cause incidence of various cancers in the long term. So, considering the above studies and results, replacement of these containers with plant-based ones made from *corn starch* and *sugar-cane* is recommended.

Keywords: Plasticizer, Bisphenol A, Polyvinyl Chloride, Cancer

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The Risk Assessment of Healthcare (HCW) PHA (Preliminary Hazard Analysis) Method

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Abstract

Improper management of Healthcare Waste (HSW), caused serious problems in developing countries such as Iran, because of high risk posed to human health and the environment. Poor management of this waste leads to increase different hazards such as infection, toxic, and injury to hospitals health care workers, waste handlers, and the community. The aim of this study was to risk assessment of Healthcare Waste (HCW) in governmental hospitals of Abadan school of medical sciences by PHA (Preliminary Hazard Analysis) method. In a descriptive-analytical study, health risk assessment of Healthcare Waste (HCW) in governmental hospitals of Abadan school of medical sciences (4 selected hospitals) by PHA (Preliminary Hazard Analysis) method were carried out in the summer of 2016. Results show that sharp and infectious wastes are categorized as the high risks. Because of the double risk of injury and disease transmission effect, sharp wastes were classified in the very high-risk potential group. Pharmaceutical & chemical, and radioactive wastes were classified in the medium risk group. Sharp wastes have the highest risk and pharmaceutical & chemical wastes have the lowest risk. Among the various stages of waste management, waste treatment process of handling steps; in all hospitals studied have the highest risk. Adequate training of hospitals health care workers and waste handlers, availability of suitable personal protective and transportation equipment, and enough supervision of environmental health manager of hospitals are needed to decrease the risk of healthcare waste management in studied hospitals that should be taken into consideration by the authorities.

Keywords: Assessment, Preliminary Risk, Healthcare Waste (HSW), Preliminary Hazard Analysis

The Study of Environmental Health Index Improvement Process in the Industry by IMS Requirement Boushehr Port & Maritime Authority

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Abstract

Due to particular nature of the port in both sea and land zone (area) and the daily goods exchange with other countries must be considered as one of the main gate of iterance of pathogens .given that the location of Boushehr province on the south tropical zone, this area could be transmitted and outbreak of Mediterranean disease. Because of vessels entrance and their crews to the harbor and use of port facilities, it could be the cause of disease spread. HSE department have taken the preventive and corrective action according to IMS requirement. In This essay environmental health condition in the industry have been studied for 5 years and determine the investigation of environmental health index improvement. Result shows the improvement at environmental health condition by increasing public knowledge, proactive action and Improvement of port infrastructure. Comparison of two ports of Boushehr and Genaveh in the improvement of environmental health indicators shows the effective role of IMS as a volunteer action in Boushehr port. In all survival indicators, conflicts related to buffets port by 76% decrement, have the maximum improvement and healthy of fresh water of operation area by 32% decrement have the minimum improvement relation to past age. Comparison between two ports with IMS and without IMS shows the significant difference between improvements of indicators of environmental health.

Keywords: IMS, Boushehr Port & Maritime Authority, Environmental Health

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The Study of Health Justice Indicators Based on the Health of Rural Households in Golestan Province in 2017

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Abstract

Maintaining, promoting and restoring health and maintaining health equity and minimizing the avoidable differences in health is one of the goals of the health system. The country's rural areas along with economic, technical and cultural development, by changing the patterns of consumption, lead to production, dispersion And the accumulation of a great deal of domestic waste and waste has been plowed, and on the other hand, in many rural parts of the parasitic diseases caused by the false human feces and the lack of access to drinking water, many problems have been created for these communities. This cross-sectional descriptive study was conducted on the status of health justice indicators based on environmental health indices among rural households in Golestan province in comparison with the country's index. Based on the findings, rural households in health toilet access indexes and sanitary waste disposal were 81.3% and 69% lower than the national index, and in the indices of livestock excretion and waste disposal of rural households, the percentage of results Favorable microbial samples of drinking water and rural households that have access to drinking water are 74% and 96.82% respectively, and 94.1% 99.29% higher than the national indicator. Equitable health promotion through proper distribution of resources in the rural environment health action plan aimed at the implementation of sustainable rural development with the goal of preventing infectious diseases, through intergenerational collaboration and participation of people play an important role in improving the quality of life and their health. The continuation of this process should be taken into consideration by the provincial authorities.

Keywords: Justice in Health, Environment, Rural Environment

The Study of The Health Status of the Mosque's Environment, Its Sites and Its Related Factors in The City of Sari, 2016

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Abstract

The importance of paying attention to the mosques, as a sacred place and the emphasis of Islam on its purification, is important for all, and if it is forgotten, it may become a focal point for the dissemination of pathogens and bring the health of the population to Jeopardize. By considering this fact that the study of health problems related to mosques is important, and the past studies do not addressed all aspects of this subject, this study aimed to investigate the health status of urban mosque environment in terms of personal health, tools and means of work and construction status The information of each mosque is recorded in the questionnaire. The questionnaire was comprised of 45 variables, each with a score in percentage terms. From the total number of mosques in Sari in 2016, 50 samples were randomly selected. After collecting health information and entering them into Excel software, the results of the project were determined using descriptive-cross sectional statistical methods. In terms of general health, 42.9% of the mosques were undesirable, 26.7% were desirable and 30.4% of them were moderate mosques. In terms of construction 13.5% of them do not have the studied variables, 53.7% were desirable, 25.6% moderate and 7.2% of them had unfavorable status. In terms of tools, 9.7% of mosques do not have studied variables, 48.8% were desirable, 32.8% were moderate and 8.7% of them were unfavorable. According to the results, the personal health status of the mosques, which is very important for the health of the people and the people who use them, was in a low level. The mosques were modest in terms of tools and construction. However, the city of Sari was in a lower level than what is expected

Keywords: Mosque, Health Center, Health Indicators, Ambient Places, Environmental Health

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Type and Amount of Pesticides used in Agriculture in Kashan, 2015

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Abstract

Human history showed that human beings tried to increase agricultural production and improve their health by using pesticides to fight pests. Pesticides eliminate pests, pollute the environment, and cause diseases. This study was conducted to determine the status of pesticides in agricultural sector of Kashan during 2015. In this descriptive study questionnaires were used to determine the amount of cultivated land, type of cultivated product, group and type of consumed pesticides, as well as formulation and application rate of each pesticide. The data were grouped into categories and the results were compared to the chart and table. The results showed that a total of 16 types of pesticides were used in the agricultural sector of Kashan; among which, 5 types (31.25%) were from organophosphorus group, 3 types 18.75%) Pyrethroid group, 2 types (12.5%) copper compounds, and 6 types (37.5%) were from other types of pesticides . The data from this study showed that most of the applied pesticides were organophosphates, among them the most commonly used was diazinon. Considering the widespread use of organophosphorus pesticides, the probability of contamination and poisoning with these compounds is a potential hazard to human health. Accurate and informed use can be effective in preventing environmental pollution and crop production.

Key words: Pesticide, Organophosphorus, Agriculture

Using religious teachings in explaining the concepts of environmental health

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Abstract

Using religious sources such as Holy Quran, Nahjolbalagheh and Sahifeh Sajjadieh in conducting medical research, according to our beliefs, Muslims have a positive and effective role in expanding the knowledge of health, believing and the commitment of Muslim people to do so. Be Therefore, the present study was conducted with the aim of utilizing verses and narrations (religious sources) in the part of the scientific products of the field of health. This cross-sectional descriptive study was performed on all project unit project reports in environmental health students of Babol University of Medical Sciences during a six-year period (2010-2015). Data was collected and evaluated by using a researcher-made checklist in accordance with research objectives and by using one of the methods of scientometrics, through reviewing sources along with other sections of the report. Descriptive and inferential statistics were used to process the data.

A review of 2605 sources from 110 project study reports, as well as a review of all their parts, showed that 19 reports (17.2 percent) were used from religious sources including the Holy Qur'an, Nahjulbalagheh, Sahifeh Sajjadiyeh, which used the Holy Quran 7 cases in 6 reports and hadiths and narrations were 16 in 12 reports. Despite the significant relationship between health research in the field of environmental health and religious concepts and preaching, the share of using valuable religious sources in the compilation of scientific reports of environmental health students has been low.

Keywords: Religious Sources, Verses and Narrations, Scientometrics, Environmental Health, Students.

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Analysis of Articles Presented at Environmental Health Conferences

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Abstract

The environmental health profession in Iran, with half a century of history as a profession, has more than four decades of academic and academic background, whose professors and students work to prevent diseases and promote the health of the community. Much of the research in the field is presented in the form of lectures and posters at the National Conference on Environmental Health held annually. Therefore, the present study was conducted with the aim of analyzing the thematic articles presented in this conference.

This cross-sectional study was carried out over a 16-year period from the first year of the conference (from 1995 to 2013) on all papers presented at the environmental health conferences in a census. Titles and abstracts of all papers were evaluated. Articles were divided into four sections: water and wastewater, waste, air, sound and radiation, general health. To extract the data, a special collection form was used to fit the research objectives. Data processing was done using descriptive statistics and chi-square test. A review of 2928 articles presented in 16 congresses during 16 years showed that 1362 articles (%45.51) in relation to water and wastewater, 402 articles (%13.72) on waste, 311 articles (%10.62) In the air domain and 853 articles (%29.13) were provided for general health. Although the findings of present study indicate that experts and students in the field of environmental health are important issues in the field of water and wastewater, other health areas, such as waste and air, also require special attention of the scientific community of environmental health, by using the results of scientific articles.

Keywords: Environmental Conference, Water and Sewage, Air, Waste, General Health.

Challenges in Environmental Health Inspection and Administrative Barriers matter 13 law

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Abstract

According to the the community's expectations of environmental health and its activities in order to maintain and improve its health and legal duties and Also, the changes and evolution that have taken place in health care in the past two decades have many challenges. For this reason, we have been asked to take a cross-sectional study of the challenges in this research materials and methods. This study was a descriptive cross-sectional is done in the first half of 1396 and completed the questionnaires by environmental health experts and finally, it was analyzed with SPSS software. Results and conclusion by examining the results of the questionnaires, the most important challenges are as follows:

-Non-priority matter 13 of the law of food, drinking, cosmetics and health on other existing laws

- Determination of the reviewing authority under matter 13 of the Food, Drinking, Cosmetic and Health Law and the establishment of a specific branch in the judicial system

- The lack of specific quality food instructions in matter 13 of the Food, Drinking, Cosmetic and Health Act, as well as the lack of transparency of certain activities in the health and food and medicine deputy

- Delete the credit lines of environmental health and integrate it with other university units

According to the results, the formation of the Strategic Committee in the Scientific Society for Environmental Health and Health Center Environmental and Work is proposed to solved the challenges of the health environment.

Key word: Environmental Health, Challenge, matter 13

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Evaluating the status of environmental health emergency center of Yazd province with the purpose of human resource consolidation in small cities with low and moderate population density based on SWOT method

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Abstract

Identifying the effective factors of success through analyzing the current situation and conditions can be a major development in reaching the high levels of planning and utilizing of strengths. Extreme activity and its multiplicity and diversity in the form of system with emphasis on achieving the goal of environmental health cause some problems such as reducing motivation, cooperation and creativity resulting threat to the public health. Staff gathering in form of environmental health emergency center can be the right solution based on SWOT method, since the environmental health technical assistant can control the fellow inspectors better, while the capabilities and the interest of the staff can be used for resolving the problems. This descriptive - analytical study based on SWOT model. At first examine the status of existing environmental health emergency centers in Yazd province and then using its effects on the achieving the environmental health goals in order to define the strengths, weaknesses, opportunities and threats. In the current study, by comparing the strengths and weaknesses, using the analysis of opportunities and threats, we found a significant relationship between functional percentage of the environmental health emergency center and the staff gathering, which can help to achieving the goals through the strategic management of this process . According to the results, opportunities such as consultation, solidarity, motivation and mutual objective of environmental health personnel in a specific complex with the supervising of technical assistant are desirable. Developing the indicators, teamwork, customer satisfaction, using the capabilities of the personnel and the possibility of staff replacement in case of leaving, are some of the strengths of the project. The lack of such a structure with the organizational chart in the Ministry of Health is one of the threats and we need a solution for eliminating those threads and enhancing the opportunities.

Keywords: environmental health emergency centers, management, SWOT, Yazd

Examining the Executive Barriers and Challenges in Effectiveness of Inspections of Water Supply System Based on Risk Level in Abarkouh

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Abstract

Bacteriological and chemical monitoring of drinking water from abstraction to consumption point is one of the tasks of environmental health experts and the providing of healthy, safe drinking water is the task of water and sewage companies, according to the current rules and regulations.

Despite increased controls on safety of drinking water by environmental health experts in many ways such as inspecting the resources and reservoirs, analyzing and measuring chlorine, conducting necessary experiments on drinking water in cities and villages, correspondence and meeting with agencies responsible for providing water; and even though this is one of objectives in approved operational planning of Ministry of Health, available statistics do not show much success in the effectiveness of inspections.

This research is a descriptive cross-sectional study based on the checklists of the water supply system in the comprehensive environmental health inspection system and its purpose is examining the executive obstacles and challenges in effectiveness of inspections done by environmental health experts, and their executive solutions in Abarkouh.

Based on the data recorded in comprehensive environmental health system in the first six months of 2017, 60 water supply systems (40%) of 147 were at low risk, 39 systems (26%) were at moderate risk, 40 systems (27%) were at high risk and 2 systems (1.36%) were at very high risk.

According to the findings, regardless of spent time and difficult conditions during inspection and opposition of individuals or authorities, most of the existing problems and deficiencies are related to the facilities and burnout pipes or fences and security issues of resources and reservoirs, among them the issue bioterrorism in case of water and food is most evident. The executive solution for these problems and increasing the impact of inspections, other than financing the water and sewage companies in order to rehabilitate or improve the water supply systems and providing security for them, requires more interaction with- and support from the provincial authorities to address the sensitivity of the issue in provincial meetings.

Keywords: challenge, environmental health ،biotrorism, water supply system, Abarkouh

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Investigating the Activity of Environmental Health Inspectors in 2017

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Abstract

Environmental health means control of physical, chemical, biological factors that somehow affect human health .By considering the subject of health in food, the supervision of cemetery is of particular importance. This goal will not be achieved unless the monitoring forces have the necessary scientific and practical ability to do so. In this regard, one of the duties of the medical university of the whole country is the supervision of the procurement and distribution centers and public places, which under the responsibility of environmental health inspectors. The survey of activity of environmental health inspectors carried out in the health centers of sari in 2017. All data on community health monitoring and archived materials on environmental health control by health inspectors, in Sari, was the source data for this study. All data collected from the health center of Sari by checklist. All achieved Excel charts evaluated and compared the issuance and renewal of the health cards, the crimes, the result of the inspection of the inspectors and other information with each other. By comparing the information, results show that the inspector's activity at Center 6 was greater than that of the other centers, and the inspectors' activity was generally well evaluated in which with more training the environmental health of centers is increased. This study made us more confident about environmental health at places under the inspection of environmental health inspectors in our city from different aspects.

Keywords: Environmental health, Health center, Environmental Health Inspection

Necessity of Environmental Health Regulation Revision Related to the Law of foodstuffs, Drinking and Cosmetics (13 Clause) Based on Feld Inspections

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Abstract

Paying attention to the health of food, including monitoring, and control of food distribution, establishment and processing is very important to provide community health. These goals do not lead the result unless supervisory staffs have a comprehensive method or a tool for favorable evaluation. This study was performed to revise 13 clauses of the law of foodstuffs, drinking, and cosmetics during 2017. This study was conducted from June to August in 2017. The team was composed of faculty, inspectors and experts of environmental health for regulation evaluation and revision of 13 clauses of the law of foodstuffs, drinking and cosmetics. Total 31 checklists that have covered the 46 types of class food processing establishment, were revised by team members according to precise field survey as a strap to the clauses. The results of the study show that total 168 defective cases were observed in compliance regulations of 13 clauses of the law of foodstuffs based on food processing establishment on a field survey so that 74 cases did not matter and should be deleted. Furthermore, 34 cases were not enough in size, and it was necessary to be perfect. Seven clauses are repetitious and 9 clauses have obligatory to revise; in addition, 7 cases are obscure and it is necessary to measuring device in 9 cases. Regulations of "Production and distribution of Pickles and distillation" and " Sweets processing establishment " have the most defective cases and regulations of "Food supply and processing buffet" and "grocery "have the least defective cases in among of regulations, respectively.in spite of complementary correction of 13 clauses in 2013, there are important problems with field inspections. So that the checklists that is presented in the health inspections system (Silverlight software) does not match to these regulations. it seems that revision of regulations and checklists is a necessity and should be performed in partnership with environmental health inspectors of health centers. For the most comprehensive and effective inspection, tedious and time- consuming clauses for inspectors should be revised and corrected.

Key words: Regulation, Processing centers, Revision, Environment health inspectors.

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The Executive Obstacles of the Article 13 of the Food, Drinking, Cosmetics and Sanitation Law

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Abstract

There are various potentially executive obstacles in the implementation of governmental laws in any country. In the same way, lack of the correct implementation of law is considered as greatest threat to sustainable development goals in each country, especially laws related to public health. The aim of the study is survey the executive obstacles to implementation of the Food, Drinking, Cosmetics and Sanitation Law (FDCSL approved in 2000). This study is a comparative study in which the article 13 of the FDCSL and its modification were compared to the constitution law (approved in 1989), the civil law (approved in 1925) and the other related domestic rules from the aspects of civil right and procedural right to identify these obstacles. Besides, the environmental health experts were interviewed. The results indicated the absence of a clear legal definition of the situation of the word of building, not be mentioned and specified the word of legal in many phrases in the law and non-deterrent penalties were the main obstacles to the implementation of article 13 of the FDCSL. The findings of this study suggest that in the process of adopting regulations, more attention to domestic law particularly in terms of civil rights can reduce possible contradictions in implementing this law.

Keywords: Sustainable Development, Government, Public Health, Responsibility

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What Challenges do the Environmental Health Inspectors Face? A Delphi Study in the Province of Semnan

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Abstract

Consideration of food quality, monitoring and control of food supply and distribution centers and public places is very important in terms of health. Health monitoring and control of these centers are the responsibility of environmental health inspectors who frequently face some challenges and difficulties in performing this task. The purpose of this Delphi study was to gather environmental health inspectors opinions about the likely challenges of hygienic inspection in Semnan province. This standard Delphi study had three rounds of data collection that began with a questionnaire developed by the researcher from the literature. The questionnaire included 33 challenges of environmental health inspectors. The panel included 22 experts who had upper diploma with more than 10 years of working experience, or BS and MS with at least 5 years of working experience. The participants were asked if they agreed with the 33 challenges or not. A challenge was identified as influential provided that at least 75% of respondents agreed upon it. The second round allowed participants to provide feedback on all responses from Round1. Finally, the third round used a questionnaire developed from the previous two rounds to find a final consensus on the topic and to rank the challenges according to their influence on the inspection process. The data was analyzed with descriptive statistics and a friedmans test using SPSS23. According to the results, as hypothesized, a Friedman test indicated that challenges were rated differently ($\chi^2(2)=29.299$, $p=0.001$).While all the challenges were approved as influential, the first three most important challenges are “lack of safety and support from authorities”,“extended responsibilities and workload” and “low accessibility to high quality food labs”. The standard deviation revealed that the highest consensus related to “lack of safety and support from authorities”. According to the present study it is recommended to plan the procedures so as to prioritize the most important challenges. To successfully deal with the challenges, effective supporting mechanisms should be inforced; Balance between responsibility and workloads as well as work division; provision of well-equipped and high quality food labs may help meet the mentioned challenges.

Keywords: challenges, environmental health, inspectors, Delphi study, Semnan

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A comparative Investigation of Hygienic Conditions and Soda Consumption in bakeries of Mahdishahr Township in 2015 and 2016

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Abstract

As a valuable source of proteins, minerals and calories, bread is highly important. It is critical to pay attention to the hygiene status of production and consumption of soda in bread. This comparative study was aimed to investigate the hygienic conditions and consumption of baking soda in the bakeries of Mahdishahr Township, Iran, in 2014-15. This cross-sectional descriptive study was performed in 2014(55 bakeries) and 2015(60 bakeries) in Mahdishahr township. A total number of 110 and 120 samples were collected in 2014 and 2015 respectively. Samples were collected randomly from all bakeries in two steps (two loaves from first batch). pH in the samples was tested based on the method presented by Institute of Standards and Industrial Research of Iran (No.2628). The pH of each specimen was measured in triplicate separately, and the average value was recorded as the pH of bread produced in that bakery. To check the status of health and personal hygiene of bakeries, the check list of Iranian Ministry of Health was used. Totally, 7.27% and %11.66 of bakeries used baking soda in their bread production in 2014 and 2015 respectively. In 2014 the highest and lowest soda consumption was in Lavash (8.3%) and Sangak (0%) breads. In 2015 the highest and lowest soda consumption was in Barbari (14%) and Sangak (0%) breads. In terms of health status, 20% of bakeries were at good level, 29% at moderate and 51% at weak level in 2014, while in 2015 28.3% of bakeries were at good level, 48.3% at moderate and 23.3% at weak level. According to the results, in spite of regular inspections in 2014 and 2015, baking soda consumption was still common in bakeries especially in Barbari bakeries. Moreover, health status, particularly personal hygiene was improving although still not desirable. Hence, continuous education, control of health status and legal practices as well as continuous and effective sampling control the amounts of baking soda in bakeries is thought to be influential in improving the conditions of bakeries in a long term view.

Keywords: Hygienic conditions, Soda, Bakeries, Mahdishah

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A study on the Unpermitted Food Coloring Consumption Rate in Confectionary Products of Kermanshah Province in the Years of 1395 & 1396 H.S

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Abstract

Using organic food colorings in confectionery products follow the satisfaction of customers. However, unpermitted colorings matters can cause serious health damages including allergy or even malignant tumors. This study aimed to evaluate evaluation the rate of consuming unpermitted colorings matters in confectionery products of Kermanshah Province in the years of 2015 and 2016. This descriptive, cross-sectional study was conducted in Kermanshah Province, during 2015–2016. The confectionery products were chosen randomly among different shopping centers and confectionery markets. 93 and 34 samples were analyzed in the years of 2015 and 2016 respectively. The analysis includes defatting the samples, purification and extraction of color from samples solved in water, chromatography, and finally determination of the food coloring. Data was analyzed using excel software. 47.3 percent of the 95's samples and 55.8 percent of the 96's samples contained unpermitted artificial food colorings; most of them were cookie and the least of them were cream puff. There was a relation between the knowledge of marketers about unpermitted food colorings and the rate of using these additives by them ($p<0.001$). The results show that an obvious amount of confectionery products are not healthy. Regarding the increasing rate of consuming the unpermitted food colorings, we can assert that the health of consumers is threatened seriously. Improving the knowledge of managers of the confectioneries as well as their workers about the harmful impacts of these additives and publicizing the organic food colorings can lead to a decrease in the amount of using the unpermitted food colorings and as a consequence the improvement of the health of the society.

Key Words: Food products, Confectionery products, Food colorings, Kermanshah

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Acrylamide Formation in Foods and its Impact on Health

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Abstract

Acrylamide is a potential cause of a wide spectrum of toxic effects. Nowadays, the presence of acrylamide in lots of fried and baked foods raises concerns due to its potential to cause toxicity and cancer in animals and human. On April 24, 2002, the Swedish National Food Agency reported data that showed high concentrations of acrylamide in certain foods. For this reason, many researchers have focused on this subject. Better knowing of acrylamide formation helps us in decrease of it in special food products. The aim of this study was to review acrylamide formation mechanisms in foods, its metabolism and impact on health and reduction ways of it in specific food products. The highest amounts of acrylamide are generated through frying of potatoes, roasting of coffee and cocoa beans, baking of bread and cakes, thermal processing of cereals and meat roasting. In these products, acrylamide formation has a good connection to the Maillard browning reaction. Currently it is well known that this compound is also one of triacylglycerols thermal degradation products taking place during food processing at very high temperature. The intensity of acrylamide formation in foods containing asparagine and reducing sugars depends on initial concentrations of these precursors and their ratio as well as on temperature and duration of thermal treatment, water activity and pH. According to, some studies have shown that acrylamide is a dangerous toxin for human health, so it needs to reduce the level of acrylamide in these products. Nature and final specifications of food product effects on selection of reducing ways for acrylamide content in it. Depending on the kind of food products, different strategies are proposed. Some of these strategies are as follow: 1-Removing or reducing of reactants, 2-Disruption in acrylamide formation (controlling of temperature-time relation, pH, and water activity), and 3- Destroying and/or trapping of acrylamide after its formation.

Keywords: Acrylamide, Acrylic Acid, Food, Millard Reaction

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Aflatoxin M_1 in Raw Milk of Yasuj Traditional Dairy Stores using Quick Afla M_1 Strip Test

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Abstract

Aflatoxin is a toxic source of mycotoxins and one of the most dangerous carcinogenic substances. It is metabolized in the liver and the new compound of Aflatoxin M_1 is obtained from it. Therefore, monitoring of this toxic substance is important in foods, especially milk. The aim of this study was to determine the amount of raw milk contamination to Aflatoxin M_1 in traditional dairy stores in Yasuj. In this descriptive cross-sectional study, 240 samples of raw milk were collected from traditional dairy stores of Yasuj city. The amount of Aflatoxin M_1 was measured using the quick afla M_1 strip test kit. This method permits the rapid and visual qualitative determination of Aflatoxin M_1 in milk samples and has two stages of incubation at room temperature for 5 minutes at each stage. The detection range of this kit conforms to European standards based on four control lines with values below 50 ppt, approximately 50 ppt, more than 50 ppt, and strong positive. The assay can be performed in two steps: 1-The milk sample is added to a reaction vial with a lyophilized reagent, which is mixed and incubated at room temperature for 5 minutes. 2- Then, a test strip is posed in the reaction vial and incubated for another 5 minutes and finally, the amount of Aflatoxin M_1 is read and recorded. Data analysis was performed using Excel 2007 software. The results of this study showed that Aflatoxin M_1 concentrations in raw milk were 60.83% less than 50 ppt and approximately 36.67% less than 50 ppt. Furthermore, in 2.5% of samples Aflatoxin M_1 concentration was higher than 50 ppt. The amount of Aflatoxin M_1 in 2.5% of milk samples was higher than the codex standard and European limits (50 ng/l). High levels of Aflatoxin in milk can be worrying for the community health. The best way to prevent the entry of contaminated raw milk with Aflatoxin into the traditional dairy stores is to supervise the animal foods, control and measure Aflatoxins in livestock farms before arriving to these stores.

Keywords: Aflatoxin M_1, Traditional dairy, Yasuj, Raw milk

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Alternative disinfection methods Use to Control Microbial Quality and Shelf-life of Raw Eaten Vegetables (Case Study)

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Abstract

Vegetables intake is widely recommended because of its high content of vitamins, minerals, and fiber. However, fresh cut vegetables are particularly susceptible to microbial growth and, therefore, use of an effective sanitizer on this product is important. Common different vegetables were obtained from a local wholesale market in Isfahan and washed with different common disinfectants such as edible salt, sodium hypochlorite, electrolyzed water (EW), complex disinfectant, calcium hypochlorite, and dishwashing liquid. Disinfection time and concentration were selected according to the Official Protocol in Iran. A total of 126 samples including Mint, Savory, parsley, Garden cress, Common Purslane, Chives, Basil, Radish, and mixed vegetables were analyzed for total bacteria, total coliform bacteria, and E. coli. The 9 tube Most Probable Number (MPN) method was used to measure the coliforms. Results demonstrated that calcium hypochlorite had the best efficiency for total coliforms in separate vegetable of parsley, Garden cress, Common Purslane, Chives, Radish, with100% efficacy. For total coliforms BGB (Brilliant Green Broth) test, complex disinfectant and calcium hypochlorite had 100% removal for all of the vegetables. *E.coli* test result showed in four vegetables not see *E.coli* but for other vegetables except for Dishwashing Liquid efficiency was 100%. Among all disinfectants, EW had a high efficiency for mixed vegetables. For Basil disinfected with edible salt and mint washing with complex disinfectant, Eimeria parasite and in savory disinfected with calcium hypochlorite Hook worm parasitic was found. Shelf-life was between 1 to 5 days, the maximum and minimum Shelf-life obtained to parsley (by complex disinfectant) and Basil (by sodium hypochlorite and Electrolyzed water) respectively. Our research suggested that EW had a good effect for total coliforms, *fecal coliforms, E.Coli*, and helmet eggs removal, also could save the vegetables shelf life.

Keywords: Common Disinfectants, Raw vegetable, Fecal coliform, Total coliform, Shelf-life Consumed raw, Egg parasite

An Investigation of Contamination of Consumable Vegetables to Heavy Metals in Iranian Cities

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Abstract

Raw vegetables are important components of human diet. One of the concerns of the world today, is the pollution of agricultural products with heavy metals. Heavy metals, due to lack of metabolism, are extremely dangerous for humans and their accumulation in the body leads to pathological changes in organs and causes various diseases. Therefore, this study was conducted to evaluate the contamination of vegetables of Iranian cities with heavy metals. This review study was conducted by searching the Google Scholar search engine and the magiran, SID, and Iranmedex databases with keywords of vegetable, heavy metals and Pollution of farms from 2006 to 2016. The results of various studies showed that the concentration of chromium, cadmium, lead and iron in the samples measured was higher than other metals. Vegetables such as leeks, lettuce, parsley and radishes were more polluted than other vegetables. Also vegetable leaves had a higher concentrations of metals than roots and stems, and the transfer of metals from soil to plant leaf in lettuce was higher than other vegetables, which is due to the high transfer of these metals to the plant's aerial part. The amount of contamination of vegetables has been reported from about 0.05 to 37 mg.kg-1. The results of a study on some vegetables in Karaj showed that the concentrations of chromium, iron and manganese were 3.99, 11.87, and 17.76 mg.kg-1 respectively, which was much higher than WHO and FAO standards.

Discussion and conclusions: Considering the different dimensions of the ability of heavy metals to decompose on the internal organs and their harmful effects, it is recommended that non-industrial food contamination is evaluated to ensure healthy nutrition. It is also obvious that the distance between agricultural land and highways, factories and power plants should be considered. It is advisable to educate gardeners to properly use chemical fertilizers and to use alternative vegetables that have less contamination.

Keywords: Vegetable, Heavy metals, Pollution of farms

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Assessment of Microbial Quality of Tahini, Flavored Tahini and Halva in Yazd Iran 2017

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Abstract

Tahini is made from dehulled sesame seeds that are roasted then ground by stone or mechanical apparatus. Halva is preapered from tahini by adding Saponaria root, citric acid, sugar and other additives to it. Contamination of tahini with pathogens is significant, because it is usually used without any additional heat treatment. Furthermore, it contains a lot of fat that can protect the pathogen from gastric acidity causing a reduction of the dose-response curve. Flavored tahini is made from tahini by adding cocoa or chocolate powder and stabilizer. Increasing in aw can cause the growth of microorganisms on the surface of these products.

The aim of this study was to assess the microbial contamination of halvah, tahini and flavored tahini in Yazd province in Yazd in 2017. This cross-sectional study was conducted on 295 samples supplied in factories, which were selected randomly. The samples were tested for microbial contamination such as Escherichia coli, Enterobacteriaceae, coliform, yeasts, and molds, using the microbiological tests, which were based on the Iranian national standards.

According to the results, the prevalence rate of microbial contaminated samples was 18.6 (n=55). Furthermore, the microbial contamination 18.9% in “flavored tahini”, 13.63% in “tahini” and 22.2% in halva, respectively. Additionally, the prevalence rate of contamination to *Escherichia coli*, Enterobacteriaceae, coliform were 0.3 %, 1.0%, 10.0%, in tahini and flavored tahini, respectively. Mold and yeasts together, were 6.44%. Mold was estimated 8.2% and yeast 0.2% in halva. Changing temperature and the moisture conditions to which the product is exposed during production, storage, distribution, and utilization should be identified as an important microbial stability factor. Also the modification of manual production methods can reduce the rate of contamination.

Keywords: Halva, Tahini, microbial, contamination

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Assessment of Phosalone and Chloropyrifos in Fresh Vegetables from Kermanshah, Iran using Dispersive Liquid–liquid Microextraction and HPLC-UV

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Abstract

Organophosphorous pesticides (OPPs) are widely used for agricultural activities due to their relatively low price and effective ability to control pests, weeds and diseases. These pesticides in agricultural products and foods become a serious concern. Among them, phosalone and chloropyrifos are most widely used in Kermanshah, Iran. A simple and environmentally friendly method based on dispersive liquid-liquid microextraction (DLLME) followed by high performance liquid-liquid chromatography-ultraviolet detector (HPLC–UV) was developed for the simultaneous determination of phosalone and chloropyrifos in fresh vegetables. The sample was homogenized and extraction of the target analytes with acetone was carried out assisted by sonication. Preconcentration of the analytes from the acetone extract was done by using DLLME technique. DLLME was performed by rapid injection of 1.0 mL of acetone extract contains OPPs and 1-undecanol (approximately 30 µL) into a 5.0 mL ultra-pure water which was placed in a 10-mL screw cap glass test tube. A cloudy solution resulted from dispersion of fine droplets of 1-undecanol in aqueous solution was formed in the test tube. The mixture was then centrifuged for 4 min at 5000 rpm. After centrifugation, the test tube was then transferred into a beaker containing crushed ice for cooling. After 5 min, the extraction solvent solidified and was then transferred into a conical vial, where it melts quickly at room temperature. The extractant was injected into a HPLC for analysis. Under the optimum conditions, recoveries for different vegetables are in the range of 68-88%. The calibration graphs are linear in the range of 5–800 µg kg^{-1} and limit of detections (LODs) are in the range of 2–8 µg kg^{-1}. The repeatability (intra-day) and reproducibility (inter-day) are in the range of 4.5–7.8% and 5.1–9.0%, respectively. The results for cabbage showed that it was free of phosalone and chloropyrifos contamination. For other samples phosalone and chloropyrifos were detected at the concentration level of 3.8–31.0 and 12.0–88.6 µg kg^{-1}, respectively. The obtained results show that DLLME combined with HPLC–UV is a fast and simple method for the determination of pesticides in vegetables.

Keywords: Ultrasound-assisted solvent extraction; Dispersive liquid–liquid microextraction; Phosalone; Chlorpyrifos; Vegetables

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Buffalos Milk Contamination with the Toxic of Aflatoxin M_1 in Ahvaz Area

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Abstract

Mycotoxins are a group of toxic compounds produced by several species of fungi and aflatoxins are the most important toxins. M_1 and M_2 which are derivatives of aflatoxin B_1 and B_2 are resistant against thermal changes, such as pasteurization, sterilization and autoclave and their concentration will not decrease. They are transmitted to humans by milk and milk products and threaten the health of human and the society. The aim of this study was to determine aflatoxin M_1 in buffaloes milk in Ahvaz and Karoon, Iran using ELIZA method. In a cross-sectional study, 60 milk samples were randomly collected from two farms with large number of buffalos, in autumn. ELISA method was used to evaluate of aflatoxins the samples. The average level of aflatoxin M_1 in two selected locations was (155.91 ng/l) which was more than standard level in Iran and the Codex Alimentarius. According to this research, there was a strong relationship between presence of toxin in milk with the animals' diet and method of storing their foods.

Keywords: aflatoxin M_1, milk, food safety, ELISA

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Consumers Reaction to the Labels on Food Products: the Consumer's Viewpoint

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Abstract

Since a good healthcare system directly affects the progress of a country, the society should have a proper nutrition guide. The food Labels are the most important public health implements to balance nutrition patterns, and making strong communication between manufacturers and consumers. Therefore, by reporting the consumer's viewpoint a research has been done with the aim of investigating the comments and barriers to food labels consuming by the Bandar Abbas citizens, 2017. This is a descriptive-analytic-cross section study. In this study, Bandar Abbas was divided into five districts (A:Golshahr, B:Damadi, C:Central Shopping also known as Fourth Moradi, D:Republican Bolivar also known as Azadgan, and E:Khwaja Atta). Then 200 people by Cluster sampling was randomly selected, which each of them completely filled in the food labels questionnaire concerning a demographic, comments and the barriers of them. Finally, the information and statistics of the study were analyzed by using SPSS software version 18. Data analysis showed that gender had a significant relationship with the barriers to food labels use variable in the consumers ($P < 0.05$). 58% of the participants were married and the two variables studied did not have a significant relationship with marital status. Most people had university education and there was a significant relationship between the level of their education and their opinion about the food labels as well as the barriers relating to checking the labels ($p < 0.05$). Also, among the available barriers regarding checking the food labels, the marginal features of labels the has the highest percentage (57%), and the option with the lowest abundance was lack of literacy to read tags (35%). Only 7% of the participants expressed their satisfaction with the label insertion and 48 of consumers satisfied with the legibility and suitability of the inclusion of allergenic substances place. The results of this study presented that there are many barriers to information on food labels. since these barriers have a great impact on the nutritional performance of people some criteria should be taken in to account including: long-term nutritional education, Interpreting the information on the food labels and the importance of using it in order to select the right foods for reducing the incidence of nutritional diseases.

Keywords: Food label, Consumers, Barriers

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Consumes Knowledge and Attitude toward Nutrition Information on Food Labels

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Abstract

Labels are the most powerful means of transferring information from manufacturers to consumers. Nutrition labeling is a leading public health policy aimed to improve food safety and consumer awareness of their nutritional choices. This study carried out to determine the attitudes and practice of consumers on food labels in Bandar Abbas in April 2016 to March 2017. In this descriptive and cross-sectional study, 200 individuals were selected through random selection. Data on demographics and Attitudes and practice of food retailers and consumers were collected by filling a questionnaire and the results were compared. The collected data were analyzed by descriptive statistical methods and analyzed using SPSS ver21 software. The age of participants ranged 11-68 years old and the majority of them were between 20 and 40 years of age. About 51% of the sample were women, 58% were married and had a diploma and higher education. According to the results, Mean attitude and practice of individuals were 15 and 0.99 respectively. About 85% of consumers said that the date of manufacture and expiration of the products were written in the legible form, and the most people pointed to the proper place of insertion of the date of production and expiration of the products. The main focus of the consumer's attention was to know the ingredients that make up the food, the conditions for keeping the product, the nutritional information and the sensitivities of the products. While the price and weight of the product was less important in considering the food labels. The results of this study showed that the level of consumer attitude and practice in the field of food labels is low, so teaching the interpretation of the information on food labels and its importance to achieve a suitable nutritional pattern to reduce the adverse effects associated with drug use packaged food can be effective.

Keywords: Attitudes, Practice, Food consumers, Food labels

Determination of Lead and Cadmium Concentration in Produced Rice in Ilam Province, Iran

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Abstract

Heavy metal pollution has been considered as a critical issue to crop production and food safety. Rice is the most important food in Iran. So quality of rice affects greatly human health. Cadmium and lead have been reported for great threat to health of human. We investigated Cd and Pb concentration in rice crop in Ilam province. In this study 30 samples of rice were randomly harvested from some of the agricultural lands of Ilam. The contents of Cd and Pb were measured using atomic absorption spectrometry.

The results showed that mean concentration Cd and Pb in rice samples respectively was 0.126 and 0.0949 mg/kg. the finding of this study indicated the concentration of Cd in most of the samples was higher than the standard limits reported by Iran, but Pb concentration in the samples were lower than the standard.

Keywords: heavy metals, Rice, Cadmium, Lead

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Determination of Sodium Hydro Sulfurous Anhydride, Dithionite, in Hamadan Bread's Production and Comparison with National and International Standards

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Abstract

Beards has been consumed as a high consumption products especially for poor people due to its low prices and high valuable nutrients. In recent years, addition of sodium hydro sulfurous anhydride, Dithionite, as an additive for better preservation and increase the visual appearance of food products. The purpose of this study was to investigate the determination of Dithionite in Hamadan bread's production. In this descriptive study, the concentration of Dithionitein bread in breads producing plants was determined in Hamadan in 2016. The study population was the whole of active breads producing plants in Hamadan. For this reason the sampling was done for 3 months at 30 bread producing plants. The concentration of Dithionite was determined according to Institute of Standard and Industrial Research of Iran (no: 2628). The results indicated that in all bread samples Dithionite in different month and plant were zero. The main results of this study indicated that Dithionite as an unauthorized additive has been not used in production of bread thus not threatening people's health.

Keywords: Dithionite, Standard, Bread, Hamadan

Determining of Heavy Metals Content in Milk and Dairy Products in Qazvin

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Abstract

Dairy products are nutritious drink and can play an important part in a healthy diet. The safety of dairy products decreases with increasing concentration of toxic compounds such as heavy metals. Heavy metals can cause poisonings resulting in central nervous function and impaired mental, in addition damage to vital organs. Long-term exposure may result in slowly progressing physical, muscular, and neurological degenerative conditions including cancer. The aim of this study was to measure the concentration of some heavy metals include Pb and Cd in milk and dairy products. The number of 200 samples collected from several Qazvin's markets and then transferred to the laboratory of Qazvin University of Medical Sciences. The analysis of heavy metals were performed by atomic absorption spectrophotometer. The mean metals concentration were 0.22± 0.01 and 0.12±0.009 ppm respectively. The concentration of heavy metals were found within the acceptable limits in FAO and WHO standards. It can be concluded from the results of present study that the milk and dairy products distribute in Qazvin's markets are safe to human consumption.

Keywords: milk, dairy products, heavy metals, Qazvin

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Evaluate the Concentration of Lead in Candy Colored Distributed in Bojnurd in 2016

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Abstract

Candy and candy products, although food is not perfect but sometimes including food consumed by children and pregnant women, respectively. The aim of this study was to evaluate the concentration of lead in candy color was distributed in Bojnurd. This cross-sectional study that 90 samples of colored chocolates from different areas were sampled randomly Bojnurd. After preparation of the samples, the concentration of lead by graphite furnace atomic absorption spectrophotometer equipped with model 220 Spectra AA 110 GTA- model manufactured by Varian (Varian) was measured. The descriptive (mean and standard deviation) information collected have been reported. The highest concentration of lead in candy colored 0/553 least 0/ 039 μg/g is the mean concentration of lead in candy colored 0/181. The results of this study showed that lead levels in all samples tested below the FDA standard, but the national standard limit for lead in candy is not available.

Keywords: Lead, candy colored, Bojnurd

Evaluating the Color of Edible Colors Used in Colored Candies Delivered at the Level of Bojnourd by TLC Method in 2015

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Abstract

Color is one of the important and influential factors in apparent quality, attracting consumer attention and good food market. Therefore, the use of artificial colors in some Harv products is increasing. The purpose of this study was to determine the amount of coloring consumed in color candies supplied in the city of Bojnourd. A total of 90 colored candy samples from different regions of Bojnord were randomly selected. After extraction of acetic acid, ammonia and wool with auxiliary coloration, the TLC chromatography method was used to determine the color type. 82.67% of the samples had artificial oral color and 17.4% of samples had normal color. The most commonly used color is the sunlight (40%) and the lowest color used are tartarazine and carvoyuzin (9.5%). The use of artificial colors to increase the attractiveness of these candies and the atmosphere is increasing which can be a warning for consumers. For this reason, further control and monitoring of these products and serious consideration with the offending units is recommended.

Key words: Color, candy, Chromatography, TLC

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Evaluation of Abamectin, Diazinon, and Chlorpyrifos Pecticide Residues in Apple Producte of Mahabad Region Gardens: Iran in 2014

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Abstract

The purpose of this study was to investigate Abamectin, diazinon, and Chlorpyrifos in apple from Mahabad-Iran. The influences of several parameters including shadow and sun, geographical directions and varieties of apples, whether they are golden or red type, was also taken into account on the residuals of the pesticides in the samples. The results indicated that sun considerably decreased the concentrations of diazinon and chlorpyrifos in sample exposed to it Geographical directions are showed tobe non-influential on diazinon while they are influential on Chlorpyrifosones. This can be attributed to Pesticide spraying time and prevailing wind direction in Mahabad. The pesticides in golden and red varieties showed no significant relations. The apple samples from Mahabad did not contain any abamectin while they contained residuals of diazinon and chlorpyrifos. In some semples the diazinon and chlorpyrifos were above allowed limit according to World Health Organization (WHO) standard.

Keywords: Pesticides residuals, Dispersive liquid–liquid microextraction, High performance liquid chromatography ultraviolet detection Apple

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Evaluation of heavy metals lead and cadmium in black tea produced in Yazd Province

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Abstract

Heavy metal pollution is an environmental problem and an important issue in food safety. Considering the complications resulting from heavy metal absorption in human body, and since tea, as a pleasant drink, is the second most widely consumed beverage in Iran (next to water). The aim of this study, was to contents of heavy metals lead and cadmium in black tea in Yazd Province. This cross-sectional study was conducted in 2016 and Sixty samples of most widely consumed black tea in Yazd Province were taken. Then the samples were prepared using the wet ash method and an atomic absorption spectrophotometer equipped with a graphite furnace was used to determine the contents of the mentioned elements in the samples according to National Iranian Standard No. 9266. The data was analyzed by statistical software SPSS ver.19. Average contents of lead and cadmium in the tea samples were 0.896 ± 0.251 and 0.06 ± 0.013 µg/g, respectively, and lead contents in thirteen samples(21.67%) and cadmium contents in two samples(3.33%) exceeded the limits established by the national standards. Analysis of the results indicated that there were significant differences between Iranian and foreign teas with respect to mean contents of these metals($P<0.05$). In all, according to the results obtained, it can be said that most of the black tea Iranian and foreign in Yazd province are safe for consumers in relation to their contents of lead and cadmium. However, the measured contents of these metals in some tea bag samples exceeded the permissible limits established in the national standards, that could be an important potential risk to the health of consumers**.**

Keywords: Heavy metal, Tea, Atomic absorption, Yazd.

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Evaluation of Microbiological Quality of Street Vended Fruit Juices from Yazd, Iran

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Abstract

This investigation was performed to evaluate the microbial quality of street-vended fruit juices in Yazd during the months of June till September. Fruit juices are well known for their nutritive values, minerals and vitamin contents. In many countries they are usual beverages and are sold at all public places and even roadsides stores. Contamination of these beverages is sometimes unacceptable for human consumption and is often show to be a potential health risk. Hence, fresh fruits cause increasingly important vehicles in food borne disease statistics. Thirty- four samples of freshly fruit juices were collected. Total coliform and the presence of pathogenic microorganism E. coli were analyzed by standard methods. Results revealed that the contamination level of fruit juices to Escherichia coli and coliform were 6% (n= 2) and 12% (n= 4), respectively. About 44% (n= 15) of total samples were contaminated higher than standard level for *Escherichia coli* and coliform, together. The contamination is mainly because of poor quality of water utilized for dilution as well as public unhygienic conditions associated with washing of services, contaminated water and ice for cooling, poor personal and domestic hygiene, peeling of fruits before washing of hands, dust particles in the evening. Health education of the sellers and performance of standard hygienic practices may decrease contamination of fruit juices. Regular controlling of the quality of fruit juices for human consumption must be expressed to prevent any future bacterial pathogen prevalence.

Keywords: Fruit juices, Contamination, coliform, *E. coli*, Microbiological quality standards

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Examination of Health Risk Assessment of Eggs Consumed in Holy Mashhad City, Iran 2016

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Abstract

Metals like lead, mercury, copper, cadmium, nickel, chromium, etc are important to human health due to their harmful effects, especially in chronic exposures. U.S. Environmental Protection Agency introduced Cd and Pb as the top hazardous materials. The egg is an inexpensive source of protein and high nutrient. The objects of this study were to determine the trace elements of egg and calculate the health risk assessment of that. In this cross-sectional study, 50 samples of egg purchased from poultry farm nearby Mashhad, Razavi Khorasan province in 2016. Wet digestion performed to prepare samples for determination of heavy metals. The heavy metals Copper (Cu), Zinc (Zn), lead (Pb), chromium (Cr), cadmium (Cd) were determined in the whole egg using Inductively Coupled Plasma Mass Spectrometry ICP-MS. The health risk assessment of each metal calculated by Total Hazardous Quotient (THQ, dimensionless), US EPA verified formula. This study calculated THQ in adults with a mean weight of 60 kg in Iranian population, THQ below one shows safe health risk for consumers. All statistical analysis was performed using the Stata11.2 portable software. Mean concentration of metals were Cr: 0.876 mg/kg FW^{-1}, Cd: 0.014 mg/kg FW^{-1}, Pb: 0.309 mg/kg FW^{-1}, Cu: 0.909 mg/kg FW^{-1}, Zn: 21.920 mg/kg FW^{-1}. Maximum allowable concentration (MAC) (mg kg FW^{-1}) of trace elements in the egg is 1 mg/kg FW^{-1} for Cr and 0.1 mg/kg FW^{-1} for the Cd, Pb. Hence Pb mean concentration was more than the MAC. The THQs were equal with Cu: 0.023, Zn: 0.077, Pb: 0.036, Cd: 0.006 and Cr: zero. Zn posed the most health risk in comparison the others. However, the THQ of all metals was under one that means resident people do not experience the adverse health effects due to consumption of egg. But more attention to assessment source of these pollutions is recommended.

Keywords: Egg, Health Risk Assessment, Total Hazardous Quotient, Mashhad

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Heavy Metal Levels (Cd, Co, and Cu) in Wheat Grains Cultured in Dashtestan County, Iran

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Abstract

Heavy metals (HMs) are the most dangerous contaminants for environment and human beings. Human exposure to HMs can occur when the excessive of them enter in the soil, water or air, it may cause hazards to human health through consumption of food crops cultivated in these contaminated environments. Ingestion of contaminated food is one of the main routes through which HMs enter the human body. Due to importance of wheat as the most popular food, in this study, we determined the accumulation of heavy metal levels including Cd, Co, and Cu in wheat grains in Dashtestan county, Iran. In this study, three important regions in wheat production including Shabankareh, Sadabad, and Tang Eram were selected as sampling points. A total number of 12 samples were taken from wheat grains in mentioned areas (each site 4 times). After transferring collected wheat samples to laboratory, grain samples were washed with tap water to remove any attached particles, after that rinsed three times with distilled water, and then dried at 38 $^{\circ}$C till constant weight. Dried samples were ground by using a stainless steel grinder (<0.25 mm), then 2 g of each ground grain samples were digested in a mixture of HNO_3–$HClO_4$–H_2SO_4 acids (10 ml 70% $HClO_4$, 32 ml 10% HNO_3, and 5 ml 90% H_2SO_4). A flame atomic absorption spectrometry (FAAS, Varian AA240, Australia) was used to determine the content levels of Cd, Co, and Cu. The result showed that Cd, and Co level were below limit of detection (BLD) in all wheat samples, but the mean concentration levels of Cu was 0.501 with a range of 0.223-0.849 µg/g, and the content level of moisture in wheat samples ranged from 10.15-14.88 (Mean: 11.51%). The measured detection limit values for Cd, Co, and Cu were 0.0047, 0.015, and 0.0055 µg/g respectively. Based on the data, the agricultural soil in Dashtestan County wasn't most severely contaminated by Cd, Co, and Cu.

Keywords: Heavy metal, Wheat grains, Dashtestan County, Food sanitary

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Investigating the Amount of Hydrogen Peroxide of Edible Oil Used in Fast Food and Sandwich Shops: an Objective Study Conducted in the North of Iran

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Abstract

Due to the high frying of the oil, oxidation occurs with a higher amount that produces hydroxides and then volatile compounds. This causes free radicals in the body and is the cause of cancer, inflammatory diseases and atherosclerosis. Due to the perils of hydrogen peroxide, as well as the high consumption of fast food and sandwich, it is essential to determine its health status in terms of food security. In this descriptive-analytical study, sampling was obtained from all of fast food and sandwich shops of Ramsar (64 cases) in 2016. Sampling was done in the moment that oil reached to the highest temperature. Samples were collected based on protocol No.493 by the Institute of Standards and Industrial Research of Iran. After transferring the samples to the laboratory and determining the number of peroxide based on national standard procedure, No. 4179. The data collected have been analyzed by SPSS software version 20 using Mann-Whitney test and t-test. Out of all samples, 46 samples (36%) were inedible and 82 (64%) were consumable ($p = 0.012$). The Minimum amount of peroxide was 1.2 Meg / kg and the Maximum amount of peroxide was 62.5 Meg / kg. In addition, the difference between consumable and inedible oil samples in two guild was significant ($p \leq 0.001$). The findings show that Peroxide value in most samples are higher than the standard. Therefore, the use of oils in the studied units is undesirable and because of the risks of high peroxide levels, it is recommended that appropriate measures be taken to train the staff of these units as well as to ensure that they are properly monitored by health officers.

Key words: Hydrogen Peroxide, Oils, Fast Food, Sandwich Shop

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Microbial Contamination in Pasteurized Milk and Traditional Ice Cream in Tiran

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Abstract

Milk is one of the most essential elements of the human diet. The beneficial health nutrients obtained from milk are essential for the human body and help prevent a number of chronic ailments. These benefits can be achieved from drinking it directly or by consuming dairy products such as ice cream. Due to the presence of most nutrients, these materials are a very good environment for the growth and activity of many pathogenic microorganisms. In this study, microbial contamination of pasteurized milk and traditional ice cream of Tiran (a city of Isfahan) was assessed. The data were obtained from sampling for 18 months and analyzed through a descriptive-analytical method. 75 samples from five brands of pasteurized milk and 25 samples from traditional ice cream from the same city were prepared. Coliforms, Escherichia coli and total count of these samples were tested according to the national standard method. Results were analyzed by SPSS version 19 and related statistical tests. The results showed that 78.66% of pasteurized milk samples were acceptable and 21.34% unacceptable for human consumption. Of 25 traditional ice cream samples, 48% were acceptable and 52% were unacceptable. The highest rate of contamination in traditional ice cream was the Escherichia coli (52%) and the lowest was coliform (0%). In case of pasteurized milk, the main microbial contamination was associated with Escherichia coli and coliform. The results indicated poor health status of dairy foods threatening the health of individuals. Therefore, increasing awareness of food hygiene, observing personal hygiene and equipment in dairy products guides, more control and monitoring by health centers and programs of food safety promotion are recommended.

Keywords: Escherichia coli, Microbial contamination, Milk, Traditional ice cream

Microbial Quality Assessment of Semi Dry and Cream Pastries from Confectionaries in Arak

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Abstract

Confectionary products especially éclairs are a major part of food manufacturing in Iran. Considering high consumption levels and also the possibility of microbial contamination in this section of food products, the present study aimed at determining the degree of microbial contamination of eclairs supplied to Arak province confectionaries and the association between contamination level and adherence to hygiene principles at production sites. Samples including 44 of different types of eclairs were selected and microbial tests were performed based on Iran National Standards. Data analysis was conducted using Spearman correlation and linear regression tests. This study showed that 43.2% of samples were contaminated with *E.Coli*, 59.1% with Enterobacteriaceae, 13.6% with mold, 20.5% with yeast and 13.6% with Bacillus cereus out of standard range. This was mainly attributed to insanitary personal actions by labors, insanitary conditions related to equipment, buildings and also non-conformity with food hygiene principles by labors at production sites. The results demonstrated high contamination rate of eclairs with bacteria, molds and yeasts. Using different methods in order to control microbial growth especially growth of bacteria, mold and yeast is an inevitable fact. Therefore, promoting sanitary awareness among labors, regular cleansing and disinfecting the equipment, improvement and general sanitation of confectionaries and their regular disinfection and conformity with food hygiene principles (providing high-grade raw materials, proper food storage methods and quick preparation of confections) seem necessary.

Keywords: microbial contamination, Arak confectionaries, eclairs, sanitary conditions

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Microbial Quality Evaluation of Industrial and Traditional Vegetable Salads

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Abstract

The aim of this study was to characterize the microbiological quality of common vegetable salads in Mashhad during 2015-2016. This study, to provide a prospective potential health risk associated with consumption of these and determined the impact of different disinfection technologies on quality (on the growth of indicator microorganisms). One hundred samples were analysed for *yeasts* and *moulds*, enumeration of coliforms and detection of *Escherichia coli*, *Salmonella* spp, *Enterococcus* spp and *Staphylococcus aureus*. Sampling and tests were conducted according to the standards methods (the number of standards for *Escherichia coli*, *Salmonella* spp, *yeasts* and *moulds* were respectively 2946, 1810 and 10899-2). The data were analyzed in SPSS v16 software. The results showed that yeasts, moulds and coliforms could not be detected in the industrial samples and useable, But only 40% of the traditional salads were acceptable.

In the, the frequency of mold and yeast is relatively high (38%) and for *Escherichia coli* (12%), *Enterococcus* (12%), *Staphylococcus* spp (10%) from salads processing traditionally. This is the first attempt to provide information on the microbiological quality of salad vegetables in Mashhad. In this study, it cannot be concluded that traditional salads are acceptable for consumption. The industrial unit use ozone and chlorine disinfection that were particularly effective**.** Therefore, these results suggest that effective control measures should be implemented in this production.

Keywords: Fecal Coliform, Moulds, Yeasts, Ozone, Chlorine, Mashhad

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Microbiological Quality of Sauces from Restaurants in the YAZD Province, Iran

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Abstract

The purpose of this investigation was to determine the microbiological safety of sauces served in restaurants in Yazd, Iran. Sauces, as common oriental primers are a traditional ingredient used throughout the world. These sauces were provided under low hygienic conditions of handling and selling. Nowadays, little information is known about its role in the transmission of food borne diseases (FBD). Evidence from trials indicated that cross-contamination risks are important due to poor hygiene during food handling and preparation within these premises. The European Commission Regulation No. 852/2004 on the hygiene of foodstuffs supplies a risk-based approach to control food hygiene. In this cross- sectional study, 63 sauce samples from restaurants were collected during summer 2017. The samples were transported to food laboratory under sterile condition and analyzed using methods specified for Escherichia coli, mold, and yeast. Results were compared with Iranian national standards protocols. Comparison with published microbiological guidelines showed that 1.6%, 6.3%, 15.9% of sauce samples had unsatisfactory microbiological quality due to Escherichia coli, mold, and yeasts. Moreover, 1.6 % of these samples were positive for mold and yeast. In conclusion, results emphasize the need for suitable hygiene methods in restaurants for checking these items of products.

Keywords: Sauces, Microbial assessment, Escherichia coli, Mold, Yeast

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Parasitic Contamination of Raw Vegetables and the Effect of Washing and Disinfecting Methods, Bushehr, Iran

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Abstract

Green and fresh vegetables are a large and important portion of a healthy diet, especially in vitamins and minerals. Also, they can be agent of transmission of various parasites. A field study in Bushehr, Iran, was done to determine the occurrence of the parasitic contamination of raw vegetables and the effect of washing and disinfecting methods for parasite removal. This cross-sectional study has been conducted on 163 samples of 7 kinds of vegetables composed parsley (30), mint (30), basil (30), leek (30), purslane (18), radish (13), and Cress (12) collected from 20 wholesale and retail markets were examined for parasites during six months in Bushehr city, Iran. Each sample was divided into 4 groups: the unwashed sample, washed with water alone (traditional washing method), washed with detergent alone, and washed with detergent and disinfectant (national standard washing method). After the washing process, sedimentation and centrifugation, each sample was examined for parasitic contamination. Of 163 samples examined, parasites were detected in 7.97% of unwashed and 1.84% of traditional washing method and not in samples after washing with detergent alone and with standard washing method. The furthest rate of parasitological contamination was found in mint, purslane, cress and radish samples equal to 1.84%, 1.84%, 1.22% and 1.22% for unwashed samples, respectively. The seasonal rate of parasitic contamination was found to be 5% in spring, 9.7% in winter.

The parasitological contamination may pose a health risk of unwashed and traditionally-washed raw vegetables to consumers. For healthy diet, standard washing procedure is recommended.

Keywords: Bushehr, Disinfection, Iran, Parasitic contamination, Vegetables

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Prevalence of Intestinal Parasitic Infections among Workers at food Preparation and Selling Centers of Juybar in 2016

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Abstract

Given the importance of parasitic diseases and the role of employees at food preparation and selling centers in diffusion of the pollution as well as lack of workers' awareness about pollution in Juybar town this study was conducted in 2016. This descriptive study included 2208 food staffs and vendors who have presented medical examination cards from laboratories. Fecal sampling tests were carried out in three phases and three different times. Samples were then analyzed using direct laboratory observation. The results showed that the overall prevalence of intestinal parasites was 1.58 %, the percentage prevalence of Giardia, Oxyurisand, and other parasites were1.31 %, 0.09%, and 0.18%, respectively. The most frequent infection with the protozoan Giardia is relatively high in Iran. Its value is variable and depends on the weather conditions, nutritional status, its level of personal hygiene, and social variables. Employees of food preparation and sale centers play a role in the release of some intestinal parasites into societies. So, training individuals and social groups about personal hygiene and sanitation principles of food safety and transmission modes of parasites, implementation of laws and health regulations, and acquisition of health insurance cards can play important roles in the diagnosis and treatment of parasitic infections and can eventually reduce them.

Keywords: Intestinal parasites, Medical examination cards, Stool, Workers prepare, Sell food centers, Juybar

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Risk Assessment of Some Heavy Metals in Four Species of Fish in Fish-stores of Zarrindasht Count in Spring

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Abstract

Heavy metals are known to cause deleterious effects on human health through food chain .Heavy metals may accumulate in aquatic animals' organs and tissues such as liver, kidney, gills and muscles. This study aims to demystify risk assessment of some heavy metals concentrations such as Nickle, Cadmium, Lead and Zinc in the muscles of Otolithes ruber, Parastromateus niger, Scomberomorus commerson and Sphyraena jello fishes in 2016. 85 samples from the aforementioned fishes were taken from fish-stores of Zarrindasht count in spring. Wet Digestion method is applied to extract the considered metals from the tissues, and the concentrations of the heavy metals were measured by Atomic Absorption Spectrophotometer Younglin AAS8020. All statistical analyses were performed by SPSS (V. 24) using ANOVA along with Duncan test. The results showed the highest and lowest concentrations of Cd and Ni were in Sphyraena jello and Scomberomorus commerson, respectively. The lowest Concentration of Pb was in Parastromateus niger. The lowest concentrations of Zn were observed in Otolithes ruber. Concentrations of Pb and Zn were lower than the determined proportions of FAO, WHO, UKMAFF, NHMRC and FDA. Ni and Cd concentration was higher than the Global Standards in Sphyraena jello.

Keywords: heavy metals, risk assessment, fish, muscle, Zarrindasht

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Study of Heavy Metals Concentration (cd, pb, and cu) in Vegetables (Rasht, 2017)

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Abstract

The levels of three different heavy metals [cadmium (Cd), lead (Pb), and copper (Cu)] were determined in various vegetables [dill, radish, radish leaves, parsley, spinach, spring onion, leek, fenugreek, mint and coriander], which are cultivated around in Gilan in winter as well as the vegetables that are imported to Rasht City. Also, the contribution of the vegetables to the daily intake of heavy metals from vegetables was investigated. One hundred twenty samples (40 samples per month) were collected for three months, and an ICP-OES spectrophotometer was used to determine the concentrations of the metals. The average concentrations of each heavy metal, regardless of the kind of vegetable, for Cd, Pb, and Cu were 0.55±.3, 1.12±59, and 4.22±1.33 mg/kg, respectively. Based on the obtained concentrations and the information of the National Nutrition and Food Research Institute of Iran, which recommend the maximum contents for Cd, Pb, and Cu through vegetable consumption was estimated at 0.2, 0.3, and 40 mg/kg, respectively. So rate Cd more than doubled and Pb levels approximately near quadruple recommended amount is in vegetables Consumption of Guilan Province But measure Cu is much lower from recommended amount. It is concluded that the vegetables grown and consumed in this city are a health hazard for human consumption.

Keywords: Heavy metals, Vegetables, Health risk, Pollution

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Study on Sodium Hydro Sulfurous Anhydride, Dithionite, Concentration as an Unauthorized Additive in Candies (Case Study: Hamadan City)

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Abstract

In our country candies have been consumed as a high consumption sugar product. In recent years, additions of chemical additives to food products without any supervision can cause seriously effect on human health. In this study, the residual amount of Sodium hydrosulfite candies produced in Hamadan candies production plants was investigated. In this descriptive study, the residual concentration of Dithionite in candies produced in Hamadan 2015 was determined. The study population was the whole of active candies producing plants in Hamadan. For this reason the sampling was done for 4 months in 20 candies producing plants. The concentration of Blankit was determined according to ISIRI guidelines. Data analysis was performed using SPSS 20 and Excel 2013 software. The results indicated that in all 80 candy samples Dithionite was additive at candies products and the lowest and highest Dithionite amount were 3.2 and 23.86 mg/kg, respectively. Also, the results indicated that over than 37% of total sample size the Dithionite concentration was higher than the standard value. The average Dithionite concentration in candy produced in March, April, May and June 2015 were 9.7±5.84, 9.49±3.7, 9±3.76, and 7.1±2.99 mg/kg which there was significant differences between different months. The results of this research indicated that Dithionite was observed in the most candy production plants due to the use of unsuitable main products which should be given adequate training and observation to shopkeeper.

Keywords: Dithionite, Standard, Candy, Hamadan

The Amount of Aflatoxin M_1 and the Remains of Antibiotics in Raw Milk Supplied Across the City of Bojnurd During 2015

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Abstract

Milk is considered as one of the most complete foods. The aim of this study was to determine the level of aflatoxin contamination in raw milk and antibiotic residue in Bojnurd. In this study, 40 samples of raw milk from raw milk distribution centers in the city of Bojnurd, were taken randomly in Fall 2015. Comparisons of the samples was measured by ELISA kits for aflatoxin and antibiotic residues coupons were evaluated. According to the results, no residues of antibiotics in raw milk were found and the amount of aflatoxin concentrations was determined between 1.5 and 65 ng per ml. According to the results of antibiotics and aflatoxin M_1 in raw milk in Bojnurd the level was within acceptable limits. According to the results, the need for continuous control of milk samples for antibiotic residues and aflatoxins in other seasons is recommended.

Keywords: Aflatoxin, residues of antibiotics, milk

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The Effect of Consultation Services on Improving the Health Conditions in Food Production and Distribution Centers and Public Sites, Kashmmar,Iran

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Abstract

The importance of training in the prevention of food-borne diseases is indisputable. All staffs involved in food preparation and cooking must undergo health education. These trainings include face to face training and attendance in educational courses. Training kitchen and food production centers' staffs about regulations, individual and environmental hygiene, food safety, and continuous monitoring to comply with health rules, encouraging employees who comply with these requirements, as well as timely health warnings are very effective in preventing contamination and food insecurity. This cross-sectional study was conducted after coordination with public centers that prepare and distribute foods. The relevant information was then collected to carry out this study. The health check checklist investigates the health conditions of the place in terms of building, individual, and equipment. Using this checklist, the promotion in level of sanitation is considered according to the self-regulatory and self-report guidelines. In this regard, annual resolution of at least one critical item is considered as a sanitary promotion of the business unit. Finally, the data were collected and analyzed using SPSS $_{16}$ software.

The results of this study indicate that using health experts' services in the form of counseling, due to continuous training and direct monitoring of food processing can lead to health promotion in all units. If this happens along with inspections of health experts in health centers, that is through interstitial collaboration between the consultant and inspector, desired goals can be achieved to improve health conditions as soon as possible.

Keywords: Consultation, Hygiene, Food production and distribution center

The Effects of Specified Educational Courses on Health Knowledge, Attitude, and Practice of Food and Sanitary Personnel in Gonabad

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Abstract

The educational courses have an important role in health promotion. These courses affect knowledge, attitude, and practice of food and sanitary personnel. They also can change learners' behavior. The aim of this study was to investigate the effects of specified educational courses on knowledge, attitude, and practice of food and sanitary personnel in Gonabad. In this cross-sectional study, knowledge, attitude, and practice of 135 food and sanitary personnel were studied before and after an educational intervention course. A validated questionnaire based on the instructions from Ministry of Health and Medical Sciences was used for data collection. To analyze data, the statistical tests of paired t-test and One-way ANNOVA were used. The results revealed positive effects of education programs on knowledge, attitude, and practice of participants. The mean scores of knowledge were 67.4±6.03 and 61.5±5.9for the trained and untrained groups, respectively. There was a significant relationship between knowledge scores before and after the intervention ($p<0.001$). Moreover, attitude and practice of participants were increased significantly before 93.7±15.9; 52.64±8.1 compared to after 99.8±15.8; 59.3±8.3 intervention respectively ($p<0.001$). This study showed that educational intervention can be effective in promotion and improving the knowledge, attitude, and practice of food and sanitary personnel.

Keywords: Health education, Knowledge, Attitude, Practice

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The Study of Consumed Vegetables Parasitic Infections in Birjand city by Direct Examination Methods in 2016

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Abstract

Parasitic diseases are the most important infectious disorders and one of the main public health problems in many communities. One of the most important ways of parasite infection is by consuming the raw vegetables. The aim of this study was to assess the parasitic contaminations of fresh consumed vegetables in Birjand city in 2016 by direct examination methods. In this cross-sectional study 196 samples of different vegetables including leek, parsley, lettuce, coriander, radish, spring onion, tarragon, basil, mint, and cress were collected from 20 vegetable sellers in Birjand city in 2016. Samples were evaluated for presence of metazoan and protozoan parasitic contaminations. The vegetables were washed with water and tested microscopically after performance of sedimentation method. Results were reported as descriptive statistics (average and percentage). Out of 196 samples, 52.10% were found to have parasitic contamination. The highest rate of contamination was detected in fenugreek and parsley with 15 positive samples (77.7%), while the lowest rate was attributed to radish and lettuce with 4 (20%) positive samples. Regarding the parasitic infestations, syst of Giardia Lamblia with 36 positive samples (27.2%) and Alternaria spp with 30 positive samples (22.7%) had the most pollution. Egg of Tenia with 4 positive samples (3%) had the least pollution among consuming vegetables. The results revealed that percentage of vegetables contamination in Birjand city was middle. Consequently, essential measures should be taken into account to increase the awareness level of people about the proper disinfection of vegetables.

Key words: Vegetables, Parasitic infection, Birjand

Using HACCP Principles in Assessment Contamination of Baklava Sweets in Yas Confectionary (Aran & Bidgol City)

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Abstract

Traditional confectioneries constitute a major part of the dietary culture in Iran. Baklava Sweets is very popular in Iran which is available in various forms in most cities. The present study aimed to determine the prevalence of microbial contaminations in the production stages of Baklava sweets in Yas confectionary (Aran & Bidgol city) on the HACCP principles in 2016. This study was conducted on 158 samples of Baklava sweets supplied in Yas confectionary, which were selected from 4 production stages by application of HACCP principles. These samples were tested in terms of microorganisms such as Escherichia coli, yeasts and molds, Enterobacteriaceae, using the microbiological tests based on Iranian national standards. According to the results, from all stages of the process, transfer of materials and hand intervention, have been considered as critical control point (CCP). "Various ingredients" and "dishes" had the highest (65.8%) and lowest (5%) prevalence rates of microbial contamination. The application of HACCP principles will help the self-control of confectionary productions. Corrective controlling measures including health training and continual monitoring are effective for reducing the food hazards. Also cooking stage considered as CCP for microbial contamination controlling.

Keywords: Baklava, HACCP principles, Microbial contamination, Confectioneries

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