Hormozgan University of Medical Sciences

7th International and the 26th National Conference on

Environmental Health

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In the Name of God

Abstracts of Articles

7th International and the 26th National Conference on Environmental Health

Hormozgan University of Medical Sciences

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Abstracts of articles

7th International and the 26th National Conference on ***Environmental Health***

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Conference Topic

Environmental Health & Social Accountability

- Environmental health, intersectoral interactions and challenge
- Environmental health and public health challenges
- Environmental health, policy, social responsibility and public education
- Challenges to improve environmental health indicators
- Social conflicts and executive regulations of environmental health and etc.

Environmental Health, Costal & Marine

- Identification and estimation the release of pollutants into marine and coastal environments
- Oil pollution in marine and coastal environments
- Emerging contaminants in marine and coastal environments
- Heavy metals, aquatic pollution and their risk assessment
- Microplastics in marine and coastal environments
- Algal pollution in marine and coastal environments
- Radioactive pollution
- Biological monitoring of environmental risk factors And etc.

Environmental Health, Emerging & re-Emerging Diseases

- The vector-borne emerging and re-emerging diseases and environmental health
- Environmental health and emerging and re-emerging diseases from the environments (water, soil and air)
- Successful and unsuccessful of environmental health in dealing with COVID-19 And etc.

Sciences & Technologies for Environmental Pollutants Management

- Water and wastewater treatment and its management approach with emphasis on new technologies
- Municipal, industrial and hospital waste management
- Recycling and reuse of materials and resources
- Management, control and treatment of air pollutants
- Adverse health effects of environmental radiation and management
- Green fuels and renewable energies
- Management and treatment of contaminated soils
- Environmental health and application of artificial intelligence And etc.

Environmental Health & Foresighting

- Assessment needs of future environmental health research
- Redefining environmental health activities based on future needs
- Rethinking environmental health education framework based on future needs And etc.

Health Impact Assessment of Development Projects (HIA)

- The role of health attachments in development plans
- Challenges ahead in compiling the health attachment
- Executive guarantee of attachment of health
- The need to revise the content of the health attachment And etc.

Environmental Health & Climate Change Challenges

- Climate change and its effects on health
- Dealing and reducing the health effects of climate change
- The impact of climate change on the sensitivity and vulnerability of the environment
- Climate change control at the level of national and international

Other topics of environmental health

- Residential health and public areas health
- Health and safety of food and agricultural products
- Determining and monitoring environmental health indicators
- Adverse effects of development plans on health and environment
- Improving environment and vector control

Organizer

Hormozgan University of
Medical Scieces

Message from the President of the Conference

Human activities generate and disperse large amounts of pollutants into the environment. These pollutants can pose serious threats to human health and the environment. Therefore, it is necessary to consider the latest national and international scientific experiences and achievements in the field of environmental pollutant control and reduction in order to develop a future roadmap in this field. To achieve this goal, Hormozgan University of Medical Sciences has planned to hold the 7th International and the 26th National Conference on Environmental Health in February 1402 in the beautiful island of Kish. This conference is based on the main approach of responding to the needs of the society and will welcome papers and achievements in the seven topics of environmental health and social accountability, environmental health, costal and marine, environmental health, emerging and re-emerging diseases, sciences and technologies for environmental pollutants management, environmental health and foresighting, health impact assessment of development projects, and environmental health and climate change challenges. The programs of this conference are held in the form of keynote speeches, poster presentation, short communication, workshop, symposium, meeting the expert, and innovative ideas show. All professors, researchers, experts, students, elites, beneficiaries and executive managers are invited to attend and present their achievements in this conference.

Dr. Gholamali Javdan

Message from the Scientific Secretary

According to the existing definitions, environmental health is the control of all environmental factors that directly or indirectly threaten human health in an acute or chronic way. Therefore, environmental health plays an essential role in the health of the society and, like the environment, it is a transnational affair and includes a very broad social, cultural and economic dimension. The Iranian Environmental Health Scientific Association, in collaboration with medical universities all over the country, holds a conference entitled National Conference on Environmental Health in which the latest scientific achievements in the field of environmental health are presented in the form of lecture papers and posters. This year, the 7th International Conference and 26th National Conference on Environmental Health will be held on February 21-23 in Kish Island hosted by Hormozgan University of Medical Sciences. In this conference, it has been tried to establish social accountability as an important task and inherent responsibility for environmental health as the main axis of the conference and planning is done accordingly.

Our conference events were as: 6 Keynote speech sessions, 2 Meeting with expert sessions, 2 Workshop programs, Idea Show event, 6 Brief speech sessions, and 4 Poster presentation programs. The main themes of this conference were selected in such a way that it could consider the centrality of social accountability in all areas of this field, So Our conference topics were:

- Environmental Health & Social Accountability
- Environmental Health, Costal & Marine pollution aspects
- Environmental Health, Emerging & re-Emerging Diseases
- Sciences & Technologies for Environmental Pollutants Management
- Foresight of Environmental Health in Iran
- Health Impact Assessment of Development Projects (HIA)
- Environmental Health & Climate Change Challenges

In additions we will have 3 Symposiums in themes of

- Environmental Risk Control
- training challenges in Environmental Health

- Environmental health and holding religious ceremonies

Finally, we hope that with the good participation of specialists and experts in this field, we can have a small impact on improving the environmental health conditions of the country and the region and play a small role in improving the Earth as a place to live. Undeniably, any research finding, scientific and executive experience would be enlightening for prospect planning.

Dr. Vali Alipour

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Tailoring the structure of ZIF for supreme adsorption of emerging antibiotic metronidazole

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Abstract

Background: Scientists have been studying the removal of pharmaceuticals from the environment due to their harmful effects. Metronidazole is one such pharmaceutical that is extensively used, highly soluble in water, and non-biodegradable. In this study, researchers explored the removal of metronidazole using Metal-Organic Frameworks (MOFs), specifically C8H10N4Zn(ZIF-8) and C8H10N4ZnCu(Cu-ZIF-8).

Methods: The MOFs were synthesized using an environmentally friendly approach, and their structures and morphologies were fully characterized. The researchers modeled and optimized the effects of solution pH, contact time, adsorbent dose, and antibiotic concentration on the process by performing experiments based on the Box-Behnken design (BBD).

Results: Cu-ZIF-8 exhibited an enhanced antibiotic adsorption potential compared to pristine ZIF-8. The optimal removal (94.09%) for antibiotic removal occurred in 0.69 g Cu-ZIF-8/L, mixing time 51 min, and pH 6.6. A 93.7% removal was also predicted for ZIF-8 when adsorbent dose, mixing time, and pH were adjusted to 0.92 g/L, 54 min, and 6.5.

Conclusion: The environmental conditions for antibiotic removal by two adsorbent materials were optimized based on the process models. In addition, isotherm and kinetic models predicted the antibiotic removal well. The metal leaching analysis indicated that the zinc and copper concentrations for ZIF-8 and Cu-ZIF-8 complied with the maximum limit levels.

Keywords: Zeolitic Imidazolate Frameworks (ZIFs), Cu-Doped ZIF-8, Metronidazole, Adsorption, Box-Behnken Design (BBD).

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Maternal exposure to benzophenones, pregnancy period and birth outcomes

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Abstract

Exposure to benzophenones, a group of endocrine disrupting compounds (EDCs), are raised a major concern due to their possible human health outcomes. The aim of this study was to monitor maternal urinary level of benzophenones and to find out its association with gestational age and its effects on infants' birth outcomes including birth weight, birth length, head circumference and Ponderal index. Four common metabolites of benzophenones (BPs) including 2,4-dihydroxy benzophenone (BP-1), 2-hydroxy-4-methoxy benzophenone (BP-3), 4-hydroxy benzophenone (4-OH-BP) and 2,2´-dihydroxy-4-methoxy benzophenone (BP-8) were measured in urine samples of 166 pregnant women selected from the PERSIAN cohort in Isfahan in the 1st and 3rd trimesters of pregnancy. According to the results, BP-3 was the predominant metabolite in both trimesters. There was a significant negative association between BP-3 and BP-1 levels and gestational age in girls. While, in evaluation of all infants, BP-1 showed a significant positive association with gestational age in the 1st trimester. Classification of infant's birth weight according to their mother's gestational age represented that the majority of them were appropriate for gestational age, but boys' weights were higher than girls. Also, birth outcomes of preterm (<37 weeks) infants were noticeably lower than term infants (37-42 weeks). This study demonstrated that benzophenone derivatives especially BP-3 can affect the duration of pregnancy and consequently fetal growth especially girls in the early and late stages of pregnancy. However, more investigations in a different population are needed to prove the results. Thus, the application of these compounds as a UV protector requires precise regulation to reduce exposure, especially in pregnant women.

Keywords: Benzophenones Exposure, Gestational Age, Birth Outcomes.

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Comprehensive investigation of SARS-CoV-2 fate in wastewater and finding the virus transfer and destruction route through conventional activated sludge and sequencing batch reactor

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Abstract

Background: Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) RNA transmission route was thoroughly investigated in the hospital wastewater, sewage collection network, and wastewater treatment plants.

Methods: Samples were taken on four occasions from December 2020 to April 2021. The performance of two different wastewater treatment processes of sequencing batch reactor (SBR) and conventional activated sludge (CAS) was studied for virus destruction. For this purpose, liquid phase, solid phase and bioaerosol samples were taken from different units of the investigated wastewater treatment plants (WWTPs).

Results: The results revealed that all untreated hospital wastewater samples were positive for SARS-CoV-2 RNA. The virus detection frequency increased when the number of hospitalized cases increased. Detection of viral RNA in the wastewater collection system exhibited higher load of virus in the generated wastewater in areas with poor socioeconomic conditions. Virus detection in the emitted bioaerosols in WWTPs showed that bioaerosols released from CAS with surface aeration contains SARS-CoV-2 RNA posing a potential threat to the working staff of the WWTPs. However, no viral RNA was detected in the bioaerosols of the SBR with diffused aeration system. Investigation of SARS-CoV-2 RNA in WWTPs showed high affinity of the virus to be accumulated in biosolids rather than transporting via liquid phase.

Conclusion: Following the fate of virus in sludge revealed that it is completely destructed in anaerobic sludge treatment process. Therefore, based on the results of the present study, it can be concluded that receiving water resources could not be contaminated with virus, if the wastewater treatment processes work properly.

Keywords: Bioaerosol, Biosolids, COVID-19, CAS, RT-qPCR, SBR.

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Assessment of cause-specific mortality and disability-adjusted life years (DALYs) induced by exposure to inorganic arsenic through drinking water and foodstuffs in Iran

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Abstract

The health risk and burden of disease induced by exposure to inorganic arsenic (iAs) through drinking water and foodstuffs in Iran were assessed. The iAs levels in drinking water and foodstuffs (15 food groups) in the country were determined through systematic review of three international databases (PubMed, Scopus, and Web of Science) and meta-analysis. Based on the results of the systematic review and meta-analysis, the average iAs levels in drinking water and all the food groups at the national level were lower than the maximum permissible levels. The total average non-carcinogenic risk of dietary exposure to iAs in terms of hazard index (HI) was 3.4. The average incremental lifetime cancer risk (ILCR) values of dietary exposure to iAs were determined to be 1.5×10-3 for skin cancer, 1.0×10-3 for lung cancer, and 4.0×10-4 for bladder cancer. Over two-thirds of the non-carcinogenic and carcinogenic risk of dietary exposure to iAs was attributed to bread and cereals, drinking water, and rice. The total annual cancer incidence, deaths, disability-adjusted life years (DALYs), death rate, and DALY rate (per 100,000 people) were assessed to be 3347 (95% uncertainty interval: 1791 to 5999), 1302 (697 to 2336), 72,606 (38,833 to 130,228), 1.6 (0.87 to 2.9), and 91 (49 to 160). The contribution of mortality in the attributable burden of disease

was 95.1%. The contributions of the causes in the attributable burden of disease were 72% for lung cancer, 16% for bladder cancer, and 12% for skin cancer. Due to the significant attributable burden of disease, national and subnational action plans consisting of multi-disciplinary approaches for risk management of dietary exposure to iAs, especially for the higher arsenic-affected areas and high-risk population groups in the country are recommended.

Keywords: Environmental Burden of Disease, Exposure Assessment, Food Safety, Health Outcome, Health Risk Assessment.

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Challenges and barriers of health impact assessment studies in Iran

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Abstract

Background: The purpose of the HIA (Health attachment, Peyvast salamat) is to provide a practical approach that can be used to address the health problems of the projects and reduce health inequalities. This evaluation has always been faced with challenges that create problems in the process of preparing and correctly implementing the HIA report and hinder the correct evaluation.

Methods: In this study, related articles using keywords: "Health impact assessment", "challenge", "environmental impact assessment", "impact assessment" and "development" through three computerized bibliographic databases PubMed, Scopus and Google Scholar was searched.

Results: Studies have shown that health impact assessment uses a variety of methods to make decisions about the impact of policies, plans and projects on community health or its determinants. The process of preparing the evaluation report of the effects of plans and projects has always faced problems, many strengths and limitations of the evaluation of environmental effects are also discussed in the case of health. Laws and regulations are one of the main challenges of evaluating health effects and should be regulated in such a way that they have an executive requirement. The lack of manpower as well as the lack of knowledge and skills necessary to conduct and review evaluations causes many problems. Increasing the level of awareness of health assessment officials and experts, as well as increasing the awareness of the general public, will lead to making the right decisions and increasing people's participation. Insufficient health data of the studied area and financial resources are also considered as a serious challenge. Health impact assessment can influence decision-making and strengthen interdisciplinary collaboration in ways that improve community health.

Conclusion: Currently, health related studies are a growing sub-branch of impact assessment and are facing challenges, some of which include the weak structure of expertise and insufficient expertise of experts and consultants, the wrong view of employers towards the environment. , failure to provide sufficient information and evidence, weak public participation, and ultimately lack of follow-up and monitoring of health. Awareness of these challenges and solutions to them will lead to the improvement of health impact assessment.

Keywords: Health Impact Assessment, Challenge, Environmental Impact Assessment, Impact Assessment, Development.

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Survey on the concentration of disinfection by-products in the urine of pregnant women and correlation with lifestyle factors

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Abstract

Background: Based on epidemiological evidence, types of of birth outcomes such as premature birth, congenital anomalies, changes length pregnancy, fetal growth, death, etc. are related to exposure to disinfection byproducts (DBPs) such as trihalomethanes based on bromine. The purpose of this research is to investigate the concentration of brominated trihalomethanes in the urine of pregnant women, and the correlation between their concentration and demographic, social characteristics and water consumption behavior as lifestyle parameters.

Methods: In this study, 118 pregnant women in the third trimester, participating in the birth cohort, were studied. The concentration distribution of urine samples was measured by gas chromatography. The correlation between urinary Br-THMs concentration with demographic and lifestyle factors was investigated by Spearman and Pearson correlation.

Results: According to the results, the average concentration (standard deviation) of Br-THMs, including bromochloromethane (BDCM), dibromochloromethane (DBCM) and bromoform (TBM), respectively, is 17.30 (40.80) ng/l. , 10/25 (11/37), 14/76 (17/27) and 4/96 (3/21) were obtained.

Conclusion: The duration of washing clothes by hand was effective in increasing exposure to brominated trihalomethanes. Also, the relationship between the uses of storage tanks as a source of drinking water, according to different statistical methods, was reported a significant correlation.

Keywords: Pregnant Women, Brominated Trihalomethane, Lifestyle.

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Biofuel (Biodiesel) Production from Sewage Sludge: Optimization, kinetics, Activation Energy and Reaction Thermodynamics

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Abstract

Background: The global energy crisis and environmental issues related to fossil fuels have been significant drivers for the recent development of renewable and clean energy. Biodiesel is widely recognized as an environmentally-friendly fuel. The aim of this study is to produce biodiesel from sewage sludge, model, and optimize the process, as well as investigate the kinetics, activation energy, and thermodynamics of the reaction.

Methods: Sludge from a municipal wastewater treatment plant, which utilizes advanced sequential batch reactors, was converted into biodiesel through the esterification/transesterification reaction in the presence of an acid catalyst. Subsequently, the impact of four independent reaction variables, including temperature, time, catalyst concentration, and methanol to dry sludge ratio on biodiesel yield, was modeled using the adaptive neural-fuzzy inference system. Furthermore, the optimization of response variables was conducted using three evolutionary algorithms: genetic algorithm, particle swarm optimization algorithm, and ant colony optimization algorithm. Finally, the kinetics, activation energy, and thermodynamics of the transesterification reaction of sewage sludge lipid were investigated.

Results: Statistical and analytical evaluations among evolutionary algorithms demonstrated that integrating the PSO algorithm with the ANFIS model significantly enhances the predictive power of the combined model. Based on this, the maximum biodiesel yield (19.06% by weight of sludge) was achieved through the developed PSO-FIS model under optimal conditions (temperature of 64 °C, reaction time of 16.35 hours, catalyst concentration of 4.51%, and methanol to dry sludge ratio of 6 ml/g). Additionally, the study of kinetics and thermodynamics of biodiesel production reactions revealed that at the optimal temperature of 60 °C, the reaction rate constant, activation energy, Gibbs free energy, enthalpy, and entropy were, respectively, 0.1271 (1/hour), 24.39, 98.5, 38.5, and -0.18 kJ/mol.

Conclusion: Process modeling in this study demonstrated the positive impact of variable optimization on improving the efficiency of biodiesel production (from 17.76% to 19.06%). Moreover, the results indicated that sewage sludge, as an inexpensive and consistently available

primary raw material, holds the potential to serve as a reliable raw material source for biodiesel production on a commercial scale.

Keywords: Sewage Sludge, Green Fuel, Biodiesel, ANFIS, Algorithm.

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Social accountability and how to use it in environmental health services

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Abstract

Background: Social accountability is an approach based on civil participation to hold governments accountable for meeting the needs of society. This approach prevents managers from looking one-sidedly, improves public services, increases public trust in governance, reduces corruption in government systems, deepens democracy, empowers citizens; Especially the marginalized, vulnerable and poor groups of the society and their voices are heard. Therefore, it is important to know how to implement social accountability mechanisms in the field of government services, including health services. One of the areas of health services is environmental health services. The purpose of the current article is to explain the importance and how to implement social accountability mechanisms in the field of health with special emphasis on environmental health services.

Methods: In this narrative review article, in order to obtain the required scientific resources, searching for the keywords "social accountability", "public participation", "health services" and "environmental health" in Persian databases(Magiran & Sid) and English databases (Google Scholar) was done.

Results: The components of social accountability include citizens' voices, enforceability and answerability. Its application mechanisms include traditional mechanisms (based on public pressure and sanctions) and newer mechanisms including; Participatory public policymaking, participatory budgeting, tracking expenses and incomes by citizens, supervision of citizens on the provision of services and evaluation of these services by citizens. The most important factors affecting social accountability measures include the political and cultural context, access to reliable information, media, civil society capacity, government capacity, government and civil society synergy, and institutionalization. Studies have shown; Applying the concept of social accountability in the provision of health services is possible and manageable and has a beneficial effect on improving the health of society. Research evidence related to the state of social accountability in Iran's health sector shows; Despite the multiplicity and adequacy of the principles of the constitution in recognizing the right of people to participate in policies, especially in the health sector, governments have mainly focused on providing participatory budgets instead of participatory policies. Also, higher health education based on social accountability in Iran has performed poorly.

Conclusion: Relying on the principles of the constitution and the existing background and capacities of public participation, as well as the training of medical students based on the social accountability approach, it is possible to improve the health and environmental health services of the society.

Keywords: Social Accountability, Public Participation, Health Services, Environmental Health.

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Environmental health risk of brine disposal for reverse osmosis water desalination plants: a case study

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Abstract

Reverse osmosis desalination brine (RODB) is a concentrated by-product containing higher salinity and turbidity and chemicals added to the raw water. As the RODB discharge has caused many environmental concerns, this case-control study investigated the (RODB) impact on the coastal environment. Five RODB Receiving beaches and one control point were selected, 84 samples of RODB, seawater, and coastal sediments were taken then chemical, and physical; biological parameters were measured, and environmental risk was assessed. The seawater salinity and turbidity on the RODB-receiving beaches were higher than the control point, and the population and diversity of plankton were lower. The content of some heavy metals was higher in the sediments affected by RODB. Low to moderate degrees of heavy metal-related environmental threat was calculated. The discharge of RODB leads to changes in the coastal ecosystem quality and can be an environmental hazard, therefore, it requires serious monitoring and control programs.

Keywords: Environmental Risk, Desalination, Reverse Osmosis, Pollution, Marine.

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Examining the Future Position of Environmental Health in the Horizon of the Seventh Five-Year Development Plan Law

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Abstract

Background: Determining the role of each discipline in the future and the need for long-term and medium-term planning for the necessary changes in the educational, implementation, and research structures are undeniable necessities. The future study of different approaches to make these changes in the environmental health system requires comparative studies with development laws such as five-year development plan laws. Therefore, the purpose of this study is examining the future position of environmental health in the horizon of the seventh five-year development plan law.

Methods: This is a qualitative study that has investigated the position of environmental health fields in the horizon of the seventh five-year development plan law regarding two structural and content sections by a library and comparative method.

Results: The results of this research showed that the seventh five-year development plan law was compiled in 24 chapters, although no chapter was specifically allocated to the environment or health. In addition, service quality improvement, health system management, medicine and medical equipment, and health insurance were among the general concepts of the health system improvement chapter. However, issues such as waste, effluent, water quality, toxins, heavy metals, and food health and safety were included in this law to outline the future of environmental health.

Conclusion: Based on the results of the study, it can be predicted that environmental health experts in the 5-year period from 2024 to 2028 may intervene in plans such as the establishment of centers for technical and health officials of food products, evaluation and announcement of agricultural toxic residues, nitrates, heavy metals in raw agricultural products, national strategic plan for waste management, clean industries and special wastes management, reallocation of water used by large water-bearing industries with priority to non-conventional water sources, irrigation of green spaces using effluent and other non-conventional waters, monitoring of surface and underground pollution.

Keywords: Environmental Health, Development Plan Law, Solid Waste, Water And Effluent, Future Research.

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Legislative processology of Health Impact Assessment in the Five-Year Development Plan Laws in the Islamic Republic of Iran: Challenges and Solutions

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Abstract

Background: The world health organization presented an approach called health impact assessment (HIA) to countries, the purpose of which was to judge the potential effects of policies, programs or plans on public health. This type of assessment, when it is carried out through environmental factors such as water, soil and air, creates a special type of environmental impact assessment under the title of environmental health impact assessment, which in Iran, this approach is implemented titled HIA, presented in the five-year development plan laws. Therefore, this study aimed to survey legislative processology of HIA in the five-year development plan laws in Iran and describe the challenges and provides solutions in this field.

Methods: This is a qualitative study that analyzed the legislative process of HIA and examined the challenges and solutions to solve these challenges using a library method.

Results: The results of this study showed that the legislative process and policymaking of the HIA can be found in Article 32 of the fifth five-year development plan law and Article 4 of the general health policies of Iran, respectively. Also, the existence of a conflict of interest with environmental impacts assessment, the lack of transparency and clarity of the HIA law, the lack of a legal requirement to publish the results of the HIA reports, and the lack of public participation in the preparation of the HIA reports are the most important challenges to HIA.

Conclusion: According to the results of this research, it can be concluded that despite the legislator's efforts in approving laws and regulations in the field of health care and the governor's view on the issue of providing public health in the development path, the HIA plan cannot achieve its goals and objectives with the current situation.

Keywords: Health Impact Assessment, five-year development plan law, Environmental Health Impact Assessment, Environmental Impact Assessment.

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Renewable energy sources in Iran to mitigation climate change and sustainable development

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Abstract

Background: Iran, as one of the most important contributors to greenhouse gas emissions in the Middle East and globally, holds substantial potential in aiding carbon dioxide control through an energy sector perspective. This stands as a comprehensive approach towards sustainable development and mitigating climate change impacts.

Methods: This study is based on the latest research in renewable energy and climate change in Iran. It also investigates Iran's Seventh Development Plan regarding energy and environmental aspects. This study reviews the types of renewable energy sources in Iran, their potential, the opportunities and challenges related to their development, environmental impacts, and climate change mitigation.

Results: The total power potential of renewable energy including: solar, wind, hydroelectric, biomass and geothermal in the country is estimated to be 124 thousand megawatts. Therefore, solar energy with 71 and wind energy with 49 thousand megawatts account for more than 97% of the country's total potential in renewable electricity production. Therefore, focusing on the development of solar and wind power plants has a higher priority, and Iran ranks 133 out of 180 countries in terms of environmental performance index. This is while the country has obtained a very poor rank of 171 in the sub-index of projected greenhouse gas emissions and the growth rate of greenhouse gas intensity.

Conclusion: Iran, endowed with high capacities in renewable energy, can play a significant role in combating climate change and ensuring sustainable development. Its geographical position offers numerous advantages for extensive utilization of renewable energy sources, particularly solar and wind. Examination of existing laws regarding renewable energy indicates the country's legislative involvement through three approaches: guaranteed purchasing, provision of facilities, and quantitative goal-setting for its development. However, despite these measures, they have not been able to ameliorate the state of renewable energy in the country. The current situation presents a significant discrepancy between quantitative targets and the nation's plans.

Keywords: Climate Change, Renewable Energy, Environment, Sustainable Development.

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Risk assessment and characteristics of microplastics in coastal sediments of Gulf of Oman

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Abstract

Background: Competitions around the world, microplastic particles are known as a newly emerging and abundant pollutant in all ecosystems, especially private ecosystems. Microplastics have a high dispersion power, biodegradability, severe on the health of living organisms, and research on the evaluation of these particles is still limited. Therefore, this assessment has examined the ecological assessment and characterization of microplastics in coastal sediments in the Gulf of Oman. This study is the first environmental risk of microplastics in the sediments of the Gulf of Oman.

Methods: Sampling of sediments was done in the summer of 2023, from 40 stations (40 samples in total). Samples were analyzed using a two-step separation method based on density, as well as acid digestion and visual counting with a microscope. Micro raman analysis was done to identify the type of polymer and SEM analysis was done to check the surface morphology.

Results: In this study, all places, especially the sediments of urban, commercial and recreational areas, were contaminated with microplastics, which was due to high population density and human activities. Most of the shapes found in the sediments were fragment shapes due to their use in buckets, toys, packages and bottles. The most common color in all the samples is white due to its widespread use in the clothes of the people of the region, fishing nets, the body of fishing boats and pleasure and tourism ships, and the most polymer found in most areas is polypropylene due to its widespread use in packaging and textiles. And it was industry.

Conclusion: According to the obtained results, risk assessment was done. Urban, commercial and recreational areas had high risk. According to the obtained results, measures should be taken regarding the production and consumption of plastics, such as establishing environmental laws, reducing consumption and, if possible, replacing them with other materials.

Keywords: Microplastic, Polymer, Sediment, Risk Assessment, Gulf of Oman.

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Investigation of Climate Change in the Provincial Centers of Iran from 1993 to 2022

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Abstract

Background: Despite the existence of climate change and its effects, no comprehensive study has been conducted in Iran regarding the change in climate parameters during the past decades. Hence, this study was carried out to examine the meteorological variables in the centers of the provinces of Iran over a 30-year period.

Methods: The climatic parameters studied included average temperature, minimum temperature, maximum temperature, and precipitation amount. Given the importance of the accuracy of meteorological data and the potential for bias in results due to data errors, this study employed a precise method for validation and calculations. A simple linear regression test was used to determine the trend type and the magnitude of the slope of the climatic parameters.

Results: The map illustrating the changes in the selected variables was created for various regions of the country. To enhance accuracy and offer a more comprehensive view, data from 40 additional cities, besides the provincial capitals, were also incorporated. Comparing the ten-year average changes showed that the minimum temperature in most cities decreased during 2013-2022 compared to 1993-2002. Meanwhile, the maximum temperature increased in all cities during 2013-2022. The northwest and west regions of the country experienced a greater increase in maximum temperatures than other regions. The ten-year average temperature rose in all cities except Isfahan, with the west and northwest regions seeing a more significant increase. Precipitation increased more in the north

and northwest regions than in others. The areas most affected by a decrease in rainfall were the northern and western regions of the country.

Conclusion: The present study demonstrates that Iran has been significantly impacted by climate change in the last 30 years. The direction and magnitude of these changes have varied across different cities and regions, indicating that research and policymaking for climate change in Iran should be conducted with a regional perspective.

Keywords: Climate Change, Meteorology, Average Temperature, Precipitation, Maximum Temperature.

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Integrated attached and suspended biomass moving bed membrane bioreactor for municipal wastewater treatment: performance and biokinetic study

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Abstract

A new moving bed membrane bioreactor (MBMBR) configuration was developed for the treatment of real municipal wastewater. A regular membrane bioreactor (RMBR) and an integrated moving bed membrane bioreactor (IMBMBR) were operated to evaluate carbon and nutrient removal, nitrification and denitrification, microbial community, kinetics behavior, and membrane fouling. The results showed that the quality of the effluent was significantly better with the IMBMBR. The removal efficiencies of COD and BOD5 with the IMBMBR were 90.94 ± 4.4% and 95.39 ± 3.96%, respectively, compared to 87.65 ± 4.8% and 93.84 ± 3.52%, with the RMBR. The IMBMBR configuration membrane showed less fouling than the RMBR. The attenuation of membrane fouling in IMBMBR is likely due to the lower concentrations of extracellular polymeric substances (EPS). In terms of biokinetics, modified Stover-Kincannon and second-order models fitted the experimental data more smoothly than the first-order model did. The results of this research indicate that the wastewater treatment sector can achieve a more acceptable effluent quality by replacing RMBR with IMBMBR.

Keywords: Integrated Moving Bed Membrane Bioreactor, Biokinetic Models, Membrane Fouling, Municipal Wastewater.

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Analysis of the Development of Environmental Health Education and Research Centers in Iran

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Abstract

Background: One of the key centers for developing qualified and effective human resources to address societal demands across a range of sectors is higher education and universities. The education of experts in the field of environmental health is crucial since it has a direct impact on people's health in society. Therefore, the purpose of this study is to assess the development of these centers of education and research in this area on a nationwide scale.

Methods: This study is a cross-sectional that was conducted in 2019-2021. First, a description of the ten areas of higher education in terms of population and size was presented, and information regarding indicators such as the presence of health faculties, the presence of professors and research centers were reviewed and the data obtained were analyzed.

Results: Results showed that the ratio of professors in some of regions of the country is not consistent with other regions, so in region eight this ratio is much higher than the national average and in regions five and ten is much lower. Regarding the allocation of training locations for environmental health students in the eastern provinces of the country and regions eight and nine, the frequency of training locations for environmental health students is very high. As for research centers related to environmental health, these centers do not exist in nearly equal proportions in different regions of the country, so that some provinces actually there are no research centers and in some other provinces, the existing research centers are not dedicated to environmental health centers. In region five, the number of employees with environmental health degrees was highest, while in region seven, the number of employees with environmental health degrees was lowest.

Conclusion: According to the geographical strategy document on higher health education in the Islamic Republic of Iran, the development of higher education nationwide should be based on the needs and capabilities of each geographical area. Considering the relationship between the field of

environmental health and human health, this requires more serious attention from authorities in developing specialized education centers and human resources.

Keywords: Educational, Research, Development, Environmental Health, Iran.

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Investigation the social responsibilities of environmental health

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Abstract

Environmental health is the discipline that focuses on the interrelationships between people and their environment, promotes human health and well-being, and fosters a safe and healthful environment.The primary goal of environmental health is to identify environmental factors that may be harmful to human health and to prevent, eliminate, and control the adverse effects resulting from these factors. Environmental health places a strong emphasis on human health as its primary objective, with indirect attention given to the quality of the environment and the preservation of ecosystem health. In accordance with the 2023 global environmental health slogan, "Preparation to protect people's health everywhere and every day," professionals in this field must exert the necessary efforts to educate and implement social responsibility in their work. This deeper sense of responsibility aligns with their commitment to pursuing and achieving a valuable goal: the health of humans and the preservation of the environment. Responsible professionals fulfill the duties they have set for themselves, as well as the responsibilities society expects of them. The social responsibilities of environmental health researchers are evident in movements like environmental justice, particularly in community health-based collaborative research. The social responsibilities of environmental health, dedicated to safeguarding public health by managing and reducing environmental factors affecting it, encompass protecting human health and hygiene, evaluating environmental effects, promoting sustainable development, ensuring equitable access to environmental health services across all societal strata, engaging with stakeholders and advocating for policy changes to preserve the environment, promoting education and its continuity, involving communities to address their health and environmental concerns, and considering ethical principles, as explored in this study.

Keywords: Social Responsibilities, Environmental Health, Sustainable Development, Human Health, Environmental Protection.

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Simulation of the potential impact of climate change on malaria incidence using artificial neural networks (ANNs)

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Abstract

Background: Climate change can increase the spread of infectious diseases and public health concerns. Malaria is one of the endemic infectious diseases of Iran, whose transmission is strongly influenced by climatic conditions.

Methods: The effect of climate change on malaria in the southeastern Iran from 2021 to 2050 was simulated by using artificial neural networks (ANNs). General circulation models (GCMs) were used to determine the best delay time and to generate the future climate model under two distinct scenarios (RCP2.6 and RCP8.5). To simulate the various impacts of climate change on malaria infection, ANNs were applied using daily collected data for 12 years (from 2003 to 2014).

Results: The future climate of the study area will be hotter by 2050. The simulation of malaria cases elucidated that there is an intense increasing trend in malaria cases under the RCP8.5 scenario until 2050, with the highest number of infections occurring in the warmer months. Rainfall and maximum temperature were identified as the most influential input variables. Optimum temperatures and increased rainfall provide a suitable environment for the transmission of parasites and cause an intense increase in the number of infection cases with a delay of approximately 90 days.

Conclusion: ANNs were introduced as a practical tool for simulating the impact of climate change on the prevalence, geographic distribution, and biological activity of malaria and for estimating the future trend of the disease in order to adopt protective measures in endemic areas.

Keywords: Climate Change, Malaria, Simulation, ANNs, GCMs.

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Degradation of 2,4-dichlorophenoxyacetic acid herbicide by three-dimensional electrofenton process with lead dioxide coated titanium anode (Ti/β-PbO2) and Fe/SBA-15 nanocatalyst particle electrodes

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Abstract

Pesticide wastewater is accused of polluting receiving waters with toxic and non-biodegradable organic pollutants. The present study has developed an integrated electrochemical oxidation process based on PbO2 anodic oxidation and Fe/SBA-15 heterogeneous electro-Fenton (PbO2/EF-(Fe/SBA-15)) for synergistic treatment of pesticide wastewater. PbO2 electrocatalyst was prepared by anodic deposition method and Fe/SBA-15 catalyst was synthesized by incipient wetness impregnation method. To optimize and model the removal of 2,4-D, a quadratic mathematical model by orthogonal central composite design (CCD) was proposed and validated. In optimal conditions including solution pH = 5, H2O2 concentration = 2000 mg/L, applied current = 10 mA/cm2, Fe/SBA-15 dose = 1.25 g/L and 2,4-D concentration = 30 mg/L, the experimental removal efficiency of 2,4-D after 35 min of reaction in the PbO2/EF-(Fe/SBA-15) process was 99.85%. Moreover, the kinetics of 2,4-D removal in the integrated PbO2/EF-(Fe/SBA-15) process was about 3.84 times faster than the separate PbO2 anodic oxidation, confirming a remarkable degradation synergy. The mineralization of 2,4-D was confirmed by LC-MS and TOC analyses, and considering the identified intermediates, the possible degradation pathways of 2,4-D to CO2 and H2O were suggested. Real pesticide wastewater treatment was studied under optimal conditions. COD removal efficiency in PbO2/EF-(Fe/SBA-15) process and PbO2 anodic oxidation was 71.2% and 32.5%, respectively. Also, the energy consumption (EC) of these two processes was 17 kWh/kg COD and 38 kWh/kg COD, respectively. The results of this study suggest the integrated PbO2/EF-(Fe/SBA-15) process is a practical and cost-effective process for non-biodegradable pesticide wastewater treatment.

Keywords: PbO2 Anode, Electro-Fenton, Fe/SBA-15, Pesticide Wastewater, Integrated EAOP.

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A highly efficient adsorbent for Amoxicillin derived from Palm Kernel: Artificial neural network modeling

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Abstract

In the present study, a new sorbent was fabricated from Palm kernel (PK) by dry thermochemical activation with NaOH and characterized by FTIR, X-ray diffraction, FE-SEM and BET, which used for the Amoxicillin (AMX) sorption from aqueous solution. The influence of effective parameters such as pH, reaction time, adsorbent dosage, AMX concentration and ionic strength on the sorption efficacy of AMX removal were evaluated. The main functional groups on the surface of the magnetic activated carbon of Palm Kernel (MA-PK) were C-C, C-O, C=O and hydroxyl groups. The specific surface of char, activated carbon Palm Kernel (AC-PK) and MA-PK were 4.3, 1648.8 and 1852.4 m2/g, respectively. The highest sorption of AMX (400 mg/L) was obtained by using 1 g/L of sorbent at solution pH of 5 after 60 min contact time, which corresponding to 98.77%. Non-linear and linear models of isotherms and kinetics models were studied. The data fitted well with Hill isotherm (R2= 0.987) and calculated maximum sorption capacity were 719.07 and 512.27 mg/g from Hill and Langmuir, respectively. A study of kinetics shows that the adsorption of AMX follows the Elovich model with R2= 0.9998. Based on the artificial neural network (ANN) modeling, the MA-PK dosage and contact time showed the most important parameters in the removal of AMX with relative importance of 36.5 and 25.7%, respectively. Lastly, the fabricated MA-PK was successfully used to remove the AMX from hospital wastewater.

Keywords: Adsorption, Agricultural Waste, Wastewater Treatment, Artificial Neural Network, Isotherm and Kinetic Study.

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Assessing drinking water quality based on water quality indices, human health risk, and burden of disease attributable to heavy metals in rural communities of Yazd County, Iran, 2015-2021

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Abstract

The water quality indices, human health risk, and burden of disease attributable to heavy metals in rural communities of Yazd County, Iran were studied. The water quality index (WQI), heavy metal pollution index (HPI) and heavy metal evaluation index (HEI) were used for assessing of drinking water quality. The health risks of heavy metals in drinking water were estimated in terms of hazard quotient (HQ) and incremental lifetime cancer risk (ILCR), and disability-adjusted life year (DALY), respectively. Based on the DWQI scores, the drinking water quality in rural communities of Yazd County was characterized as good for 61%, fair for 25%, marginal for 2%, and poor for 12%. In about 20% of the rural communities, the average HI level of heavy metals was higher than the boundary limit of one. In all the communities, the total ILCR values of the heavy metals were in the range of significant increased cancer risks. The DALY rate of exposure to the heavy metals via drinking water was 13.9 and considered to be relatively high as compared to that of other drinking water pollutants obtained in the previous studies. The drinking water quality improvement through decreasing Cd and As levels below the standard values can drastically reduce the attributable burden of disease and promote the public health in the rural communities.

Key word: Water Quality Index, Heavy Metal Pollution Index, Heavy Metal Evaluation Index, Hazard Quotient, Incremental Lifetime Cancer Risk, Disability-Adjusted Life Year.

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Carcinogenicity and non-carcinogenicity Risk Assessment encounter of air heavy metals Distribution in PM 2.5 Zabol city, Iran

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Abstract

Because of its hazardous and respirable components, particulate matter (PM2.5) is a priority air pollutant and a known carcinogen. The current study examined the concentrations and compositions of specific elements in samples (PM2.5), ecological risks, and the carcinogenic and non-carcinogenic risks associated with inhaling, ingesting, and absorbing heavy metals through the skin from total suspended particles for both adult and pediatric age groups in the highly dust-polluted city of Zabol, Iran, in the years 2022–2023. The samples were prepared and then put into the ICP-OES. The following was the order of the metals' mg/kg concentrations under study: Zn(15.27)>pb(3.66)>Cr(3.38)>Cd (0.011) is ranked above Al (75053) > Ca (8206) > Fe (5439) > Mg (5323). The findings show that, when it comes to non-carcinogenic risk assessment, ingestion exposes children and adults to the highest average HQ values, while cutaneous and inhalation exposures are lower. Additionally, the hazard index (HI) for heavy metals is below the safe threshold of 1. In both adults and children, the RI values for lead, cadmium, and chromium are less than 〖1×10〗^(-6). The USEPA states that there is an acceptable level of carcinogenicity for all heavy metals. Thus, it is impossible to disregard the possibility of cancer caused by these metals in suspended particles in Zabol.

Keywords: Carcinogen, PM2.5, Heavy Metals, Zabol.

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Magnetic recoverable novel heterogeneous ZnO@carbon-mediated peroxymonosulfate toward photocatalytic degradation of diazinon

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Abstract

In this work, ZnO anchored on CoFe2O4@activated carbon (ZCFAC), as a heterogeneous photocatalyst, was fabricated for the first time and applied to activate peroxymonosulfate (PMS) to boost the degradation of diazinon (DZN) pesticide. The structure, morphology, and optical properties of the ZCFAC hetero-junction were characterized through a series of techniques. The highest degradation efficiency of DZN (100 percent in 90 min) was achieved by the PMS-mediated ZCFAC/UV system, superior to other single or binary catalytic systems due to the strong synergistic effect between ZCFAC, PMS, and UV. The operating reaction conditions, synergistic effects, and the possible pathways of DZN degradation were investigated and discussed. Optical analysis showed that the band-gap energy of the ZCFAC hetero-junction not only enhanced the absorption of UV light but also reduced the recombination of photo-induced electron/hole pairs. Both radical and non-radical species (•OH, SO4•−, O2•−, 1O2, and h+) took part in the photo-degradation of DZN, assessed by scavenging tests. It was found that AC as a carrier not only improved the catalytic activity of CF and ZnO nanoparticles and conferred high stability for the catalyst but also played a crucial role in accelerating the catalytic PMS activation mechanism. Moreover, the PMS-mediated ZCFAC/UV system showed good reusability, universality, and practical applicability potential. Overall, this work explored an efficient strategy for the best use of hetero-structure photo-catalysts toward PMS activation to achieve high performance in decontaminating organic compounds.

Keywords: Diazinon Photodegradation, Sulfate Radicals, Pesticide Removal, Ferrite Cobalt, Recoverable ZnO.

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Investigation of blood biomarkers associated with long-term exposure to ionizing radiations in radiation workers

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Abstract

Background: Long-term exposure to ionizing radiation (IR) can cause dire health consequences even less than the dose limits. Previous biomonitoring studies have focused more on complete blood counts (CBCs), with non-coherent results. In this study, we aimed to investigate the association between exposure to IR and cytokine interleukin-6 (IL-6) along with hematological parameters in Tabriz megacity's radiation workers.

Methods: In this hospital-based study, blood samples were taken from 33 radiation workers (exposed group) and 34 non-radiation workers (control group) in 4 hospitals. Absorbed radiation dose was measured by a personal film badge dosimeter in radiation workers. The studied biomarkers and all of the selected covariates were measured and analyzed using adjusted multiple linear regression models.

Results: The exposed doses for all radiation workers were under the dose limits (overall mean = 1.18 mSv/year). However, there was a significant association between exposure to ionizing radiation and IL-6 (49.78 vs 36.17; t = 2.4; p = 0.02) and eosinophils (0.17 vs 0.14; t = 2.02; p = 0.049). The difference between the mean of the other biomarkers in radiation workers was not statistically significant compared to the control group.

Conclusions: This study demonstrated that long-term exposure to ionizing radiation, even under the dose limits, is related to a significantly increased level of some blood biomarkers (Il-6 and Eosinophil) that, in turn, can cause subsequent health effects such as cancer.

Keywords: CBC, IL-6, Ionizing Radiation, Radiation Workers, Tabriz Megacity.

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Non-carcinogenic and cumulative risk assessment of exposure of kitchen workers in restaurants and local residents in the vicinity of polycyclic aromatic hydrocarbons

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Abstract

Background: Polycyclic aromatic hydrocarbons (PAHs) are often formed when organic substances do not burn completely.

Methods: This study evaluates the non-carcinogenic and cumulative risks associated with PAHs levels by testing blood and urine samples in kitchen workers and residents near restaurants in Shiraz, Iran. Metabolites of PAH in the urine samples as well as clinical parameters in the blood samples were measured. The non-carcinogenic and cumulative risk assessments from exposure of the study groups to PAH metabolites were also evaluated.

Results: The highest average concentrations of PAH metabolites were related to kitchen workers (2126.7 ng/g creatinine (ng/g cr)). The metabolites of 1-Hydroxypyrene (1-OHP) and 9-Phenanthrene (9-OHPhe) had the highest and lowest mean concentrations, respectively. A direct correlation was observed between the levels of PAH metabolites with malondialdehyde (MDA) and total antioxidation capacity (TAC) levels ($p < 0.05$). Hazard Index (HIi) was obtained less than one ($HIi < 1$), indicating low-risk negative health impacts on the target groups. Nevertheless, conducting more studies to determine the health status of these people is quite evident.

Conclusion: Higher levels of PAH metabolites were observed in the urine of kitchen workers and residents near restaurants compared to the control group. The correlation between MDA levels and PAH metabolites highlighted the potential health risks. However, overall, the low HIi values suggest

a low risk of adverse health effects, emphasizing the importance of identifying and reducing PAH emissions to mitigate their harmful impact on human health.

Keywords: Polycyclic Aromatic Hydrocarbons, Restaurants, Health Risk Assessment, Non-Carcinogenic.

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Biodegradation of N-hexadecane Using Bacterial Consortium Isolated from Seawater Contaminated with Petroleum

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Abstract

Background: This study aimed to determine the biodegradation potential of n-hexadecane by three bacterial strains (Pseudomonas aeruginosa, Bacillus subtilis, and Bacillus Paralicheniformis) isolated from seawater contaminated with petroleum.

Methods: The effect of parameters, including the surfactant (Tween 20, Tween 80, and sodium dodecyl sulfate (SDS)), concentration (1-4 CMC (critical micelle concentration)), n-hexadecane concentration (0.5-5 percent), and bacterial consortium volume (5-20 mL), were investigated on the biodegradation of n-hexadecane. Finally, intermediate compounds resulting from the biodegradation of n-hexadecane were determined.

Results: Based on the results, the highest biodegradation of n-hexadecane (80.34 percent) was obtained in Tween 80 surfactant after 21 days compared to SDS (46.17 percent) and Tween 20 (72.97 percent) surfactants. The lowest and highest biodegradation of n-hexadecane (percent) at the end of day 21 was obtained at concentrations of 1 (80.14 percent) and 4 (90.82 percent) CMC of Tween 80 surfactant, respectively. The biodegradation of n-hexadecane (percent) significantly increased (98.8 percent) at the end of 21 days when the bacterial consortium was utilized in high volume (20 mL). The highest biodegradation of n-hexadecane (percent) occurred at a concentration of 0.5 percent and reached 99.12 percent after 70 days. In addition, the Pseudomonas aeruginosa strain biodegraded n-hexadecane better after 21 days (25.15 percent) compared to Bacillus subtilis (20.5 percent) and Bacillus paralychniformis (16.8 percent). Biodegradation of n-hexadecane by

these bacteria produced n-tridecane-1-ol, 2-hexadecanol, n-hexadecanoic acid, and 1-hexadecanol as intermediates.

Conclusion: The results indicated that the synergy of bacterial consortium and surfactant could improve the biodegradation of n-hexadecane.

Keywords: Biodegradation, Bacterial Consortium, N-Hexadecane, Surfactant, Seawater.

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Examination of the SARS-CoV-2 virus on the surfaces of fuel station nozzles in the northwest of Iran

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Abstract

There are several ways for transmitting the SARS-CoV-2 virus to humans, and one of these ways is the contact with infected surfaces. Fuel stations have been a major concern for people and health experts due to the frequent use of common nozzles. This study was performed to identify the COVID-19 virus in the nozzles of fuel supply stations. In the current research, 25 fuel supply stations along the main street ways were investigated to recognize Coronavirus infection on the surfaces of the nozzles. For each fuel supply station, 4 nozzles were chosen (a total of 100 samples). The sampling was carried out at two periods of time, that is, before and after quarantine restrictions. Swapping was used for surface sampling, and Real-time PCR was used to determine the positive and negative results. The results showed that out of nine fuel supply stations (36 samples of nozzle surfaces), five were positive for the presence of SARS-CoV-2 on the nozzle surfaces before the corona restriction. The results showed that in the conditions after corona restriction, all samples were negative in terms of the presence of SARS-CoV-2 on the surfaces of the nozzles. In spite of the fact that gas stations can be one of the foremost inclined places for the transmission and spread of coronavirus due to the nearness and visit of individuals, but through the observance of health behaviors and implementing some procedures, cutting the transmission chain in gas stations can be facilitated.

Keywords: SARS-CoV-2, Surface Contamination, Fuel Supply Stations, Nozzle Surfaces.

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Electrodegradation of 2,4-Dinitrophenol in three-dimensional Sono-electrochemical process: Optimization using Taguchi design technique

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Abstract

2,4-dinitrophenol (2,4-DNP), which is a nitrophenol compound, is a carcinogenic and non-biodegradable pollutant, which is found at high concentrations in industrial wastewater. Degradation of 2,4-DNP using a three-dimensional sono-electrochemical (3D/SEC) process equipped with G/β-PbO2 anode and Fe/SBA-15 nanocomposite particle electrodes was evaluated in the present study. Investigating the effect of parameters including pH, electrolysis time, current density, and 2,4-DNP concentration on the performance of the 3D/SEC-Fe-SBA-15 process in 2,4-DNP degradation was considered, and optimization of these parameters was done using the Taguchi design technique. Field emission scanning electron microscopy (FESEM), X-ray diffraction analysis (XRD), energy-dispersive X-ray spectroscopy mapping (EDX-mapping), transmission electron microscopy (TEM), and Fourier Transform Infrared Spectroscopy (FTIR)) were the analyses techniques used to support the successful synthesis of Fe-SBA-15 and G/β-PbO2 anode. The optimum values obtained for pH, electrolysis time, current density, and 2,4-DNP concentration were 5.0, 60.0 min, 5.0 mA/cm2, and 50.0 mg/L, respectively. The experimental removal efficiencies of 2,4-DNP, COD, and TOC using 3D/SEC-Fe-SBA-15 process, under the mentioned conditions, were obtained to be 96.3%, 88.28%, and 83.82%, respectively. In addition, the AOS value was developed from -0.29 to +0.88; this indicates the high mineralization of 2,4-DNP and improvement of the solution biodegradability. Detecting the intermediates produced during the degradation process was done by LC-MS analysis, and pathways for its degradation was proposed. Results were indicative of the high potential of the 3D/SEC-Fe-SBA-15 process for treating wastewater containing phenolic compounds, e.g., 2,4-DNP, and can provide acceptable efficiency.

Keywords: 2,4- Dinitrophenol, 3D/SEC Process, Fe/SBA-15 Particle Electrodes, Degradation Pathway, Taguchi Method.

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Comparing the effectiveness of ICNA and ACC indicators in evaluating the health status of medical equipment

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Abstract

Background: During the last decade, the increase in the number of cases and prevalence of hospital infections has attracted a lot of attention. Examining the cases of outbreaks and cases of hospital infections has confirmed the relationship between the bad health condition of the hospital environment and the transmission of microorganisms that cause hospital infections. In Iran, there are no written instructions and guidelines for monitoring the daily cleaning of medical equipment in hospitals. Few studies have been done regarding the level and role of medical equipment levels in the incidence and prevalence of hospital infections. Therefore, this study was conducted to evaluate the health status of medical equipment's in Nishabur hospital's intensive care units (ICU) before and after daily cleaning in order to compare the efficiency of the observational and microbial methods in evaluating hygienic conditions and cleaning of the environmental surfaces at the hospitals in Nishabur.

Methods: The study was performed in a ten-week period, twice a week before and after daily cleaning according to the ICNA observational method and the ACC microbial method in the ICU of Nishabur hospitals, and the health condition of the levels of medical equipment by The above methods were monitored and compared.

Results: Result showed in total, 826 ICNA checklists were completed in this research for the 13 studied spots, 27.1% of the spots were contaminated before cleaning procedures, which dropped to 7.7% after cleaning. Data of the samples (826) using the ACC index revealed that 74.8% were contaminated before cleaning procedures which dropped to 17.4% after cleaning. Bottle suction with 8.2% and Electroshock with 1% were the most and the least contaminated spots, respectively. As the results proved, the microorganism of Staphylococcus epidermises is the most grown organism in the intensive care unit.

Conclusion: This study suggests that visual assessment is not enough to ensure quality of the process and it is necessary to document the level of cleanliness by quantitative methods. Also preparing the integrated instructions and guidelines of cleaning and disinfection and its continuous monitoring with standard methods would be effective in reducing the microbial contamination.

Keywords: Aerobic Colony Count, Disinfection, Health Status, Hospital, Observational Method.

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Investigating the Air Quality of Tehran Metropolis Based on the Air Quality Index in 2018-2022

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Abstract

Background: Air pollution and adverse air quality is one of the major problems of megacities that seriously threatens the health of their residents. This adverse quality is due to various pollutant resources such as automobiles, industries, heating devices, construction, and commercial activities during recent decades and there are more concerns about it. According to the report of the World Health Organization, about 99 percent of the world's people breathe polluted air, and about 7 million people die every year due to air pollution worldwide. Therefore, monitoring air pollutants and studying their variations are specifically important. This study was targeted toward a comparative investigation of the air quality of Tehran metropolis based on Air Quality Index (AQI) over a period of five years (2018-2022).

Methods: This was a descriptive cross-sectional study. In this research, the AQI index has been used to determine the air quality of Tehran and to introduce the responsible pollutant. First, to describe the air pollution level, we obtained AQI data from the Iran National Air Quality Monitoring System (http://aqms.doe.ir). Then, data were processed by Excel software. Finally, the processed data were analyzed by R version 4.3.2.

Results: The results showed that the average AQI had an increasing trend during the study period from 75.89±25.36 in 2018 to 107.25±36.51 in 2022. The number of unhealthy days for sensitive groups and unhealthy has also increased. The results also showed that in 67 percent of the days PM2.5 was responsible pollutant. Also, the average AQI had higher values in the months of December and January.

Conclusion: The air quality of Tehran metropolis has decreased in the years of study, which can cause an increase in diseases, the number of deaths and economic losses. Consequently, some strategies, such as traffic management, employment of other types of fuel or quality improvement,

management of home heating systems, and use of public transportation should be considered as air pollution control options in the coming years.

Keywords: Air Pollution, Air Quality Index, Tehran.

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Investigation and comparison of odds ratios and levels of lead, zinc, arsenic and selenium in women with and without a history of abortion in the study population of the Shahrekord cohort

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Abstract

Background: Spontaneous abortion is a serious threat to the mother's physical and mental well-being. The cause of spontaneous abortion is multifactorial disease. Prenatal non-essential metal exposure, particularly heavy metals, has been suggested to be associated with adverse pregnancy and birth outcomes. The purpose of this study was to investigate the relationship between the concentration of essential and non-essential metals including Pb, As, Zn, and Se and the risk of spontaneous abortion.

Methods: In this case-control study the levels of Pb, As, Zn, and Se in the whole blood of 60 women with spontaneous abortion (case group) and also 60 women without spontaneous abortion (control group) were measured by atomic absorption spectrophotometry.

Results: Results revealed statistically significant reductions ($P<0.001$) in whole blood levels of Zn and Se as well as the levels of As and Pb had a substantial elevation ($P<0.001$) in cases compared to controls. According to the findings, repeated spontaneous abortion may be influenced by increasing whole blood levels of heavy metals such as As and Pb (OR= 17.53, P = 0.001 and OR= 15.58, P= 0.001) as well as decreasing levels of vital micronutrients Zn and Se (OR = 0.20, P = 0.001 and OR= 0.14, P = 0.001).

Concolusion: The results of this study support the idea that limiting intake of non-essential metals can help prevent spontaneous abortions. Overall, the information presented is expected to help plan future fundamental and applied investigations on the spontaneous abortion.

Keywodrs: Pregnancy, Abortion, Heavy Metals, Environmental Exposure.

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Occurrence of microplastics in the distribution system in Kermanshah city, Iran

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Abstract

Background: Plastic, a synthetic material, can break down into microplastics and nanoplastics, which can cross the gastrointestinal tract and be found in various parts of living organisms. The increased introduction of plastics into the environment has raised concerns about their effects on human life, particularly the pollution of drinking water from microplastics in sources such as surface water, groundwater, and wastewater.

Methods: In this study, samples were randomly collected from faucet filters and divided into 19 categories for investigation. The visual method with a stereomicroscope, Fourier transform infrared (FTIR) analysis, and scanning electron microscopy (SEM) were used to examine the surface morphology of microplastics. Citric acid was used to digest organic waste materials, and sodium chloride (NaCl) was used to float microplastics based on density differences.

Result**s:** The results showed that high amounts of microplastics in tap water, with an average of 77.1 ± 85.3 pieces per case. The most abundant particles were those with a diameter of less than 2000 microns, and the most frequent type of microplastic was fiber particles. The study also found that microplastics with white and transparent and dark or black, respectively, had a higher share than other colors. The most detected polymers were polyethylene and polypropylene.

Concolusion: It is important to pay attention to the abundance of microplastics and the possibility of transferring dangerous toxins and pollutants in water distribution systems, such as tap water.

Keywodrs: Microplastic, Distribution System, Water, Filtration.

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Evaluation of air quality in Yazd using Sentinel-5 Precursor satellite of TROPOMI instrument in 1400 and 1401

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Abstract

Background: The sustainable development and global governance of the environment require global monitoring of the environment and its security. This can be achieved by providing timely and high-quality data, information, services, and knowledge. The main objective of this study is to analyze the concentrations of CO, SO2, NO2, and aerosols in the atmosphere of Yazd city in 1400 and 1401. This will be done through the analysis of Sentinel-5 Precursor (SP5) satellite images using the TROPOMI instrument.

Methods: The study utilized remote sensing techniques to monitor air quality in Yazd city during the years 1400 and 1401. The concentration of CO, SO2, NO2, and aerosols pollutants in the troposphere were monitored using SP5 satellite data with the TROPOMI instrument. The satellite data was processed using the Google Earth Engine (GEE) platform.

Results: According to the results, the concentration of pollutants was higher in 1400 compared to 1401. The main source of pollution was aerosols. During the winter season, the concentration of SO2 was higher than in other seasons. The annual average concentration of NO2 was high in both years, reaching near 8 mol/m2 in the central part of the city. The Golbad study revealed that the prevailing wind in Yazd was from the west and southeast and that the wind speed was higher in 1400 than in 1401.

Conclusion: The air quality of Yazd city is greatly affected by the high concentration of particles, which is mainly due to the presence of deserts around the city, urban development, and the increase in vehicles. During winter, the high concentration of SO2 can be attributed to the use of residential fuel. The high levels of NO2 in Yazd are due to the high air temperature and the presence of various industries. The increase in pollutants in the year 1400 may be due to stronger winds carrying pollutants. Despite the adoption of strict environmental policies by relevant organizations to reduce air pollution, more planning and action are needed to reduce greenhouse gas emissions.

Keywords: Air Pollution, Remote Sensing, Sentinel-5 Precursor Satellite, TROPOMI, Yazd City.

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Investigation on chlorine resistance of bacteria isolated from hospital water systems

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Abstract

Background: Biofilm formation in water system of hospitals, including plumbing systems and fixtures, poses a potential threat to patient safety, particularly when the biofilm bacteria demonstrate antimicrobial resistance characteristics. This study aimed to investigate the occurrence of chlorine-resistant bacteria (CRB) in biofilms within water system of 6 hospitals in Isfahan.

Methods: Biofilm samples were collected from the drinking water distribution system (DWDS) of 6 hospitals in Isfahan, Iran and finally 41 samples were studied. In this study, the bacterial isolates were exposed to the chlorine concentrations of 0.5, 1.5, 2.5 and 4 mg/liter, for 5 and 30 minutes. Bacteria with high resistance to chlorine were identified using molecular methods.

Results: Out of the 41 biofilm samples collected from hospitals, 109 colonies of bacteria were isolated from DWDS of hospitals. Exposure of bacteria to free chlorine at a concentration of 0.5 mg/l showed that 64% of the isolates were CRB. However, increasing the chlorine concentration to 4 mg/l decreased the high fraction of bacteria (91%). The dominant CRB identified were Sphingomonas, Brevundimonas, Stenotrophomonas, Bacillus and Staphylococcus with Bacillus exhibiting the highest frequency.

Conclusion: The results demonstrate the potential risk of biofilm formation in the water system of hospitals, causing the dissemination of CRB in hospital environments through tap water. This issue could be a potential health concern for the hospitalized patients, especially for immunocompromised individuals. Monitoring of chlorine resistance can provide valuable insights for the maintenance of the water system of hospitals and practices that ensure their efficacy of disinfection.

Keywords: Biofilm, Hospital Water, Chlorine Resistance, Nosocomial Infection.

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The importance of upgrading and updating waste management systems during the outbreak of pandemic diseases such as Covid-19: turning threats into opportunities

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Abstract

The COVID-19 pandemic has been a significant catalyst for change in waste management systems globally. With the increased amount of medical and hazardous waste generated by the pandemic, it became necessary to make specialized waste management protocols. Additionally, the pandemic has brought to light the importance of public awareness and participation in waste management, and there have been calls for more sustainable waste management practices. Therefore, there is a need for a comprehensive review of waste management systems to ensure that they are well-equipped to handle emerging diseases and are sustainable in the long term. This article highlights the need to improve waste management rules to address the negative effects of pandemics on waste management and discusses the challenges faced by Iran as a developing country. Also it reviews the reaction of developed and developing countries in the field of managing the situation and revising waste management rules. In order to enhance the overall health of society and contribute towards sustainable development goals, it is crucial to prioritize strengthening waste management systems and establishing modern protocols that effectively address emerging diseases. Additionally, by ensuring proper waste management practices and the development of adequate legal frameworks, we are empowered to proactively hinder the onset of secondary disasters, including diseases arising from insufficient waste control measures during pandemic diseases.

Keywords: Waste Management System, COVID-19, Challenges, Policy Makers.

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Risk assessment of Gastrointestinal cancer in hookah and opium users

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Abstract

Background: Gastrointestinal (GI) cancers prevail in Iran. The existing literature shows the relationship between tobacco and opium consumption and the incidence of this type of cancer. Yet, there is scarce research on the effect of simultaneous consumption of these Substances on cancers, especially GI cancers. Therefore, the present study aimed to test the relationship between hookah and opium smoking and the effects of their simultaneous use on GI cancers in Minab city in Hormozgan province.

Methods: The present case-control study was conducted on 60 cases (patients with GI cancers) and 120 controls (healthy residents) of Minab, a city in Hormozgan province. In this study, chi-square and Fisher's exact tests were used to test the difference between the participants' characteristics in the case and control groups. Moreover, the logistic regression model was used to test the relationship between hookah and opium consumption and GI cancers as the main outcome.

Results: The mean ± standard deviation of participants' age was 55.58 ± 12.80 (R = 30-81) in the control group and 56.22 ± 13.88 (R = 30-90) in the case group. The prevalence of opium, cigarette, and hookah consumption in the case group was 55%, 40%, and 65%, respectively. In the control group, it was 4.2%, 10%, and9.2%, respectively. This difference was statistically significant ($p < 0.001$). The results showed that tobacco and opium significantly increase the risk of GI cancers. This risk is increased significantly respectively in participants smoking only cigarettes (OR=5.08), only hookah (OR=17.71), only opium (OR=31.05), opium and hookah simultaneously (OR=65.81), opium and cigarettes simultaneously (OR=77.08) and cigarettes, hookah and opium simultaneously (OR=110.74) ($p < 0.05$).

Conclusion: This study showed a significant and positive relationship between opium and tobacco consumption and GI cancers. Considering that cancer prevention is the most affordable strategy in controlling this disease, the present findings help prevent the disease through identifying some risk

factors of GI cancers. It is recommended to conduct more detailed studies considering the pattern of smoking and other risk factors.

Keywords: Gastrointestinal Tract Cancer, Hookah, Opium, Hormozgan.

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Assessment of Agricultural Pesticide Residues in Drinking Water Sources: A Case Study in Maragheh

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Abstract

The presence of residues from agricultural pesticides and toxins in water sources poses potential risks to human health. It is imperative to monitor and measure these contaminants in drinking water sources to safeguard the health of consumers. This study aimed to investigate the residual levels of agricultural toxins and pesticides, including malathion, diazinon, dichlorvos, and fenitrothion, in both surface water and the drinking water network of Maragheh city during the spring and summer of 2021. A total of 28 samples were collected, and qualitative mapping was employed to detect the presence of toxins and pesticides in water sources. The health risk associated with these contaminants was evaluated to understand their potential impact on consumer health. The study revealed that the highest concentrations of toxins were detected in surface water and the reservoir of the drinking water storage dam. This accumulation may be attributed to the inflow of toxins into the dam's reservoir. Among the measured pesticides, fenitrothion exhibited the highest concentration at 1.15 mg/L in the dam's reservoir. Following treatment at the downstream water treatment plant and within the distribution network, the concentration of this pesticide decreased to 0.56 mg/L. Additionally, an analysis of pesticide levels in the drinking water network indicated a higher frequency of pesticides in spring samples, likely due to increased toxin usage during this season. The calculated health risk, considering the generally low concentrations of pesticides in drinking water samples, suggests that health risks are minimal for consumers in most instances. This study underscores the importance of ongoing monitoring and management practices to ensure the continued safety of drinking water sources and protect public health.

Keywords: Pesticides; Health Risk Assessment; Maragheh; Geographic Information System.

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Study of the Correlation between Arsenic Contamination in Drinking Water and the Incidence of Diabetes and Hypertension in Hamadan province, Iran

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Abstract

Background: In the world, millions of people are exposed to arsenic through drinking water, soil and food. Although, according to the suggestion of the World Health Organization, the maximum recommended concentration for arsenic in drinking water is 10 micrograms per liter, but its concentration in the drinking water of more than 100 million people in the world is more than 50 micrograms per liter. Considering the importance of the known effects of exposure to arsenic through drinking water and the threat to the health, this subject has been considered as a health problem in the province and has been given attention, and finally, the present study aims to determine the relationship between the concentration of arsenic In the groundwater of the polluted areas and the prevalence of diabetes and blood pressure in the mentioned areas, the relationship between the physicochemical parameters and the seasonal changes with the arsenic concentration was also investigated.

Methods: In this study, the data of the prevalence of hypertension and Type 2 diabetes mellitus in Hamadan province in 2019 were obtained from the Vice-Chancellor for Health of Hamadan University of Medical Sciences. Sampling of drinking water from all the cities of Hamadan province was done according to the WHO standard. To show the spatial patterns of arsenic concentration and estimate unknown points, the inverse distance weighting (IDW) method of ArcGIS 10.8 software was applied. The relationship between physicochemical parameters and arsenic was evaluated using Pearson regression. In order to investigate the association between arsenic level and the prevalence of diabetes and blood pressure, Poisson regression method was used. SPSS V.23 and Excel software were used in all analyses. All the tests were performed at the 95% confidence level.

Results: According to the results, the highest arsenic pollution was observed in Kabudarahang city with an average of 40.1 ppb. According to the findings, in the summer season, except for chromium, the concentrations of all dissolved ions were lower than in the spring season. Among the studied parameters, nitrite, nitrate, sulfate, calcium, CaH and TSS had a positive and significant relationship with arsenic concentration. Based on the results of multiple regression, with the increase of calcium and sulfate concentration, the amount of arsenic increases by 0.7 and 1.63 units, respectively. Based on research findings, like previous studies, there was a positive association between arsenic variable and response variables of diabetes and hypertension.

Conclusion: Based on the findings, Kabudarahang city, which borders Kurdistan and Zanjan, has the highest exposure to arsenic. The main source of arsenic pollution in Kabudarahang area is geogenic activities. Based on observations, weather conditions can also have an effective role in the changes of arsenic concentration in the studied area. In addition, according to the results of Poisson regression, arsenic variable had a positive relationship with prevalence of diabetes and hypertension. Therefore, due to the high level of arsenic in Kabudarahang area, in order to minimize the health risk, it is necessary to take necessary measures to solve the problem of arsenic contamination in the study area. Among these measures, we can mention increasing awareness and education of the public, water purification and the use of alternative water sources.

Keywords: Arsenic, Diabetes, Blood Pressure, Physicochemical Parameters.

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The association between exposure to arsenic and the occurrence of cancers in Hamadan province

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Abstract

Background: According to the statistics of the Institute of Health Measurement and Evaluation, cancers are the second cause of death in the world since 1990. Among the environmental factors effective in the occurrence of cancers is the presence of heavy metals such as arsenic in water and food. this study aims to determine the relationship between arsenic in the underground water and incidence of cancer in contaminated areas compared to other areas in Hamadan province.

Methods: The available data related to the occurrence of cancers in recent years were received from the Vice-Chancellor of Health of Hamadan University of Medical Sciences. Poisson regression method was used to investigate the relationship between arsenic level and cancer incidence. Monte Carlo simulation was used to estimate the degree of uncertainty in the calculation of acute and chronic arsenic risk indicators.

Results: According to the results of Poisson regression, among the investigated cancers, the incidence rate of cancers of breast 2.31 (1.79-2.97), lung 2.44 (1.75-3.40), thyroid 2.48 (1.58-3.89), gall bladder. 2.95 (0-931-9.39), pancreas 2.88 (1.53-5.42), bladder 3.47 (2.31-5.20), scalp and neck 3.01 (1.54-3.86) showed the highest relationship with arsenic contamination in contaminated areas at a significant level (p value<0.05).

Conclusion: The results show that the average concentration of arsenic in the underground water of Kabudarahang city is more than standard and in this region the risk of carcinogenesis through drinking is more than acceptable level. The findings also showed that both children and adults are at risk of cancer due to the high concentration of arsenic in Kabudarahang city. In this regard, adults are exposed to contaminated water for a longer period of time due to their older age, so they have a

higher risk. According to the results, all values of DI, HQ and LCR for oral consumption were more than those values through the skin adsorption. In the present study, the results of the Poisson regression model, in accordance with the risk analysis, show a positive and significant relationship between arsenic pollution and the occurrence of most of cancers in the contaminated area.

Keywords: Arsenic, Cancer, Risk Assessment.

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Need assessment and production of educational content related to the health effects of climate change using the Delphi technique

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Abstract

Background: As the health consequences of climate change are likely to become more apparent in the future, climate change education across education systems can be one of the most important and effective tools for developing capacities to address and adapt to such crises. The current research was conducted with the aim of investigating the educational needs related to the health effects of climate change.

Methods: Delphi method was used to measure educational needs. The statistical population included students, graduates, faculty members of environmental health and environmental engineering, and environmental experts. 166 people participated in this study and answered the questions in the questionnaire in 3 rounds of Delphi. Finally, the importance of the selected topics and their impact were briefly stated.

Results: 47 items were extracted in 7 sections of concepts, trends of global climate change, health effects due to climate change, air pollution, reduction of ozone layer, ultraviolet radiation and health, climate change and water safety program and reduction of effects and adaptation to climate change. In the second round, needs with less than 7 points in each part of the questionnaire were excluded. Other subjects in the third round again got a high score, and as a result, no need was removed in this section, which indicates the importance of the subjects related to education.

Conclusion: By recognizing the risks and health effects caused by climate change and determining the educational needs, and by using the resources of expert human resources, it is possible to empower and increase the level of awareness and skills of people in different sectors.

Keywords: Need Assessment, Delphi, Climate Change, Health, Education.

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Association between exposure to PM10, SO2, NO2, O3 and respiratory health outcomes in northwest of Iran

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Abstract

Polluted air affects human life and it is crucial to assess air pollutants to inform policy and protect human lives. In this study, we sought to assess the respiratory outcomes associated with PM10, O3, SO2, and NO2 in the Iranian population. The required data, which included concentrations of air pollutants, meteorology, and population size, were obtained from the department of environment and meteorological organizations. The validity of the data was evaluated, and appropriate calculations were conducted on the data to extract the required values and parameters for modeling (using the AirQ2.2.3). This study was conducted in two megacities of Iran (Tabriz and Urmia) with over 2 million population. The annual averages of SO2, NO2, and PM10 concentrations were 9, 73, and 43 µg/m3 in Tabriz and 76, 29, and 76 µg/m3 in Urmia, respectively. Excess deaths from respiratory diseases associated with PM10 and SO2 were estimated to be 33.1 and 1.2 cases in Tabriz and 31.6 and 24.7 cases in Urmia, respectively. The proportions of hospitalizations for chronic obstructive pulmonary disease (COPD) attributable to SO2 and NO2 in Tabriz were 0.07% and 1.61%, respectively, whereas they were 2.84% and 0.48% in Urmia. O3 had an annual average of 56 µg/m3 in Tabriz and with 44.5 excess respiratory deaths and 42.5 excess hospital admissions for COPD, it had the greatest health impacts among the pollutants studied. Findings from this study add to the growing literature, especially from developing countries, that provides insights to help authorities and decision-makers develop and implement effective interventions to curb air pollution and save lives.

Keywords: Air Pollutants, Airq Model, Health Effects, Tabriz, Urmia, Iran.

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Investigation the concerns of Iranian environmental health experts regarding environmental impactful issues on public health

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Abstract

Background: Iran is ranked 133rd out of 180 countries in the Environmental Performance Index for 2022. In environmental health science, the current and future state of the environment has a significant impact on the burden of disease and health indicators. Therefore, the present study was conducted with the aim of identifying the major concerns of Iran's environmental health experts regarding environmental issues affecting public health in the field of foresight.

Methods: In the present study, the importance of Iran's environmental issues was investigated from the perspective of environmental health experts from the major higher education regions of the health ministry, and their major concerns related to environmental issues were determined using a checklist. The obtained scores for environmental parameters were evaluated and ranked after standardization. The general comparison of the environmental fields "Air and Climate", "Water Resources", "Soil" and "Environmental Pollution" was also done by considering the "average level of agreement, impact on health and level of concern", based on the results of Friedman's test.

Results: Air pollution, environmental pollution caused by wastes, environmental pollution caused by pesticides, the water crisis in the country, indiscriminate extraction of groundwater resources, and finally, a lack of attention to the environmental sustainability were the main issues that experts were extremely worried about them, and are considered the "first-class priority" of the country's environmental issues. In general comparison of the main environmental fields the "environmental pollution" field was assigned the highest priority. The " air and climate" and the "soil" fields were assigned the next ranks and finally "water resources" were placed.

Conclusion: The findings of the present study can be used in the orientations and updating of educational, research and foresight programs of environmental health education in the country based on the conditions of the higher education regions and drawing the relevant road map. On the other hand, the identification of priority environmental factors that should be placed at the top of the

planning and management pyramid can also help in formulating the country's environmental policies.

Keywords: Environment, Pollution, Environmental Health, Foresight.

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Investigating the Possibility of Recycling Polyethylene Terephthalate Plastic Container Waste as Fiber in Concrete

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Abstract

Background: The production of various waste materials such as plastics, the problems caused by it, the recycling of these materials, the lack of space for landfilling and the increasing disposal costs are among the concerns of human societies around the world, and it is necessary to consider suitable solutions for it. The aim of the current research is to investigate the possibility of recycling polyethylene terephthalate plastic containers as fibers in concrete.

Methods: In this experimental study, the effect of adding recycled polyethylene terephthalate (PET) pieces with lengths of 6, 12 and 24 mm on the bending capacity of concrete was evaluated. Concrete samples with different amounts of PET additives were prepared in the laboratory and their bending strength was measured.

Results: The results showed that the maximum increase in flexural strength of the concrete sample was obtained by adding recycled PET of 5 kg/m3 and fiber length of 24 mm compared to the reference plain concrete (18.5% more). The length of the parts affects the amount of increase or decrease in the bending resistance of the tire, and the parts with a length of 24 mm had the greatest effect of increasing the bending resistance (18.5 percent) and the parts with a length of 12 mm had the least effect (an increase of 8.5 percent) compared to the reference plain concrete, which indicates the effect More than 10% increase in flexural strength of concrete is influenced by the length of recycled PET pieces.

Conclusion: According to the results, it can be predicted that by increasing the percentage of recycled PET parts in concrete, its bending strength will decrease further.

Keywords: Solid Wastes, Recycling, Polyethylene Terephthalate, Concrete Reinforcement.

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Determination of water quality index and health risk attributed to the presence of toxic and non-toxic Heavy metals in drinking water resources by Monte Carlo simulation; A case study in southern of Iran

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Abstract

Background: Considering the health effects and the high cost of advanced treatment for heavy metals removal from the water supply, the presence of these metals has become a topic of public concern for humans. Recently, with the lack of water sources worldwide, there has been more attention to the presence of HMs in potable water and followed health risks due to human exposure.

Methods: In this study, the presence of metals such as As, Cr, Cd, Pb, Zn, Cu and Mn in potable water was measured in southern Iran and the quality index as well as the health risk were assessed. Data were analyzed by descriptive and analytical statistics and the curves were drawn in Excel 2019. WQI was used for the water quality and health risk was simulated by Mont Carlo software finally the most effective factor on the carcinogenic and non-carcinogenic risk was determined by sensitive analysis.

Results: Based on the results of this study, the concentration of toxic and non-toxic metals in more than 80% of samples exceeded WHO and EPA standards. Furthermore, the highest distribution range of HMs was related to As, Zn and Cd. According to WQI, Cr possesses the highest weight in the quality of water and follows the As. The risk assessment has shown that the non-carcinogenic risk for all metals was less than the standard level but the associated carcinogenic risk with As and Cr in both children and adults was exceeded from 10-6.

Conclusion: These results confirmed the adverse health effects of HMs in the potable water of this area. furthermore, the reduction of leakage of HMs to water sources and the effective removal of these sources is suggested.

Keywords: Heavy Metals, Carcinogenic Risk, Non-Carcinogenic Risk, Water Quality Index.

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Implementation of the Health Annex for the collection network and wastewater treatment plant of Baneh city

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Abstract

Background: In compiling the health risk assessment (HIS) for a project, it is necessary to use tools and methods that can examine the effects of policies, laws and regulations, social and economic factors on the health of citizens and their effects on the environment. In this study, HIS method for sewage collection network and the treatment plant of Baneh city in 1400 and for the horizon of 1425 has been considered. The systematic domain model was used to measure the health consequences of the development plan and evaluate the effects using the health effects assessment matrix method.

Methods: After determining the paths leading to the creation of health consequences of the plan in the systematic domain table with the areas of environmental impact, environmental health, economy, infrastructure, facilities and population, they were prioritized, then the health consequences were categorized based on the current situation and vulnerable groups were identified. Finally, the evaluation of the health effects was recommended with the two goals of predicting the consequences of the different options and helping the process owners to implement the project better.

Results: Based on the HIS table, communicable diseases, respiratory diseases, injuries and odor production were selected as the main priorities for intervention, and reducing and corrective measures and the source of risk generation were determined. Monitoring and evaluation of the activities related to the reporting process of each steps were the final part of this evaluation.

Conclusion: Odor production, incidence and spread of infectious diseases and respiratory diseases, including possible risks due to the construction of the sewage collection and network, were determined for this project. It is recommended to pay attention to the text of the evaluation expert group in order to reduce health risks during the construction and operation of the project.

Keywords: Health Attachment, Sewage Collection Network, Wastewater Treatment Plant, Baneh City.

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Occurrence of microplastics and phthalate esters in urban runoff: a focus on the Persian Gulf coastline

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Abstract

Urban runoff seems an obvious pathway for the transfer of microplastics (MPs) and phthalate acid esters (PAEs) from land-based sources to the marine environment; an issue that still lacks attention. This study presents the first results on MPs and PAEs levels in the urban runoff into the northern part of the Persian Gulf during the dry season. Average concentrations of MPs and PAEs in the urban runoff of eight selected sampling sites (N=72) along the Bushehr coast were 1.86 items/L and 53.57 µg/L, respectively. MPs with a size range of 500-1000 µm had the highest abundance, and the mean levels of PAEs in MPs were 99.77 µg/g. The results of this study show that urban runoff is a main source of MPs and PAEs contaminants that are discharged into the Persian Gulf. Therefore, to decrease these pollutants from entering the aquatic environment, decision-makers in the area should consider this problem and stop the direct discharging of urban runoff into water bodies.

Keywords: Bushehr, Contamination, Microplastics, Phthalate acid esters, Risk assessment.

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Time Evaluation of the social, economic, environmental and health effects on people living in Zabol city during storms New

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Abstract

Background: Desertification and climate change are the most important environmental challenges in the arid regions of the world, and its effects, including air pollution, affect people all over the world. Although air pollution is a harmful and pathogenic phenomenon for all people of all ages, a wide range of people, including the elderly, pregnant women, children and the sick, are more vulnerable. Iran and many provinces, especially Sistan and Baluchistan province, are surrounded by dust storms. This article seeks to investigate what effects this environmental event has had on the citizens of Zabul city, so that by identifying them, the negative effects of fine dust can be reduced.

Methods: The method used in this descriptive and analytical research is that the information was prepared through a questionnaire and the results were analyzed using SPSS software.

Results: The results of the research show that the effects of fine dust have been destructive in both economic and health dimensions, but it seems that the negative effects have been low from a social point of view.

Conclusion: the results of the factor analysis show that fine dust has an effect on mental health (individual and social), health, economic costs, medical costs, increase in traffic accidents and decrease in people's concentration in daily work.

Keywords: Dust, Quality of Life, Environmental Incident, Zabol City.

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Analyzing the Impact of Meteorological Factors on Predicting PM10 Concentrations

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Abstract

Over the last two decades, escalating dust and air pollution in the Middle East have spawned a multitude of issues, encompassing threats to human well-being and environmental hazards. The measurement of surface Particulate Matter (PM10) has remained a steadfast cornerstone in evaluating air quality. As a result, the development of precise predictive models for estimating particulate matter concentrations is imperative to proficiently manage and curtail air pollution. In this research, the estimation of surface PM10 concentrations was carried out using multivariable linear regression and Artificial Neural Network methodologies. A diverse set of influential meteorological variables such as evaporation, average temperature, sunshine hours, maximum wind speed, average dew point temperature, minimum horizontal visibility, precipitation, relative humidity, and, air pressure, were utilized for the purpose of forecasting PM10 concentration. The most robust correlation was identified between the observed and estimated PM10 concentrations within the ANN. The predictive accuracy for PM10 concentrations using MLR and ANN achieved rates of 0.54% and 0.86%, respectively, distinguishing ANN as the most precise forecasts within the scope of this research.

Keywords: Particulate Matter, Meteorological Parameters, Multivariable Linear Regression, Artificial Neural Network.

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Evaluation of the performance of a synthesized metal-organic framework based magnetic nanocomposite (mag-MOF(Cu)) derived from copper recovered from electrically printed board waste for the extraction of Diazinon from aquatic solutions

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Abstract

Background: Printed circuit boards make up the main source of e-waste, which contain substantial quantities of precious metals including Copper. Therefore, they can be considered as a great potential for the recovery of metals. On the other hand, extensive and/or inappropriate use of pesticides have resulted in the contamination of the environment inflicting damages on the ecosystem and human health. Having considered that, this study is aimed at the preparation of a metal organic framework-based magnetic nanocomposite (mag-MOF(Cu)) whose Cu had been recovered from electrically printed board waste and its efficiency in extraction of diazinon from aquatic solutions.

Methods: The recovery of Cu from electrically printed board waste was achieved using an electrochemical method under the potentiostatic mode (0.25 to 0.35 V). Then, the mag-MOF(Cu) nanocomposite was synthesized with the Cu recycled from printed circuit boards. Thereafter, a magnetic solid phase extraction process (MSPE) was employed for the extraction of Diazinon using the above-mentioned nanocomposite. The effect of influential variables, including nanosorbent amount, solution pH, extraction time, type of desorption solvent, and salt concentration were evaluated and subsequently optimized.

Results: The results of the metal recovery from electrically printed board waste indicated that Cu is the most abundant metal in the leaching solution. According to the results, at 0.25 V, the electrochemically Cu deposits were in state of relatively high purity. The results showed that the optimal conditions for the magnetic solid phase extraction method using mag-MOF(Cu) nanosorbent is equal to solution pH, 7; nanosorbent amount, 15 mg; extraction time, 15 min; elution solvent, methanol. Under the optimal conditions obtained, the acceptable linearity was observed within the concentration ranges of 5.0–500.0 μg/L (R2=0.9956) for Diazinon, respectively. The respective limits of detection (LOD) and quantification (LOQ) were measured to be 1.9 and 5 μg/L. Besides, the mag-MOF(Cu) was applied for the extraction and determination of Diazinon in tap water, surface

water, well water, and treated waste water samples with the recoveries ranging from 84.0 to 105.5% (RSDs = 3.8–9.6%).

Conclusion: The obtained results showed that the synthesized mag-MOF (Cu) nanocomposite whose Cu had been recovered from electrically printed board waste, could be applied as an efficient sorbent with a great potential for the preconcentration and extraction of the pesticides from aqueous media.

Keywords: Printed Circuit Board Waste, Copper Recovery, Metal-Organic Framework, Extraction, Diazinon.

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Degradation of microplastic/plastic by biological methods emphasizing the use of insects: opportunities and challenges (review study)

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Abstract

Background: The increase in the production rate of plastic due to its many advantages and as a result of the increase in demand, along with the mismanagement of disposal, has led to the emergence of pollutants called microplastics. The widespread presence of this emerging pollutant in all aspects of life, threatening natural ecosystems and human life due to its ability to bioaccumulate and transferring through the food chain, has particularly attracted the world's attention, so that microplastics pollution is the second important issue in the field of environment and ecology. The failure in plastic recycling, along with disability to overcome its excessive production and the release of about 80% of plastic waste into nature, has resulted in the aggravation of environmental pollution with microplastics. Consequently, the removal of microplastics has become an important and necessary topic.

Methods: The present research has been carried out with the aim of investigating the degradation of microplastics by insects, through Google Scholar, ScienceDirect, Wiley, Scopus, PubMed and Web of Science databases and reviewing the available findings by using 25 of the most pertinent articles in this regard to present the latest achievements.

Results: According to the researches, the degradation of microplastics by different species of insects through the synergy of the digestive system and gut microbiota, as well as the unique characteristics of some species of insects producing the least amount of pollution and the highest rate of polymerization, has been confirmed. This is affected by factors such as the type of polymer, the size of microplastic particles, the age and the diet of the larvae, and by optimizing these factors, an increase in the efficiency of the process has been observed.

Conclusion: Despite the limitations of this method, the desired results obtained in removing microplastics have made it a preferable method over other methods. Therefore, it is expected to reduce the limitations and complete this method to eliminate the pollution of microplastics by conducting future researches and more detailed investigations.

Keywords: Plastic Pollution, Microplastic, Biodegradation, Insects, Invertebrates.

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Phytoremediation of pollutants in oil-contaminated soils by Alhagi camelorum: evaluation and modeling

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Abstract

Phytoremediation is a cost-effective and environmentally friendly method that serves as a suitable alternative to chemical and physical approaches for removing pollutants from soil. This research investigated the potential of Alhagi camelorum, a plant species, for the phytoremediation of total petroleum hydrocarbons (TPHs) and heavy metals (HMs), specifically lead (Pb), chromium (Cr), nickel (Ni), and cadmium (Cd), in oil-contaminated soil. A six-month field-scale study was conducted, where A. camelorum seeds were grown in a nursery and later trans lanted onto prepared soil plots. Control plots (without plants) were also included. Soil samples were analyzed throughout the study period using inductively coupled plasma-optical emission spectroscopy (ICP–OES) for HMs and gas chromatography–mass spectrometry (GC–MS) for TPHs. The results showed that after six months, the average removal percentage was 53.6 ± 2.8% for TPHs and varying percentages for the HMs (Pb: 50 ± 2.1%, Cr: 47.6 ± 2.5%, Ni: 48.1 ± 1.6%, Cd: 45.4 ± 3.5%). The increasing trend in the population of heterotrophic bacteria and the level of microbial respiration compared to the control plots indicated that the presence of the plant has an effective role in promoting soil microbial growth ($P < 0.05$). Furthermore, kinetic rate models were investigated to evaluate the pollutant cleaning rate. The coefficient of determination was reasonably consistent with the first-order kinetic rate model for all the aforementioned pollutants ($R2 > 0.8$). Based on these results, it can be concluded that phytoremediation using A. camelorum can effectively reduce TPHs and HMs in oil-contaminated soils.

Keywords: Alhagi Camelorum, Heavy Metals, Kinetic Rate, Phytoremediation, Total Petroleum Hydrocarbons.

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Health risk assessment due to the presence of heavy metals in drinking water resources of Maragheh city

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Abstract

Background: Heavy metals in water can pose risks to human health. Therefore, it is necessary to monitor and measure metals to ensure the health of consumers.

Methods: This study aimed to measure heavy metals such as arsenic, lead, cadmium, chromium, zinc and mercury in water resources and urban water distribution network in spring and summer of 2021 in Maragheh city. Accordingly, 25 samples were taken to investigate the presence of heavy metals. The presence of these metals in water sources was investigated using qualitative maps and finally, by evaluating the health risk caused by the presence of these metals, their effect on the health of consumers has been studied.

Results: Examining the concentration of metals in water resources upstream of the dam shows a relatively high concentration of metals, especially arsenic (13.2 µg/L). Despite this, the amount of arsenic after water treatment plant and in the distribution network is reduced to an insignificant level. On the other hand, the results show that the amount of zinc metal in the network is higher than in the reservoir of the dam, and its concentration in the dam is equal to zero and in the network it reaches the highest value of 578 µg/L. Finally, the health risk assessment shows that the calculated THI values for all samples vary between 0.01 and 0.99.

Conclusion: Based on the calculated health risk, there is no threat to the health of consumers regarding heavy metals in Maragheh drinking water. Also, these results double the necessity of additional studies regarding the leakage of zinc metal from the pipes and accessories of the city's drinking water distribution network in the future.

Keywords: Arsenic, Heavy Metals, Health Risk, Maragheh, Geographic Information System.

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Occurrence and ecological risks of microplastics and phthalate esters in organic solid wastes: In a landfill located nearby the Persian Gulf

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Abstract

Landfill sites are the main source of plastic waste. Thus, municipal solid waste (MSW) in landfills may act as a reservior of microplastics (MPs) and related pollutants such as phthalate esters (PAEs) into surrounding environment. However, there is limited information on MPs and PAEs in landfill sites. Levels of MPs and PAEs in organic solid waste disposed in a landfill of Bushehr port were investigated for the first time in this study. The mean MPs and PAEs levels in organic MSW samples were 12.3 items/g and 7.99 µg/g, respectively, and the mean PAEs concentration in MPs was 87.5 µg/g. The highest number of MPs was related to the size classes of >1000 µm and <25 µm. The highest dominant type, color, and shape of MPs in organic MSW were nylon, white/transparent, and fragments, respectively. Di(2-ethylhexyl) phthalate (DEHP) and diisobutyl phthalate (DiBP) were the dominant compounds of PAEs in organic MSW. Based on the finding of present study, MPs showed a high hazard index (HI). DEHP, dioctyl phthalate (DOP), and DiBP demonstrated high-level hazards for sensitive organisms in water. This work illustrated considerable MPs and PAEs levels from an uncontrolled landfill without adequate protection, possibly contributing to their release into the environment. The sites of landfill located near marine environments, such as Bushehr port landfill adjacent to the Persian Gulf, may indicate critical threats to marine organisms and the food chain. Continuous landfills control and monitoring, especially the ones near the coastal area, is highly recommended to prevent further environmental pollution.

Keywords: Coastal Landfill, Ecological Risk, Municipal Solid Waste, Plastic Waste, Pollution Load Index.

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Occurrence, seasonal distribution, and ecological risk assessment of microplastics and phthalate esters in leachates of a landfill site located near the marine environment: Bushehr port, Iran as a case

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Abstract

Plastic wastes are produced in a large amount everywhere, and are commonly disposed in landfills. So landfill leachate seems an obvious source of microplastics (MPs) and phthalate esters (PAEs) due to a huge usage as plastic additives and plasticizers. But this issue still lacks attention and the present study provides the first information on the levels of MPs and PAEs in the fresh landfill leachate of Bushehr port during different seasons. The mean levels of MPs and PAEs in the fresh leachate in all seasons were 79.16 items/L and 3.27 mg/L, respectively. Also, the mean levels of PAEs in MPs were 48.33 µg/g. MPs with a size of >1000 µm had the highest abundance in all seasons. The most prominent shape, color, and type of MPs in the leachate were fibers black, and nylon, respectively. Dibutyl phthalate (DBP) and Di(2-ethylhexyl) phthalate (DEHP) were the most dominant PAEs present in the leachate samples. The results of this study revealed high hazard index (HI) and pollution load index (PLI) of MPs in all seasons. Dioctyl phthalate (DOP), DEHP, DBP, diisobutyl *phthalate* (DiBP), butyl benzyl phthalate (BBP), and diethyl phthalate (DEP) represented a high risk to the sensitive organisms. The results of this study showed that significant levels of MPs and PAEs may release into the surrounding environment from the landfill sites without sufficient protection. This issue is more critical when the landfill sites in particular are located near the marine environments like the Bushehr landfill that is located near the Persian Gulf, which can lead to serious environmental problems. Thus permanent control and monitor of landfills, especially in the coastal areas are highly needed to prevent further pollution.

Keywords: Fresh Leachate, Pollution Load Index, Solid Waste, The Persian Gulf, Seasonal Variation.

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Determining the requirements of waste management in Tehran under earthquake conditions

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Abstract

Background: One of the visible consequences of earthquakes is the creation of a large amount of waste, which is more than the power of municipalities and requires the collaboration of other municipalities and institutions. Tehran is one of the metropolis which has always faced the risk of earthquakes. The purpose of this study was to determine the requirements of waste management in Tehran under earthquake conditions.

Methods: This is a descriptive-analytical study that was conducted for one year in Tehran. In this study, the current state of waste management infrastructure and the characteristics of streets and buildings in Tehran were collected in 22 different areas. Then, based on the collected information, earthquake scenarios were designed in the Radius program and the amount waste that is likely to be produced was estimated. Based on the results of the Radius program and taking into account the conditions of the city of Tehran, a comprehensive plan was prepared for the collection, transportation and final disposal of these wastes in earthquake conditions, and in it, the quantitative and qualitative characteristics of the waste storage locations, the equipment requirements and the necessary manpower for waste management, a map of emergency traffic routes, as well as a plan for cleaning and collecting waste was prepared.

Results: The results of the present study showed that if the Ray fault is activated and an earthquake occurs due to it (with a magnitude of 7), more than 55 million tons of demolition wastes will be produced, the largest amount of which is related to region 1 (by 2579064 tons) and the lowest amount will be related to the region 19 (533,501 tons). Also, the collection of waste caused by the earthquake in Tehran requires 1050 excavators, 3078 ten-ton trucks and 24 temporary waste storage centers in 22 districts of Tehran with a total area of 498 hectares.

Conclusion: Based on the results, the collection of waste caused by the earthquake in Tehran requires a series of equipment and facilities, which Tehran Municipality currently lacks. Therefore,

it is suggested to prepare them in the shortest possible time through national resources and programs, as well as to equip certain provinces of Tehran province with the machines needed to manage the waste caused by the Tehran earthquake.

Keywords: Earthquake, Demolition Wastes, Requirements, Tehran.

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Health Risk Assessment of Toxic Heavy Metals (pb, Cd, Hg, Al) and Ethyl Alcohol through Beverage Canned Products in Iranian Markets 2021

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Abstract

Background: The entry of heavy metals into the food chain and reaching critical concentrations leaves harmful metabolic effects in living organisms. Non-alcoholic beverages are one of the highest consumption groups in the beverage portfolio of the people of the world, especially in the Middle East and Islamic countries. In order to maintain the health of the community members due to the increasing consumption of these beverages, the levels of toxic metals should be monitored regularly.

Methods: 42 random samples from 36 different brands were selected. The samples were categorized into 5 categories: malt, energizing, carbonated, other including Coffee, Rani, Dough and non-carbonated. In order to measure the heavy elements, the samples were digested by a wet digestion method using nitric acid and hydrogen peroxide. Potassium dichromate, sulfuric acid and silver nitrate were used to measure alcohol. The absorbance of the samples was read at a wavelength of 560 nm using a spectrophotometer.

Results: There were 5 samples of bottled drinks with malt extract, 15 energizing, 11 carbonated drinks and 5 others including coffee, rani, Dough and non-carbonated drinks. Average values obtained of all samples were higher than the standard values in all metals, including Aluminum 0.850+2.69, Cadmium 0.021+0.04, lead 0.122+0.19 and mercury 0.015+0.03.

Conclusions: Therefore, a regular study of the heavy metals pollutants in beverage bottles, especially non-alcoholic beverages, is highly needed, and efforts to reduce the source of these pollutants are essential.

Keywords: Atomic Absorption Spectrometry.

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Assessment of Metronidazole antibiotic ecological risk by release to environment from the hospitals Isfahan City effluent

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Abstract

Background: Pharmaceuticals as emerging trace environmental contaminants are now a cause of great concerns and hospital effluents are important sources for the release of them into the environment. Metronidazole (MTZ) is one of the most popular antimicrobials, antibacterial and antiprotozoal, widely used in veterinary and human medicine. This study aims to determine the concentrations of MTZ in effluent of hospitals and to evaluate ecotoxicological risk for aquatic organisms.

Methods: Grab samples were taken from effluents of 15 large hospitals in Isfahan city and MTZ concentrations were analyzed using HPLC-UV. Average daily MTZ prescription for patients and wastewater production in each hospital were also determined.

Results: MTZ was detected in effluents of all 15 hospitals in the range of 0.3 to9.5 µg/L (mean=4.8±6.4 µg/L). Significant correlation was seen between MTZ concentration in hospital effluent and MTZ prescription as well as number of hospital's beds. Ecological risk quotient (RQ) values of 14 hospitals were above 10 for green algae (high ecological risk) as well as 13 hospital effluent for fish indicating that MTZ in hospital effluents pose high risk to sensitive aquatic organisms.

Conclusion: Then it is more than necessary to develop efficient treatment methods for the remove of MTZ before discharging into the environment.

Keywords: Metronidazole, Hospital, Effluent, Risk Assessment, Ecotoxicology.

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Photocatalytic Degradation of Atrazine Herbicide from Aqueous Solution by GO/TiO2 Composite: Catalytic Efficiency, Mineralization and Toxicity Bioassays

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Abstract

The widespread use of herbicides in agriculture, particularly Atrazine, raises concerns about environmental pollution and potential health hazards. This study focuses on the photocatalytic degradation of Atrazine using a graphene oxide/titanium dioxide (GO/TiO2) composite. The synthesized GO/TiO2 composite is explored for its enhanced catalytic efficiency compared to conventional TiO2 due to improved electron conductivity and enhanced Atrazine degradation. Photo-degradation efficiency was estimated by observing changes in Atrazine concentration (10-50 mg/L), initial pH (3-11), photocatalyst concentration (0.1-1 g/L), irradiation time (10-120 min), and intensities of UV light (8-36 W). The present study also delves into mineralization and degradation mechanisms, providing insights into the efficiency of the photocatalytic process. Finally, toxicity tests and reusability were also investigated. According to the obtained results, optimal conditions were achieved with an Atrazine concentration of 10 mg/L, an irradiation time of 80 min, photocatalyst concentration of 0.8 g/L, pH of 6, and UV light intensity of 36 W, resulting in an Atrazine removal efficiency of 86.54 percent. The Atrazine mineralization tests indicated a slow increase in the BOD5/COD ratio after the photocatalytic process, from 0.59 to 0.74, suggesting that Atrazine degradation leads to degradable products. Evaluation of the stability and recyclability of the GO/TiO2 composite also indicated its potential for practical application. Additionally, the research assessed the toxicity of the treated solution using Daphnia magna bioassays, demonstrating a substantial reduction in toxicity (80 percent) after the photocatalytic degradation of Atrazine. The study concludes by highlighting the significance of the GO/TiO2 composite in addressing the environmental impact of herbicides, suggesting its potential as an efficient method for water remediation and emphasizing its role in reducing the toxicity of wastewater effluents.

Keywords: GO/TiO_2, Photocatalyst Degradation, Composite, Herbicides.

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Disinfection of hospital real effluent using TiO2\ solar radiation

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Abstract

Background: Disinfection is one of the most important stages of water and wastewater treatment. Today, photocatalytic processes have been developed and considered as a new technology to achieve microbiological discharge standards of effluents. It is a Solar /TiO2 photocatalytic process

Methods: secondary sedimentation effluent samples were taken from effluent of hospital treatment plant in Zahedan. TiO2 nanoparticles and real samples were poured into the plates and then were exposed to the direct sunlight in summer season

Results: The results indicated that the photocatalytic process efficiency increased with increasing retention time and concentration of titanium dioxide nanoparticles. The results also showed that Vis/TiO2 > TiO2 > Visible deactivation of coliform and fecal coliform. The number of coliforms and fecal coliforms during the Visible + TiO2 process decreased at a concentration of 180 mg / l and 150 min at contact time, respectively from 500×103 MPN/100ml to 7×103 MPN/100ml and at 40×102 MPN/100ml to 2×102 MPN/100ml

Conclusion: Wastewater is a complex mixture and there may be a significant difference in its disinfection with water. Although photocatalysis of titanium dioxide under sunlight has an effective mechanism for inactivating coliform and fecal coliform, it may not be practical due to the high exposure time to chlorination, ozonation or other photocatalysts including UV light (more than 150 minutes). It has been generally shown that TiO2 / solar can be effective in deactivating a wide range of microorganisms in laboratory scale and under real conditions.

Keywords: Coliform, Fecal Coliform, Titanium Dioxide Nanoparticles and Photocatalytic Process.

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Investigating the efficiency of advanced electrochemical oxidation process using persulfate in removing humic acid from water environments

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Abstract

Background: Humic acid, which accounts for most of the organic matter in water resources, has a great impact on water quality and the health of consumers. Among them are carcinogenic compounds such as trihalomethanes (THMs) and haloacetic acids (HAAs). Before removing humic acid from water sources using the methods that each has its drawbacks.

Methods: This was an experimental study in laboratory electricity, which was conducted using a discontinuous electrochemical reactor with 4 electrodes (two iron electrodes and two aluminum electrodes) connected to a direct source. Including pH, contact time, current density, amount of supporting electrolyte and amount of persulfate obtained after the investigation and finally the results of the analysis and not reaching it are placed.

Results: The results show that at a pH of 7.5, a contact time of 30 minutes, with a persulfate of 0.2 mm g/L, a current intensity of 0.5 amps, and the amount of electrolyte in the bulb equal to 1.5 g/L, the acid efficiency Humic removal (96%) was achieved. As the results show that with the operation of the coagulation and oxidation protocol with advanced persulfate 15 mg/liter of humic acid separately, the efficiency of 82% and 47% is obtained in a visual form, which is obtained by using these two methods simultaneously. Takes. The elimination process increased to 96%.

Conclusion: The use of persulfate anion as a factor that leads to the production of persulfate radicals, along with the free electrocoagulation process, is more effective in removing humic acid from water environments than the separate use of this factor and the above process. In this way, different methods of using advanced electronic diagnostic methods can be used.

Keywords: Electropersulfate, Humic Acid, Advanced Acidification.

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Investigating the effectiveness of $MnFe_2O_4$ magnetic nanocomposite coated with metal-organic framework in the adsorption process of tetracycline from aqueous sources

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Abstract

Background: Tetracyclines with effective antimicrobial activities are widely used to treat human and animal infectious diseases. About 70 to 90% of its initial consumption is released in the environment through urine and feces. This means they are often the antibiotics detected in the environment with high environmental risks. Therefore, the green synthesis of porous nano adsorbents can be useful for adsorbing these potentially toxic compounds from water sources. This study was carried out to determine the efficiency of magnetic green nanocomposite MnFe2O4/ZIF-8 in the adsorption process of tetracycline from aqueous solution.

Methods: In the current investigation, MnFe2O4/ZIF-8 nanocomposite was generated as a magnetic nano adsorber using the extract of Dracocephalum plant and characterized by XRD, FTIR, VSM, BET, FESEM, and TEM analyses. Also, to determine its efficiency in the adsorption process of tetracycline, the effect of pH (3-9), nanocomposite dose (0.025-2 g/L), initial pollutant concentration (5-100 mg/L) and contact time (5-200 minutes) were studied. In addition, to determine the adsorption mechanism, the kinetic and isotherm parameters of the adsorption process were investigated.

Results: The results of the morphological properties of the magnetic nanocomposite confirmed the spherical shape of this nano adsorber with an average size of 54 nm. BET analysis showed that modification of MnFe2O4 material with ZIF-8 as a new nano adsorber leads to excellent modification of SBET (143.8 m2/g) and VTotal (0.44 cm3/g). The highest adsorption percentage of tetracycline in optimal conditions (pH=7, contact time=120 minutes, nanocomposite dose=1.5 g/L for a tetracycline concentration of 20 mg/L) was 90.11%. In addition, the data obtained from the isotherms of Langmuir (R2=0.958), Freundlich (R2=0.534), and Temkin (R2=0.747) showed that the tetracycline adsorption is monolayer and on the homogeneous surface of the synthesized magnetic nano adsorber. The elimination process of tetracycline by nano adsorber followed the pseudo-second-order model (R2=0.998).

Conclusion: According to the results, the magnetic nanocomposite synthesized in this work can be a suitable and economical adsorber for the removal of tetracycline from aqueous environments.

Keywords: Magnetic Green Nanoadsorber, Surface Adsorption Process, Tetracycline, Isotherm, Kinetics.

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Electrochemical generation of hydrogen peroxide in Bio-electro-Fenton system

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Abstract

Hydrogen peroxide is an important industrial chemical and the current production methods of this substance require a lot of energy. The bio-electro-Fenton system is a new process for the electrochemical production of hydrogen peroxide based on the biochemical oxidation of wastewater organic matter in the anode compartment along with the cathodic reduction of oxygen to hydrogen peroxide. This study was conducted with the aim of producing hydrogen peroxide in the cathode compartment of the bio-electro-Fenton system. In this experimental study, a two-chamber bio-electro-Fenton system was set up in discontinuous conditions, equipped with anodic and cathodic carbon felt electrodes, Nafion 117 membrane, and anaerobic sludge as inoculum and glucose as substrate in short circuit conditions for 24 h. During the operation of the bio-electro-Fenton reactor, the concentration of hydrogen peroxide in the cathode compartment of the bio-electro-Fenton system was determined, and the effect of the initial concentration of the substrate on the degradation efficiency of tetracycline antibiotic was investigated. The electrochemical production of hydrogen peroxide was achieved using bio-electro-Fenton technology, so that the cumulative concentration of hydrogen peroxide was 3.27 mg/L at 8 h and 0.81 mg/L at the end of process. According to the results of this study, the efficiency of tetracycline decomposition increased by increasing the substrate concentration from 1000 to 2000 mg/L due to the production of hydroxyl radicals as a result of the decomposition of a suitable concentration of hydrogen peroxide in the presence of ferrous ions, and the value of 2000 mg/L was selected as the optimal concentration of the anodic substrate. The degradation efficiency of tetracycline also decreased to 97.02% with a further increase in substrate concentration of 10,000 mg/L. The results of this study showed that the bio-electro-Fenton system can be a suitable technology for the successful production of hydrogen peroxide without the need for an external energy source and also the decomposition of organic pollutants with the production of bioenergy from renewable raw materials.

Keywords: Hydrogen Peroxide, Bio-Electro-Fenton, Oxygen.

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Investigating marine environmental crimes in Kish Island and the combating strategies

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Abstract

Background: This is the introduction of environmental pollution as one of the environmental crimes, which has been the subject of global and regional attention. Among the most important environmental hazards is sea pollution. The introduction of pollution into marine environments and the contamination of animals that eventually reach human consumption on the one hand and the increase in tourism and marine recreation, on the other hand, have caused environmental crimes to be recognized as one of the serious problems in Kish Island, which not only it damages the beauty and biodiversity of the region, but also has negative effects on the marine industry has it. This article examines marine environmental crimes in Kish Island and ways to combat will pay it.

Methods: The method of this review research was prepared by searching in Scopus ،SID databases with the keywords green crimes, Kish Island, sea pollution, and pollution of the marine environment. Articles published between 2019-2023. The number of articles obtained by this method was about 30 articles, after studying and reviewing about 21 articles were selected and reviewed.

Results: According to the findings, there are three categories of water crimes: crimes against mobility and changeability (piracy and cybercrimes), transportation crimes (human and goods smuggling), and environmental crimes. Environmental crimes have a higher percentage in Kish Island. Environmental crimes on Kish Island include littering, heavy activities, construction, illegal fishing, polluting heavy and oil spills and coastal and marine tourism.

Conclusion: Currently, marine environmental pollution is one of the most important environmental crimes at the global and national level. One of the ways to prevent it is to have accurate information and planning of ships, in addition to that, it is often difficult to detect water crimes and punishments for perpetrators are less than the irreparable environmental effects, and even in general, most criminal acts go unpunished. It seems that severe punishment, such as sentencing people to prison, is probably a more deterrent role than punishment that often focuses on determining financial obligations and imposing monetary fines.

Keywords: Environmental Crimes, Biological Pollution, Kish Island, Environment.

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Sonophotocatalytic Mineralization of Ampicillin in Aqueous Solution: Characteristics, Mineralization and Pathways

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Abstract

Preparing Fe_2O_3/TiO_2/GO catalyst by the sol-gel method, its characterization by XRD, FT-IR, BET, SEM/EDX, and TEM, and employment in photodegradation of Ampicillin (AMP) were the objectives of the present study. The changes in photo-degradation were estimated by applying the changes in AMP concentration (10-100 mg/L), initial pH (3-11), photocatalyst concentration (0.1-0.5 g/L), irradiation time (5-60 min), and intensities of UV light (8-36 W); moreover, the optimum values of evaluated parameters were defined. Conducting the experiments using detected optimal conditions including a pollutant concentration of 25 mg/L, an irradiation time of 45 min, photocatalyst concentration of 0.5 g/L, pH of 5, and intensities of UV light 36 W has resulted in the AMP removal efficiency of 100percent. A direct relationship could be detected between AMP mineralization (TOC test) and irradiation time. The reduction to 0.2 was detected for the C/C0 ratio after 120 min and the decrease in this ratio to 0.5 for COD was observed after 60 min; however, slow enhancement from 0.36 to 0.68 was seen in BOD5/COD. Based on this, producing intermediates in the Fe_2O_3/TiO_2/GO photocatalytic process used for AMP degradation is confirmed. Obtaining high efficiency by the studied system represents the more degradability of intermediate and approximately complete mineralization (above 84percent) after 120 min. Moreover, the presence of an inverse relationship between the AMP degradation efficiency and increasing the number of cycles was recognized; based on this, the removal percentage obtained in the first stage was 100 while it was 93.72percent in the 8th stage; this approves a decrease of 6.28percent.

Keywords: Fe_2O_3/TiO_2/GO, Sonophotocatalyst, UV Light, Ampicillin.

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Investigating the occurrence of microplastics in the ambient air of residential houses in Kermanshah city in 2023

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Abstract

Background: Microplastics are persistent environmental pollutants. Their presence in water resources, air and food chains is a growing concern all over the world. Since air is a strong environmental substrate, the release and effects of airborne microplastics can remain localized or far beyond the point of release. In this study, the indoor and outdoor air pollution of residential houses in Kermanshah city was investigated

Methods: In order to collect samples, different parts of the house including the room, reception, kitchen, corridor, yard and roof were selected as sampling points. A total number of locations were selected as sampling points. After washing with distilled water, the samples were transferred to the laboratory through a fiberglass filter (diameter 47 mm, 1.1 µm) and filtered using a vacuum pump. After preparing and extracting the above samples, the visual method was used for quantitative and qualitative detection of microplastics.

Results: The results of the study confirmed the presence of microplastics in all samples. The abundance of microplastics with a minimum value of 158 and a maximum value of 4480 pieces per square meter was significantly higher in indoor samples than in outdoor samples. Most of the abundance of microplastics is related to black fibers and is attributed to the origin of textiles. Also, more than 78درصد of the samples were determined to be less than 500 micrometers in size.

Conclusion: Possible exposure to air contaminated with microplastics is unavoidable and it is necessary to investigate all possible aspects of the presence of microplastics in the indoor environment and to assess the extent of this problem.

Keywords: Microplastics, Air, Pollutants, Indoor Air.

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Investigation of heavy metals in potatoes and onions in Iran and their effects on human health

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Abstract

Background: Considering the importance of onion and potato consumption in the household diet, it is important to control the concentration of heavy elements in food to ensure a person's health. This study was conducted with the aim of investigating the risk of heavy metals through onion consumption on human health.

Methods: This study was conducted as a review using the keywords of potato, onion, heavy metals and Iran through searching in websites related to journals and reputable databases such as Web of Science, Ovid PubMed, Systematic Review, SID Google Scholar. is done. A total of 70 review sources and finally 33 sources focusing on studies in Iran were selected.

Results: The findings of the study showed that the concentration of heavy metals was higher in areas where untreated, industrial wastewater or phosphate fertilizers were used in agricultural lands. Also, the concentration of heavy metals in leafy vegetables was reported to be higher than in tuberous products such as onions. And the concentration of metals in the northern regions of the country was slightly higher than other regions. The concentration of heavy metals in onions and potatoes in most regions was lower than the standard limit and within the desired range.

Conclusion: The high concentration of these heavy metals in some areas may be due to the use of untreated sanitary and industrial effluents by farmers to irrigate the fields. Therefore, treatment of these wastewaters and bioremediation of excess metals from land should be considered.

Keywords: Heavy Metals, Iran, Onion, Potatoes.

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Investigating the efficiency of Fe-Mn nanoparticles doped with ZIF-8 NH2-(Fe-Mn@NH2-ZIF-8) as an adsorbent for removing Direct Blue 86 dye from aqueous solutions

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Abstract

Background: Direct Blue 86 is known as one of the most famous and widely used dyes, which is often used as a colorant in the leather, textile and paper industries. This dye is toxic and dangerous for humans and animals at a concentration of about 1 ppb and has carcinogenic and mutagenic properties as well as harmful effects on the skin. Therefore, the aim of this study is to remove Direct Blue 86 dye using NH2-ZIF-8 doped with Fe and Mn (Fe-Mn@NH2-ZIF-8).

Methods: This study was conducted experimentally and on a laboratory scale. In this study, the efficiency of NH2-ZIF-8 doped with Fe and Mn in removing Direct Blue 86 dye has been investigated. This study was carried out in three general stages, the first stage of adsorbent preparation, the second stage of test design with the help of R software and conducting absorption tests, and the third stage of data analysis. Absorption tests were carried out considering the desired range of effective factors in absorption, including contact time, pH, dye concentration, and adsorbent dose in experimental conditions and at ambient temperature. Finally, the obtained results were statistically analyzed using R software.

Results: In this study, the response surface method (RSM) was chosen to study the effect of combining independent input variables and a dependent output response variable (removal efficiency). The maximum removal efficiency of crystal violet dye was 95.1%, which was obtained under optimal operating conditions including: absorbent cycle rate of 0.125 g/liter, pH equal to 9, contact time 92.5 min, and dye concentration of 14 mg/liter. Results such as p-value (2.2×10-16), high F-value (560.633), multiple R2 (0.9929), R-squad. Adjusted R2 (0.9882) and the non-significance of the Lack of fit model (0.147) showed that the reduced second-order model is very significant for the removal of Direct Blue 86 by the absorbent. Also, the results show that the pseudo-second-order kinetic model is the most suitable model for dye adsorption on Fe-Mn@NH2-ZIF-8 adsorbent and the adsorption behavior of Direct Blue dye on NH2-ZIF-8 doped with Fe and Mn is from the model Freundlich follows with R2=0.9955.

Conclusion: In total, the results of the experiments showed that NH2-ZIF-8 adsorbent doped with Fe and Mn can be used as an effective and useful method to remove Direct Blue 86 dye from aqueous solutions.

Keywords: Absorbent, Iron-Manganese Nanoparticles, Direct Blue 86, NH2-ZIF-8.

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Effect of Pesticides on Enzymatic Activity microorganisms in Soil

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Abstract

Comprehensive investigations into the impact of pesticide spraying, as well as the influence of pesticide metabolites, on soil microorganisms' biological activity are notably lacking in existing literature. This review study emphasizes the significance of continuous, long-term monitoring of pesticides' effects on soil health. Maintaining soil quality hinges significantly on the well-being of microorganisms, which help transform chemicals, generate plant-accessible nutrients, and promote plant growth. The pivotal role of enzymes in soil biochemical processes underscores their importance as indicators of microorganism performance. Modern agriculture relies heavily on pesticides to manage pests and enhance crop yields. While these pesticides offer benefits, they can upset the balance of the soil bacterial population and hinder enzyme production. Pesticides' most detrimental aspect lies in their residue formation, which can yield persistent, hard-to-degrade compounds and xenobiotics. Microorganisms exhibit rapid responses to pesticides, contingent upon dosage and exposure frequency. These responses gauge the organisms' ability to break down pesticides and their tolerance to chemically active substances. The bacterial enzymatic response in soil to pesticides varies depending on soil physicochemical properties and agricultural practices. Beyond synthesizing and decomposing organic compounds, enzymes produced by soil and plant microorganisms play a crucial role in breaking down diverse pollutants, including heavy metals and pesticides. Monitoring changes in organisms exposed to pesticides can involve assessing the microbial biomass ratio, encompassing carbon, nitrogen, phosphorus, and sulfur. Dehydrogenase enzymes are particularly valuable in monitoring soil microbial biomass in the presence of pesticides, as they biologically oxidize organic substances in soil, facilitating the transfer of protons and electrons from substrates to final electron acceptors.

Keywords: Soil, Microorganisms, Pesticides, Bacterial Enzymatic Response.

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Creating a pictorial report of consumables in the form of periodic table of elements with the approach of controlling environmental pollutants (Case study of Saipa Automative manufufacture)

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Abstract

The introduction of pollutants of industrial origin, such as heavy metals, into the environment, especially aquatic ecosystems, has caused bioaccumulation. Visual report of consumables in the form of periodic table of elements can be effective in controlling their environmental pollutants. The purpose of this research was to identify the raw materials of automobile production in the form of Mendeleev's table, which was prepared for the preparation of control programs in the suppliers in order to reduce the pollutants caused by the production of automobile parts. In the last decade, the introduction of pollutants of human origin such as heavy metals into the aquatic ecosystem has caused bioaccumulation in aquatic animals and humans. The purpose of this study is to provide a simple presentation in order to understand the raw materials used in the automobile industry as a basis for future environmental studies, including, a Mendeleev table was first prepared, and then the consumption of elements and chemicals in the automobile and component manufacturing industry was studied. Finally, a visual Mendeleev table was created to identify the uses of elements and raw materials used in the automobile industry in order to prevent the introduction of Pollutants were released into the aquatic environment. By examining the test plans of raw materials of car parts and manufacturing companies, the elements used in the automobile industry were discussed, then the picture of parts and chemicals used in the automobile industry was prepared, and after completing the separate tables, the final table The application of the periodic table of elements was prepared with the approach of consumables in the automotive industry. From the applications of the periodic table of elements with the approach of consumables in the automotive industry to creating the potential of reducing pollutants in the production of materials and parts, life cycle assessment, replacing low-risk materials with hazardous materials, and wastewater It is the treatment of waste water that enters seas and other water environments.

Keywords: Pictorial Report, Periodic Table of Elements, Water Environment Pollutants.

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Enhanced removal of rhodamine B dye by combined sonon-nanofenton process: characteristics/effect of different parameters/kinetic studies

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Abstract

Background: With the increasing consumption of water and the scarcity of resources, the reuse of wastewater, especially in industries, to meet part of the water needs has been taken into consideration. The dyeing industry is one of the industries that consume a lot of water, and the main problem of their wastewater production is the abundance of dyes and lack of complete biological decomposition.

Methods: In this study, nanoparticles of zero-Valent iron (NZVI) were chemically synthesized and used as a catalyst in the combined sonon-nano-Fenton process for the degradation of rhodamine B dye. The characteristics of zero-valent iron nanoparticles were determined using scanning electron microscopy (SEM) and BET. The study examined the impact of various factors such as pH parameters, initial dye concentration, iron nanoparticle dose, capacity, and H2O2 concentration on the degradation efficiency.

Results: The efficiency of Rhodamine B dye degradation was compared across four processes, namely Sonolysis, Sono-NZVI, Sono-H2O2, and Sono-Nanofenton. The results indicated that the Sono-Nanofenton process was the most efficient among them. After 60 minutes of reaction, the Sono-nanofenton process demonstrated a removal efficiency of 98%.

Conclusion: Furthermore, the kinetics of the degradation process followed the pseudo-first-order kinetics and the Langmuir Hunshilwood model. And the combined SononanoFenton process using zero valent iron has been promising in the removal of rhodamine B dye.

Keywords: Rhodamine B, Sonon-Nano-Fenton, Zero-Valent Iron.

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Studying the contributory factors leading to cholera outbreaks due to the escalating effects of climate change

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Abstract

Cholera, an infectious waterborne disease resulting from the bacterium Vibrio cholerae, continues to pose a significant global public health challenge. This research aims to conduct a thorough analysis of the intricate association between climate change and the occurrence of cholera outbreaks, with a focus on clarifying the factors that shape this multifaceted relationship. This research adopts a multidisciplinary approach, drawing on expertise from fields such as epidemiology, environmental health, and public health. It investigates various critical aspects, including the impact of rising temperatures on the survival and proliferation of Vibrio cholerae in aquatic environments, the role of extreme weather events and shifting precipitation patterns in facilitating cholera transmission, and ecological changes affecting natural reservoirs and disease vectors. Population displacement and migration induced by climate-related factors, like floods and sea level rise, can force vulnerable communities into unsanitary and overcrowded living conditions, heightening the risk of cholera transmission. The primary goal of this research is to offer a comprehensive understanding of the factors influencing cholera outbreaks in the context of climate change by synthesizing existing research findings and conducting new analyses. The outcomes of this study have the potential to inform the development of effective and targeted strategies for both climate change mitigation and adaptation. These findings can also contribute to global endeavors aimed at preventing and controlling the spread of cholera in a world increasingly affected by climate chang.

Keywords: Environmental Challenge, Climate Change, Climatic consequences, Global Warming, Threats and Opportunities.

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Application of omics technology in environmental health: a new approach in disease prevention

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Abstract

Background: The world has seen a continuous increase in non-infectious and infectious chronic diseases, which has led to the creation of an interdisciplinary approach to understanding and treating diseases. Omics technology is an emerging tool that uses environmental data to understand the underlying environmental causes of disease, identify biomarkers of exposure and response, and develop new prevention and intervention strategies. In this study, the use of omics technology in environmental health was investigated as a new approach in the prevention of environmental diseases.

Methods: In this study, all the articles published until 2023 that investigated the relationship between omics, environmental diseases and human health were examined. Finally, the impact of omics technology in preventing environmental diseases and its opportunities and challenges in disease prevention were studied.

Results: The results of this study showed that the application of omics technology in environmental health has led to a new approach in disease prevention. The use of omics in environmental health research currently leads to the production of large data sets on gene expression, transcription factors, proteins, metabolites, epigenetic regulation of the genome in relation to environmental exposures. However, the developments of environmental omics are still in the stage of production and data collection.

Conclusion: The application of omics technology in the field of health provides a new method for preventing diseases and improving individual and community health. The integration of the environmental health approach with the field of clinical applications and public health needs more measures. Finally, to ensure the proper use of omics technology, some challenges related to study design, methodological techniques and data analysis should be considered.

Keywords: Omics, Environmental Health, Disease Prevention.

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Food borne vibrio in Persian Gulf. Epidemiology and genetic characterization

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Abstract

Background: Vibrios are curved gram-negative bacilli. These bacteria grow well in the presence of 2-4% salt and can tolerate up to 8% salt concentration.. These bacteria have been reported as the main causes of gastrointestinal infections due to the consumption of raw seafood. V. parahaemolyticus is the main food pathogen in Asia, especially East Asia. Overall, the prevalence of gastroenteritis caused by this species of Vibrio is estimated at 49.4%. Due to the high importance of fish and shrimp nutrition and its products in Iran, the present study was conducted to determine the prevalence of Vibrio species and the frequency of tdh, toxR and trh genes in V. parahaemolytics isolated from sea food.

Methods: In this descriptive cross-sectional study, 118 samples consisting of fish , fresh and salted shrimp were collected from different regions of the Persian Gulf. The samples were cultured on TCBS agar medium. In order to identify Vibrio species, multiplex PCR was used to identify sodB, flaE, hsp genes. In V.parahaemolyticus species, toxR gene and trh and tdh virulence genes were identified. The prevalence of V. parahaemolyticus in this study was 30.5% and the frequency of genes was as follow, tdh (15.2%), toxR (29.7%), sodB (11.9%), flaE (32.2%) and hsp (6%). the frequency of genes in V. parahaemolyticus in terms of temperature showed that the highest contamination was at 26 °C .

Results: The results of the present study indicate the high prevalence of Vibrio species and especially V. parahaemolyticus in samples of shrimp and fresh fish. The presence of virulence factors tdh, and toxR in V. parahaemolyticus isolates indicates the high ability of this species to cause disease. Therefore, consuming raw or undercooked shrimp can cause serious food poisoning due to Vibrio bacteria.

Conclusion: In the present study, Vibrio parahaemolyticus, Vibrio cholerae, Vibrio harvey and Vibrio vulnificus species were isolated and identified from fish and shrimp samples. The results indicate the need for a monitoring program for the presence of vibrio species in seafood distribution centers in order to eliminate public health risks.

Keywords: Vibrio, Seafood, Persian Gulf, Vibrio Parahaemolyticus.

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Investigating the by-products produced by the molecular breakdown of 2-4 dichlorophenoxyacetic acid in the combined method of ultrasonic and magnetic Nano catalyst N-TiO2@SiO2@Fe3O4 using GC-MS

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4. Biotechnology and Medicinal Plants Research Center, Ilam University of Medical Sciences, Ilam, Iran.

Abstract

Background: Pollutants that are receiving a lot of attention today and have caused serious concerns in the field of environmental protection, synthetic organic chemical pollutants such as pesticides and herbicides are one of the many effects. The important thing created by these compounds is carcinogenicity and mutagenicity.

Methods: Synthesis of N-TiO2@SiO2@Fe3O4 nanocomposite was done by co-precipitation and sol-gel method. of this magnetic Nano-catalyst combined with ultrasonic in the presence of visible light to measure by-products resulting from the molecular synthesis of poison 2-4 dichlorophenoxyacetic acid from aqueous solutions at pH=6, catalyst dose 0.3 g/liter, concentration 5 mg/liter poison 2 4-dichlorophenoxyacetic acid, magnetic stirrer speed 250 rpm and duration 90 minutes were used.

Results: In this study, by using GC-MS method, the production by-products resulting from the removal of 2-4 dichlorophenoxyacetic acid poison were measured. The resulting spectrum was matched by library search at NIST. The results of the spectra obtained from this research showed that it does not match with the spectra obtained from the molecular breakdown of 2-4 dichlorophenoxyacetic acid.

Conclusion: This research showed that N-TiO2@SiO2@Fe3O4 nanoparticle modified in the presence of ultrasonic and visible light, while removing 2-4 dichlorophenoxyacetic acid poison, can be an effective method to prevent the production of byproducts of molecular synthesis of poison.

Keywords: 2-4 Dichlorophenoxyacetic Acid, Ultrasonic, Molecular Fragmentation, GC-MS.

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Determining the abundance and characteristics of microplastics detected in and around a petrochemical complex in Imam Khomeini Port, Khuzestan, Iran

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Abstract

Background: Concerns about plastics and microplastics, which are known as a threat to the environment, aquatic species and living organisms, have increased. The production of plastic products in the world has exceeded 380 million tons per year, and most of them are thrown away after one use and eventually cause environmental pollution.

Methods: The area under study was a petrochemical in the site of four special economic zones in Imam Khomeini port located in Khuzestan province, and 10 points were selected from this area, 5 of which are soil in contact with widespread pollution and 5 of which are sludge, sewage and The complex lesions were studied. To extract microplastics, NaCl solution with a density of 1 gr/cm3, and ZnCl2 with a density of 2 gr/cm3 were used. H2O2 was also used for cleaning. Stereomicroscope was used to determine the morphological characteristics of microplastics and ATR-FTIR was used to determine the type of polymers.

Results: The lowest and the highest frequency of microplastics were respectively related to soil in contact with the outlet of wastewater treatment plants (679 item/kg.dw) and soil in contact with the side of PET production wastewater (4289 item/kg.dw). Also, 93% of all identified microplastics were in the form of fibers and 57% of them were white in color. 61% of the examined samples were **made of polyester.**

Conclusion: The amount of pollution in sampling locations is much higher than other studies and this is a confirmation of the high level of plastic pollution in this area. Of course, no study has been conducted on the distribution of microplastics in petrochemical areas in the world, and this study provides new information to researchers.

Keywords: Microplastics, Contaminated Soil, Petrochemical, Polyethylene Terephthalate.

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Investigating the Possibility of Purifying Water Treatment Plant Effluent by Reverse Osmosis Method for Use in Combined Cycle Power Plant Using WAVE Software (Case Study: Sanandaj City)

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Abstract

Background: Water is the main element in the survival of living things. In the past decades, the global problem of water shortage and water supply has affected Iran and also Kurdistan province. The wastewater from the backwashing of the sand filters of the Sanandaj Water Treatment Plant is removed from the treatment plant circuit without reuse and is wasted. Other side, the power plant is located at a distance of 4 km from the treatment plant and needs water continuously for use in boilers and cooling towers.

Methods: Samples were taken from the backwashing wastewater of the sand filters of the water treatment plant in three separate stages and specific time intervals. After transferring the samples to the central laboratory of the Water and Wastewater Company, the concentration of all parameters required by the WAVE software was determined based on standard methods. The average concentration of the three stages of the experiment was determined as the basis for the concentration of the parameters. The design of the reverse osmosis system, which was 60 BW30-400 modules in one pass, and the resin system, which was two types of strong alkaline anionic resin and strong acidic cationic resin, was done by WAVE software.

Results: The final software report did not show any design warnings. The concentration of most of the parameters also reached zero, and the amount of other important parameters such as iron, silica and electrical conductivity reached less than the required standard of the boiler and cooling tower of the power plant.

Conclusion: According to the results of the software report, it can be concluded that the use of reverse osmosis method and ion exchange system to treat the effluent of Sanandaj Water Treatment Plant is applicable to supply the water needed by the power plant and goals such as preventing water wastage, provides reuse and protection of the environment of the region.

Keywords: Reverse Osmosis, Ion Exchange Resin, Water Treatment Plant, Combined Cycle Power Plant, WAVE Software.

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Evaluation of the efficiency of magnetic and non-magnetic activated carbon derived from Gundelia seed in removal of acetaminophen from aqueous solutions: Equilibrium and Kinetic Study

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Abstract

Background: In recent years, pharmaceuticals, as one of the environmental problems, have been identified as emerging contaminants and have also been detected at trace levels in water samples. Acetaminophen can be mentioned among the drugs included in the list of emerging organic pollutants. The purpose of this study was to evaluate the feasibility of magnetic and non-magnetic activated carbon prepared from Gundelia tournefortii seeds for removing acetaminophen from aqueous solutions.

Methods: In this experimental study, the properties of the synthesized adsorbent were determined using scanning electron microscopy (FESEM, surface area measurement (BET), fourier transform infrared spectroscopy (FT-IR), X-ray diffraction (XRD), and thermal gravimetric analysis (TGA). Then the effect of adsorbent dosage parameters, pH, contact time, pollutant concentration and ion intensity on the adsorption process were investigated. The amount of ACT remaining after purification was measured with a UV-Vis spectrophotometer at the wavelength of 243 nm. Also, adsorption isotherm and reaction kinetics experiments were performed to understand the adsorption mechanism. Finally, the obtained data were analyzed using Excel software.

Results: The results of the BET test showed that the specific surface of non-magnetic and magnetic activated carbon were 260.44 and 274.56 g/m2, respectively. The maximum removal of ACT in optimal conditions (pH=4, contact time 30 min, the adsorbent amount of 0.25 g/L at the initial ACT concentration of 100 mg/L for non-magnetic and magnetic adsorbent were %98.31 and %84.43, respectively. As well as, the optimal ion intensities in non-magnetic and magnetic adsorbents were 30 mg/L and 20 mg/L, respectively. The results of the adsorption experiments showed that the adsorption process of ACT by both magnetic and non-magnetic adsorbents studied follows the Freundlich isotherm and second-order kinetic model.

Conclusion: The results showed that the non-magnetic and magnetic activated carbon prepared from Gundelia tournefortii seeds has are efficient to remove ACT from aqueous solutions. Therefore, these compounds can be used as a high-efficiency adsorbent to remove ACT from aqueous solutions.

Keywords: Gundelia Tournefortii Seed, Non-Magnetic Activated Carbon, Magnetic Activated Carbon, Surface Adsorption, Acetaminophen.

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Analysis of microplastics in ships ballast water and its ecological risk assessment studies from the Persian Gulf

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Abstract

Transport of ballast water is considered a significant vector for dispersion of different pollutants, including microplastics (MPs), throughout the world's oceans. However, there is limited information on MPs in ballast water. Size distribution, polymer type, and ecological risks of MPs in ballast water were investigated for the first time in this study. The mean levels of MPs in ballast water and seawater samples were 12.53 and 11.80 items/L, respectively. MPs with a size category of 50-300 µm was the most abundant. Fiber, black, and polycarbonate (PC) were the predominant shape, color, and polymer type of identified MPs in ballast water and seawater, respectively. The pollution load index (PLI), hazard index (HI), and risk quotient (RQ) indicated high levels of MP pollution, potentially indicating an ecological risk. These findings increase our understanding of the major sources (such as ballast water), transportation routes, and related ecological risks of MPs to marine ecosystems.

Keywords: Ballast Tank, Hazard Index, Marine Environment, Plastic Particles, Persian Gulf.

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Investigating the relationship between exposure to heavy metals and hypertension in pregnant women

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Abstract

Background: Blood pressure is one of the most common problems in medicine, which is considered very acute, especially during pregnancy. Blood pressure disease in pregnant women is influenced by various factors such as individual, genetic, and environmental factors. Heavy metals are one of the most important pollutants. These are environmental factors and due to their carcinogenicity and accumulation in the tissue of living organisms, they are one of the important problems for public health. These metals threaten human health by creating long-term carcinogenic and non-carcinogenic risks such as diabetes and high blood pressure. Some heavy metals in water, soil, plants, and food cause problems such as blood pressure disorders in humans and especially in pregnant women, which is one of the biggest health-threatening problems. One of the most important risk factors in the field of blood pressure in pregnant women is heavy metals. This research aims to investigate the relationship between heavy metals and blood pressure during pregnancy, which will be briefly discussed below.

Methods: This study was conducted as a review of 100 reviewed articles. PubMed, Science Direct, Google Scholar, and knowledge databases were used to search for articles.

Results: The review of information shows that exposure to heavy metals such as lead, cadmium, arsenic, etc. in small amounts in the long term with multiple mechanisms causes an increase in blood pressure and other serious problems, one of which can affect a person's fertility and pregnancy. and affect childbirth, the fetus, and the child's health, several ways have been proposed to neutralize the effect of some of these metals, which can be known with more and more detailed research.

Conclusion: Therefore, it is suggested that the relationship between heavy metals and blood pressure, especially in pregnant women, should be investigated more closely in future studies.

Keywords: Heavy Metals, Pregnant Women, High Blood Pressure.

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Supplementary treatment of Slaughterhouse sewage with microalgae

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Abstract

Background: Poultry slaughterhouses are one of the industries that produce large volumes of high-pollution wastewater that have the potential to pollute the environment if treated inadequately. Wastewater treatment using microalgae species has received special attention due to its better environmental compatibility, better treatment compared to bacterial-based treatment and the production of organic fertilizers and other bio-useful products chlorlaulgaris has been recognized as one of the best microalgae for the treatment of such wastewater due to its high ability to remove nutrients (N and P) and COD.

Methods: The required samples of the sewage from a slaughterhouse located in Qazvin province were prepared and were qualitatively analyzed after being transferred to the laboratory. After conducting the required preliminary tests, the design of the tests was carried out in the response level method. The data obtained was analyzed by variance and regression, and the models applied to the organic load removal data were obtained. Numerical optimization was performed to optimize the conditions for removing COD. Finally, validation was done to ensure predictive results by models.

Results: At 95% confidence level the main effects of independent variables included total nitrogen (A), total phosphorus (B), duration of sewage and algae contact (C), duration of the brightness period(D), as well as interactions of AB, AC, AD, BD and CD in the removal of meaningful COD. In optimal conditions, including total nitrogen concentration, total phosphorus concentration, algae exposure time to sewage lighting time, mg / L 600, mg/L 34, d 15 and HR 6/12 respectively, the projected removal efficiency by the models obtained in CoD removal was 88/93 %, and the projected results were highly matched with laboratory results.In these circumstances, the desirability of the models was 97%.

Conclusion: Chlorella vulgaris algae has good potential in removing organic load from poultry slaughterhouse sewage. In these conditions, a significant amount of algal biomass is produced, which can be used for purposes such as livestock feeding and health and industrial purposes. The response level method is a good method in designing experiments and optimizing the algal treatment process of wastewater.

Keywords: Wastewater Treatment, Poultry Slaughterhouse Sewage, Chlorella Vulgaris Algae, Response Level Method.

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The waste of Shahrbabak copper mining complex and the scenarios facing the management

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Abstract

The Copper complex of Shahrbabak is one of the three complexes of the National Iranian Copper Industries Company, which was built in the limits of Shahrbabak of Kerman province for the extraction of copper from Midok copper ore. The complex includes Midok copper mine, Midok concentration plant, Midok leaching plant and Khatun Abad smelter with a capacity of 5 million tons of minerals per year with a grade of 0/6 percent, it is through blasting and drilling methods . The identification and classification of production wastes has been done after checking the requirements of the law and through field monitoring and completing questionnaires from experts active in mining in a period of eighteen months. 1.13 percent by weight of the total production waste of the complex, including all types of dust, used oils and greases, slag, batteries, incombustible wastes have dangerous criteria that require special care and other wastes include mineral tailings, worthless concentrates, sludges, thickener wastes, all kinds of metal and wood, plastic and fabric wastes, which according to the quantity and volume of production should be prioritized in management programs based on different scenarios including management based on The existing routine (first scenario), management with changes in structure and equipment (second scenario) and intelligent management after making changes in the existing situation (third scenario). After examining the quantity and quality of production waste and the facilities and facilities available, the second scenario has been prioritized in this complex, which after the establishment of the integrated waste management system; it can also be smart in the future.

Keywords: Copper Complex, Shahrbabak, Waste Management, Waste Management Scenario.

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Activation of peroxymonosulfate by manganese-containing catalyst: application for 4-chlorophenol removal

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Abstract

Background: advanced oxidation processes based on peroxymonosulfate (PMS) have shown a remarkable ability to degradation of hazardous organic pollutants in wastewater. Mn-containing compounds have been considered as environmentally friendly catalysts for PMS activation. In the present study, the γ-MnOOH catalyst was made under laboratory conditions based on the hydrothermally method and was used with the aim of activating PMS in order to remove 4-chlorophenol, which is one of the most important derivatives of the chlorophenol family.

Methods: operational parameters affecting the PMS/γ-MnOOH process, including γ- γ-MnOOH dose (0.01, 0.05, 0.1, 0.16 and 0.3 g/L), PMS dose (0.2, 1, 4, 8 and 12 mM), the initial concentration of 4-chlorophenol (25, 50, 100 and 200 mg/L) and the initial pH of the solution (3, 5, 7, 9 and 11) on the removal efficiency of 4-chlorophenol was investigated. In order to determine the role of reactive oxidizing species in PMS/γ-MnOOH process, radical quenchers (TBA, EtOH, P-BQ and L-Histidine) were used. Also, the effect of coexisting anions (chloride (Cl^-), bicarbonate ($HCO3^-$) and phosphate (PO43–)) was studied in order to identify how the process works in water matrix. Finally, the stability and reusability of the catalyst were measured by the cycle experiment. Finally, the toxicity analysis was carried out to determine the wastewater detoxification by the PMS/γ-MnOOH process using Lepidium sativum seeds.

Results: The results indicated that the combination of γ-MnOOH with PMS significantly creates a synergistic effect in the degradation of 4-chlorophenol by the PMS/γ-MnOOH process, by the rate of 27.28. In addition, the best performance of the PMS/γ-MnOOH process (4-chlorophenol removal efficiency equal to 91.44%) was obtained in neutral pH conditions, PMS dose equal to 8 mM and γ-MnOOH dose equal to 0.16 g/L. The use of radical scavengers indicated that superoxide radical (•O2–) and singlet oxygen (1O2) play an essential role in the degradation of 4-chlorophenol. On the other hand, in the presence of phosphate, the performance of the PMS/γ-MnOOH system was greatly reduced, which indicates the effective role of active surface sites of the catalyst in the degradation of 4-chlorophenol. Also, the γ-MnOOH catalyst did not show desirable stability after three cycles

of recovery test. The PMS/γ-MnOOH process showed an acceptable ability to detoxify the effluent containing 4-chlorophenol

Conclusion: Advanced oxidation process of PMS/γ-MnOOH as a powerful, sustainable and environmentally friendly system can be used in the treatment of wastewater containing phenolic compounds, especially 4-chlorophenol.

Keywords: 4-Chlorophenol, Peroxymonosulfate, γ-MnOOH.

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Investigating the relationship between outdoor air pollutants and anti-Mullerian hormone serum levels

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Abstract

Background: Environmental factors are known to be effective in reducing the concentration of anti-mullerian hormone (AMH), an indicator of ovarian reserve. However, it is unclear whether long-term exposure to outdoor air pollutants is associated with reduce in AMH levels. Therefore, this study aimed to investigate the relationship between long-term exposure to air pollutants and serum AMH levels.

Methods: This study was conducted on 806 women participating in the Tehran Lipid and Glucose Study (TLGS). Air pollutants, including NO, NO2, NOX, SO2, and PM10, were measured using previously developed land use regression (LUR) models based on each individual's residence addresses, date, and duration of residence at each address. Multivariate linear regression models were used for statistical analysis to model the linear correlation between exposure to air pollutants and AMH serum concentration. The models were adjusted for variables, including age at the beginning of the study, body mass index, smoking, physical activity, age of first menstruation, education, marital status, and parity.

Results: The results show that there is no significant relationship between the third and second tertiles of air pollutants (including NO, NO2, NOX, SO2, and PM10) compared to the first tertile on AMH serum level.

Conclusion: The lack of a significant relationship between exposure to air pollutants and the decrease in serum AMH levels in middle-aged women highlights the need for more studies on young women.

Keywords: Outdoor Air Pollutants, Air Pollution, Anti-Mullerin Hormone, Ovarian Reserve.

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Development and Implementation of aliquid-liquied microextraction-Method for Aflatoxin Detection in Sesame Seeds

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Abstract

Sesame seeds are among the oldest oil seeds cultivated by mankind, with a rich history and nutritional value. However, they are susceptible to contamination by aflatoxins, natural fungal toxins originating from species of powdery mildew. In this study, a high-performance liquid chromatography method was developed and applied to measure the levels of aflatoxin contamination in 11 sesame samples collected in Tehran. The results revealed that the aflatoxin contamination in the samples exceeded the permissible limit, highlighting the importance of effective detection methods and management strategies to ensure the safety and quality of sesame seeds. Additionally, the historical and nutritional significance of sesame seeds, as well as the challenges posed by fungal diseases and drought stress in cultivation, are discussed in relation to the findings. In the present cross-sectional descriptive study, 11 sesame samples were collected in Tehran using the micro-extraction method, and the level of aflatoxin in the samples was measured using high- performance liquid chromatography. The developed method for assessing aflatoxin contamination in sesame samples yielded satisfactory results

Keywords: Aflatoxin, Nano Extraction, Sesame,High Performance Liquid Chromatography.

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Investigation of the prevalence of complications leading to death and acute poisoning caused by aluminum phosphide tablets during the storage process of date crops in Bushehr province during 2020-2022

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Abstract

Background: Aluminum phosphide(ALP)is an inorganic fumigant substance that is used in Iran(especially in the northern and southern provinces)as a fumigant and rodenticide in domestic and semi-industrial warehouses to protect agricultural products(cereals,rice and dates).Bushehr province is the largest date producing hub in South of country and due to its high toxic potential,cheapness and availability,rice tablets have caused intentional,accidental and accidental poisonings that have led to deaths in this city.The purpose of this research was to investigate the prevalence of complications leading to death and unintentional acute poisoning caused by rice tablets in referred patients and hospitalized in hospitals and clinical treatment centers in the province.

Methods: In a descriptive-cross-sectional study of the clinical file of all the patients who were poisoned and died with rice tablets during the years 2020-2022,they were referred to Persian Gulf Martyrs' Hospitals, Bushehr, Imam Hossein(AS)Ahram,Tawheed Jam,Shahid Ganji Barazjan and Salman Farsi Hospitals in Bushehr.and demographic information, symptoms on arrival,time interval from poisoning to referral,number,method,reason and time of using pills and laboratory changes(electrolytes and arterial blood gases)were evaluated and the recorded data were counted and analyzed with statistical software SPSS ver.26 were analyzed.

Results: 44/87% of the patients were male and the rest were female,and their average age was 28/67 ± 13/23 years.Most of the patients were poisoned with a pill.82/26% had gastrointestinal symptoms,and out of 234 patients with an average age of 27/40 years,129 were women(55/13%)and 105 were men (44/87%),with a mean and standard deviation(Mean±SD)of 23/40 ± 9/20 age.The

youngest age was 8 years and the oldest was 55 years.In this study,33 people (14/10%) died from the cases.Also,the death due to poisoning with rice tablets with the time between poisoning and the patient's arrival at the center Treatment,the number of pills taken, systolic blood pressure,pH,HCO3concentration and oxygen saturation percentage had a significant relationship($P \leq 0.05$).

Conclusion: Aluminum phosphide poisoning is considered as one of the important issues in the public health of the society and the results of this research can be comprehensive information,continuous monitoring,application of preventive and preventive laws and dealing with the wrong sellers as well as speeding up the treatment of poisoned people be useful.

Keywords: Aluminum Phosphide, Poisoning, Mortality, Dates.

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The Efficiency of the Microbial Fuel Cell Reactor in Biodegradation of Methyl Tertiary Butyl Ether and Electricity Generation from Wastewater: Effects of Co-substrate, Surfactant, and Membrane Changes

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Abstract

Background: This study highlights the promising potential of utilizing an MFC reactor equipped with Nafion 117 and PVA/GA membranes. This innovative and cost-effective approach has proven to be highly effective in addressing the challenge of treating methyl tertiary butyl ether (MTBE) in wastewater, while also offering the added benefit of electricity generation.

Methods: Biodegradation efficiency and electricity generation were assessed in this study using co-substrates such as glucose (GLS) and sodium acetate (SAC), in addition to surfactants like sodium dodecyl sulfate (SDS) and cetyl trimethyl ammonium bromide (CTAB). The MTBE concentration ranged from 10 to 200 mg/L, and it was quantified in the samples through gas chromatography with a flame ionization detector (GC–FID). To explore the structural characteristics of Nafion 117 and PVA/GA membranes, we conducted field emission scanning electron microscopy (FESEM), Fourier-transform infrared spectroscopy (FTIR), and X-ray diffraction (XRD) analyses.

Results: The maximum biodegradation efficiency of MTBE (percent) in MFC reactors with Nafion 117 and PVA/GA membranes was found to be 93.3percent and 89.8percent, accompanied by maximum production voltages (mV) of 895 mV and 853 mV, respectively. This was achieved with the addition of SAC co-substrate and SDS surfactant. Notably, the addition of co-substrate had a more significant impact compared to the surfactant. Simultaneously adding both the co-substrate and surfactant had a substantial effect on both the biodegradation efficiency (percent) of MTBE and the generated voltage. Based on these findings, it can be concluded that the MFC reactor equipped with Nafion 117 and PVA/GA membranes is capable of effectively breaking down MTBE. However, due to its lower cost, the PVA/GA membrane may be considered a more economical choice.

Conclusion: Therefore, the utilization of an MFC reactor featuring Nafion 117 and PVA/GA membranes holds great promise as an efficient approach for treating MTBE in wastewater, while concurrently generating electricity.

Keywords: Microbial Fuel Cell, Methyl Tertiary Butyl Ether, Co-substrate, Surfactant, Nafion 117.

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Modeling of progesterone hormone adsorption from the aquatic solutions using oak shell adsorbent: Using the response-surface method

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Abstract

Background: Wastewater production is unavoidable as a result of human daily activities and it comes from different sources including residential areas, industries and hospitals. Hospitals play a major role in the introduction of estrogenic hormones, especially progesterone, into urban wastewater, which can be harmful to human health and the environment. Due to the lack of high efficiency of physical purification, it is necessary to replace sustainable and economic purification processes for the effective removal of this hormone from wastewater. In this study, the removal of progesterone hormone using the natural adsorbent of oak shell with the response-surface method has been investigated.

Methods: Adsorption of progesterone hormone with natural adsorbent of oak fruit shell has been done in hospital wastewater samples. After preparing the required solutions, in order to optimize the variables, four factors, pH, contact time, adsorbent concentration, and the initial concentration of progesterone hormone were considered. In this research, the response surface method of Design-Expert software was used to optimize these factors and model the absorption process.

Results: The highest efficiency of the oak shell was pH=4.5, the initial concentration of the pollutant was 2.5 micrograms per liter, and the contact time of 85 minutes was equal to 82.4% for removing progesterone. Freundlich isotherm with R2=0.99 was the most consistent with the laboratory data. and the kinetics of the reaction also follow intraparticle penetration.

Conclusion: In general, the results of the experiments showed that oak placenta can be used as an effective adsorbent in removing progesterone from water environments. Because of its cheapness, availability and simple preparation, it is a suitable choice for separating various pollutants from water and wastewater.

Keywords: Adsorption, Hospital Wastewater, Oak Shell, Isotherm, Treatment.

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Environmental Health and Social Accountability: Requirements and Solutions

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Abstract

Background: Social accountability in environmental health is a requirement of implementing three components of sustainable development. Besides meeting the needs of the current generation, it can meet the needs of future generations as well. The present study takes a general view toward this topic and investigates the basic requirements of social accountability in environmental health. It comes up with a number of solutions proposed in the literature based on the experiences of other countries and expert opinions to improve accountability. This study has implications for environmental health planners and practitioners.

Methods: To conduct this study, a comprehensive search was done of academic papers registered in PubMed, Elsevier and Google Scholar from 2010 to 2023. The search strategy included searching for the terms “social accountability”, “environmental health”, “organization”, and “education” in the title, abstract or keywords of relevant papers.

Results: A total number of 18 relevant academic papers were found and reviewed. To summarize the results, after defining the concept of accountability, two major requirements of promoting the social accountability of environmental health were pointed out and finally the solutions proposed in the literature were presented.

Conclusion: Together with the development of social accountability, there are requirements and challenges that need to be resolved to increase environmental health accountability. Several suggestions have been made to help organizations be accountable to the environment, but they often result from individual researchers’ experiences, and their efficiency in educational systems and different organizations needs further investigation. There is a need to guide educational research towards the development of accountability in environmental health is essential.

Keywords: Social Accountability, Environmental Health, Organization, Education.

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Investigating the specific adsorption of heavy metal ions (nickel and cadmium) from aqueous solutions by magnetic silica nanoparticles modified with a specific ligand (APTES)

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Abstract

Background: Heavy metals cadmium and nickel enter water sources through industrial, domestic, agricultural wastewater or waste leachate. This element can disrupt the function of organs such as liver and kidney. Magnetic silica nanoparticles have the ability to control and remove heavy metals from industrial wastewater through surface adsorption mechanism. The aim of this research is to evaluate the surface absorption process of nickel and cadmium ions from synthetic wastewater with simple synthesized magnetic silica nanoparticles and modified with a specific ligand.

Methods: After the synthesis of magnetic silica nanoparticles by sol-gel method, their characteristics were determined using XRD, SEM, FT-IR devices. In order to optimize the surface adsorption process of nickel and cadmium ions with magnetic silica nanoparticles modified with specific ligand, pH parameters, contact time, initial concentration of metal ions, concentration of nanoparticles and stirring speed were investigated under different conditions.

Results: In conditions of pH = 6.5-7, initial concentration of cadmium and nickel 10 mg/l, adsorbent amount 20 mg/l, contact time 10 minutes, temperature 25 degrees Celsius and stirring speed 300 rpm, 90.5% of cadmium and 5 83% of nickel was removed from wastewater by magnetic silica nanoparticles modified with ligand. The maximum absorption capacity of cadmium and nickel was obtained as 22.63 and 20.88 mg/g, respectively. Absorption strongly depends on the initial concentration of metal ions, pH and temperature, it increases with increasing temperature and concentration of nanoparticles and decreases with increasing concentration of metal ions.

Conclusion: In optimal conditions, modified silica magnetic nanoparticles have the ability to absorb nickel and cadmium metal ions faster and more effectively than simple magnetic silica nanoparticles. These nanoparticles can be used in industries due to their recycling, reuse and easy separation from aqueous solutions by magnetic field.

Keywords: Surface Adsorption, Nickel, Cadmium, Magnetic Silica Nanoparticles, Ligand.

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Facile synthesis of ZnO-Tire for efficient Acid Red 14 dye removal from aqueous solution: Kinetics, equilibrium, mechanism insight

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Abstract

The present work reports the successful synthesis of zinc oxide loaded on the waste tire using a simple technique and evaluate its application for the effective removal of AR14 dye through adsorption process. Functional groups, structural properties, morphology and elemental composition of the ZnO-Tire were analyzed by FT-IR, XRD, SEM and EDX techniques. The impacts of solution pH, dye concentration, adsorbent amount, organic and inorganic compounds on the AR14 removal efficiency were evaluated. The maximum removal efficiency was 90.09 percent at pH=3, the nanocomposite dosage =1 g L-1, [AR14]0= 20 mg L-1 and the contact time of 120 min. The kinetic data and adsorption equilibrium fitted well with pseudo-second-order kinetic and Langmuir isotherm. Moreover, thermodynamic studies indicate the endothermic nature of the system. Also, ZnO-Tire could be regenerated and after six sequential cycles, no significant decrease in the absorption capacity of the nanocomposite was reported.

Keywords: Acid Red 14, Adsorption, ZnO-Tire Nanocomposite, Kinetic.

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Leachate treatment through the hybrid process (coagulation-flocculation/ sulfate-hydroxyl radical-based oxidation /extended aeration)

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Abstract

Background: The study focused on the development of a hybrid Batch-flow leachate treatment system (BFLTS) to address the environmental concerns associated with municipal solid waste leachate. The purpose was to evaluate the effectiveness of the BFLTS in removing COD, BOD, TSS, turbidity, TKN, and heavy metals from leachate.

Methods: This study evaluated a novel municipal solid waste leachate (MSWL) treatment system called the Batch flow leachate treatment system (BFLTS). This process uses a combination of coagulation/flocculation (C-F), advanced oxidation (sulfate-hydroxyl radical), and extended aeration of activated sludge (EAAS) to treat MSWL.

Results: The results indicated that the primary treatment phase using coagulation/flocculation with 0.8 g L-1 FeCl3 at pH 6 achieved 67% turbidity and 63% chemical oxygen demand (COD) reduction. The secondary treatment phase with the presence of both K2S2O8 and H2O2 peroxides was more efficient than single peroxide processes. While PS-based or H2O2-based single peroxide processes are less effective (UV-PS 65.7%, UV-H2O2 43.2%, Heat-PS 58.6%, Heat-H2O2 34.5%, and Heat-PS/H2O2 74.8%). The UV-PS/H2O2 system achieved the highest COD removal rate of 89.4%. In the third treatment phase, the efficient removal of COD and Biochemical oxygen demand (BOD) under optimal operating conditions was 87.3% and 94.7% respectively. Overall, the BFLTS treatment system has demonstrated high efficiency in removing COD, BOD, TSS, Turbidity, TKN, and Heavy metals by 99%, 98%, 97%, 89%, 86%, and 98%, respectively.

Conclusion: The high efficiency of the BFLTS highlighted its potential as a promising method for reducing the organic load of municipal solid waste leachate and its applicability to various types of leachates.

Keywords: Chemical, Leachate, Oxidation, Photooxidation, Waste Management.

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Biological monitoring of occupational exposure to waste anesthetic gases in operating room personnel

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Abstract

Background: Operating room personnel are exposed to a wide range of occupational. Among these, exposure to waste anesthetic gases (WAGs) is one of the most important but least studied. Acute and chronic exposure to WAGs is associated with adverse health effects. The aim of the study was to evaluate occupational exposure to WAGs by measuring concentration of nitrous oxide, isoflurane, and sevoflurane in urine samples from operating room personnel.

Methods: This was an analytical and cross-sectional study of concentrations of nitrous oxide, isoflurane, and sevoflurane were measured in 30 urinary samples taken from anesthesiologists, surgeons, surgical technicians, and nurses. Urine samples were collected at the end of the morning operating shift (after at least three hours of exposure). Urine samples were analyzed using an Agilent 5977B gas chromatography–mass spectrometry (GC/MS) coupled with an Agilent 7697A headspace auto-sampler by the method introduced by Accrosi *et al*.

Results: Urinary concentrations of nitrous oxide, isoflurane, and sevoflurane were found to be 175/8 ± 77.52 ppb (range: 7.98-319.91), 4.95 ± 3.43 ppb (range 0.78-14.9) and 15.0 3± 16.06 (range 0.76-46.40) ppb, respectively.

Conclusion: the biological monitoring of unmodified urinary anesthetic gases urinary concentration of isoflurane and sevoflurane could be a good internal dose biomarker for evaluate of these agents following long-term exposure.

Keywords: Biological Monitoring, Occupational Exposure, Anesthetic Gases, Operating Room.

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Hexavalent chromium removal from aqueous solution using magnetic graphene oxide derived from sugarcane bagasse in the presence of visible light: kinetic and toxicity study

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Abstract

The goal of this study was to create a potent photocatalyst for the removal of hexavalent chromium (Cr(VI)) from water and wastewater. This was done by synthesizing Sugarcane bagasse magnetic graphene oxide (SCBMGO). The SCBMGO was made using the sol-gel method processes. SCBMGO was successfully synthesized, according to morphological and structural studies of conducted using FT-IR, XRD, SEM, and VSM analysis. The as-prepared SCBMGO displayed outstanding photocatalytic removal activities of Cr(VI). The optimized sample SCBMGO presented the highest photo removal efficiency of Cr(VI) (94.5 percent) within 240 min under conditions pH 2, 20 mg L-1 Cr(VI) concentration, 2 g L-1 dosage of SCBMGO. Photocatalytic reaction kinetics of Cr(VI) was confirmed to pseudo second-order reaction. The entire removal of Cr(VI) was achieved for SB, SCBGO, and SCBMGO 20.7 percent, 49.61 percent, and 94.51 percent, respectively. SCBMGO effectively accomplished recyclable in 5 cycles through facile photocatalytic removal of pollutants under LED irradiation. The ability of SCBMGO structures to remove Cr(VI) in real wastewater was investigated, and the results showed that Cr(VI) could be removed effectively by photocatalysis in the presence of SCBMGO photocatalyst. And toxicity test was evaluated in the photocatalytic process.

Keywords: Hexavalent Chromium, Graphene Oxide, Fe_3O_4, Toxicity.

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Bioremediation of phenanthrene from contaminated soil using halotolerant consortium isolated from bovine waste

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Abstract

The aim of this study was to isolate a bacterial consortium that capable for decomposing of PAHs. Three halo-tolerant bacterial strains of Microbacterium paraoxydans B3F (S1), Stenotrophomonas N3 (S2) and citrobacter NB2 (S3) were isolated from bovine manure. The isolate Microbacterium paraoxydans B3F showed the least resistance to salinity and growth not observed at 2 and 2.5% of NaCl, while isolate citrobacter NB2 indicated growth in all salinity levels. The PHE biodegradation was more efficient in bacterial consortium compared to pure culture. At the end of the 35th day, the removal efficiency of PHE with an initial concentration of 100 mg/kg for seed volumes of 2, 10, and 20 mL was 33%, 50%, 52%, respectively. The TPHs biodegradation efficiencies at different soil/water ratios of 25%, 50% and 100% were 12%, 28.7 % and 60.8%, respectively. Three halo-tolerant bacterium were isolated from Bovine manure were efficiently used for bioremediation of Phenanthrene.

Keywords: Phenanthrene, Bioremediation, Salinity, Bovine Manure, Slurry Bioreactor.

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Phytoremediation of Potassium Nitrate from three soil textures by Vetiveria Zizanioides

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Abstract

Today, due to the increasing growth of industries and heavy pollution of industrial effluents and the proximity of industrial, urban and agricultural centers in most parts of the country, the entry of organic and mineral pollutants, including heavy metals and nitrates, into the soil is a national concern and a global environmental problem. One of the most important environmental pollutions is soil pollution. There are many methods for remediating polluted soils, but the use of conventional methods is expensive, and for this reason, the need for inexpensive purification methods is felt. Using plants like vetiver to remove soil pollution is a cost-effective method known as phytoremediation. In order to purify soil contaminated with nitrate and its absorption by vetiver grass, a greenhouse experiment with 4 treatments of nitrogen fertilizer (control, 20, 40, 80 mg/liter), and 3 types of soil texture (sand, clay, loam) with 3 Repetition was done in the form of a completely randomized design using potassium nitrate fertilizer. The results showed that the amount of nitrate absorption by vetiver grass was the highest in clay texture and fertilizer treatment of 20 mg/liter. Also, the above texture had the least nitrate contamination due to high absorption by vetiver grass.

Keywords: Soil Pollution, Nitrate Absorption, Vetiver Grass, Potassium Nitrate Fertilizer, Phytoremediation.

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The importance of using life cycle assessment in industries and mines relying on iron ore mine, life cycle assessment as a tool to achieve sustainable development: stages and its application in iron ore industries

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Abstract

Background: Industrialization and the expansion of urbanization and the development of communities have created new needs in life, which require the extraction and use of natural resources, including mines. Although mining and its related industries have a positive role in economic and social aspects, they also cause environmental degradation, including changes in the shape of the land, surface and underground water pollution, changes in ecosystems, and changes in species diversity and the increase of dust should be considered and investigated. In order to be aware of the environmental perspective and achieve sustainable solutions, there are different methods and tools, one of which is life cycle assessment.

Method: In this review study, authoritative English and Farsi databases, including Google Scholar and SID, were searched to find related articles. In this study, the key words life cycle assessment, environmental impact of mining, life cycle assessment of mines and their English equivalents, lice cycle assessment, environmental impact assessment of mining and life cycle assessment of mining were used.

Results: Life cycle assessment as a comprehensive tool can determine and quantify the environmental and health effects during the life cycle of raw material extraction, raw material production, product production processes, use, management and final disposal of waste. This approach also makes it possible to compare different production methods with each other so that one can choose the best option from among the available options and try to improve it.

Conclusion: Due to the existence of many mines in Iran, it is necessary to make the use of this tool mandatory in these industries. Surveys show that there are not many studies in this field in Iran, and it is suggested that policy makers take measures in this field.

Keywords: Life Cycle Assessment, Mine, Environment.

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Assessment of gamma radiation dose Rate and health risk prediction for swimmers in some hot springs of Hormozgan, Iran

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Abstract

Background: Ionizing radiation exists in all environments on the earth's surface, underground, and in the atmosphere. Humans are naturally exposed to both external radiation from the environment and internal radiation from the food, water, and air we ingest. The hot spring is considered one of the world's hydrotherapy centers and is highly praised for its healing properties. Radon and radioactive elements are present in hot spring sediments, water, and soil, so these components are radioactive. Hormozgan hot springs, which are popular with residents, have not been studied to date on radiation risks or the annual effective doses of the hot spring ingredients to internal organs. Next, it is important to measure radiation and deepen our knowledge about it. The main aim of this study was to evaluate gamma radiation levels in the hot springs of Khest, Bostano, Momadi, Siahkosh Nimekar, and Angoran which are located in the west of Hormozgan, Iran.

Method: The equipment used in this cross-sectional study is a radiation surveymeter. Measurements are taken at a height of 1 meter above the water surface. Dose rates were recorded over 1 hour.

Results: Our results indicate the outdoor gamma radiation dose rate in the embodiment of Khest hot spring 1, the embodiment of Khest hot spring 2, and the embodiment of Khest hot spring 3 were (0.6 µsv/h -0.94 µsv/h; mean: 0.85 µsv/h), (1.3 µsv/h -2.22 µsv/h; mean: 1.8 µsv/h), and (2.31 µsv/h -4.2 µsv/h; mean: 3.2 µsv/h), respectively. The outdoor gamma radiation dose rate in the embodiment of Bostano hot spring, the water collection of Bostano hot spring, and the entrance to the Bostano pool were (0.9 µsv/h-1.5 µsv/h; mean: 1.2 µsv/h), (1.23 µsv/h -1.37 µsv/h; mean: 1.32 µsv/h), and (2.7 µsv/h-3.5 µsv/h: mean: 3.1 µsv/h), respectively. The outdoor gamma radiation dose rate in the embodiment of momadi hot spring was (0.06 µsv/h-0.13 µsv/h; mean: 0.095 µsv/h). The Siahkosh Nimekar hot spring in various stations was (0.2 µsv/h- 0.3 µsv/h; mean: 0.25 µsv/h). The Angoran hot spring was (0.15 µsv/h-0.25 µsv/h; mean: 0.2 µsv/h).

Conclusion: This study showed that the gamma radiation risk level of the embodiment of Khest hot spring 3 was higher than all of the hot springs investigated. This is approximately equal to the gamma dose rate of Ramsar in northern Iran, which has high background radiation and is well known in the world. To reduce the effects of gamma radiation on the health of swimmers, individuals, and authorities in these regions should consider protection and prevention policies.

Keywords: Gamma Radiation, Health Risk, Swimmers, Hot Springs, Bandar Abbas, Iran.

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Optimization treatment of Pharmaceutical wastewater containing cefixime by catalytic ozonation combined with S2O4/MAC using central composite design (CCD)

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Abstract

Background: among the pollutants of the pharmaceutical industry, antibiotics are one of the most important pollutants. Therefore, the present study was designed and implemented with the aim of determining the amount of synthetic wastewater treatment containing cefixime antibiotic by catalytic ozonation in the presence of persulfate activated with magnetic activated carbon using the central composite design method.

Methods: This experimental study was conducted in a laboratory and in a closed system. In this study, the effect of the most important parameters such as solution pH, reaction time, catalyst dose, cefixime initial concentration and persulfate concentration on the removal efficiency were studied. HPLC device was used to analyze the antibiotic residue in the samples.

Results: The ANOVA analysis showed that all of operational parameters in cefexim degradation are significant. the Optimum conditions obtained suggested using response surface design (RSM) were at pH = 8, cefixime concentration = 57.5 mg/L, catalyst concentration = 1.5 g/L, retention time = 46.25 min, persulfate concentration = 1.75 mM; which the maximum degradation was 97%.

Conclusion: The results of this study showed the acceptable efficiency of the catalytic ozonation process in the presence of persulfate activated with magnetic activated carbon in breaking down the antibiotic cefixime.

Keywords: Cefixime, Catalytic Ozonation, Persulfate, Magnetic Active Carbon (MAC), Central Composite Design.

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Identifying mitigation strategies of comprehensive health centers against dust hazard: A qualitative study in Iran

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Abstract

Background: Exposure to dust can disrupt healthcare services and severely affect all activity domains of the health system. The aim of this study was to explore mitigation strategies for comprehensive health centers against dust hazard.

Methods: The present study was conducted using a qualitative design with a conventional content analysis approach in 2022-2023. The participants in this study were managers and staff of comprehensive health centers and experts in health in disasters and emergencies in Kerman, Bam, Regan, and Ahvaz. Data were collected through interviews. Data collection continued until data saturation. The collected data were analyzed based on the steps proposed by Graham and Landman. Participants' statements, after recording and transcribing, were categorized into semantic units. Data were analyzed by using MAXQDA software version 2022.

Results: The analysis of the data revealed five main themes: reducing the impact of dust hazards, management functions, empowerment and performance improvement, maintaining and promoting safety, and inter- and intera organizational coordination to implement mitigation strategies.

Conclusion: The findings showed that the mitigation strategies and solutions can be used by health policymakers and planners to reduce the impact of dust hazards, empower and motivate healthcare staff, develop training protocols to enhance risk perception of the staff and members of the community, create the necessary infrastructure for adoption of effective mitigation strategies in healthcare centers to create resilience and continue service delivery.

Keywords: Dust, Hazard, Mitigation, Comprehensive, Health Centers.

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A review of facemasks pollution in the Environment: A focus on reduction pollution

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Abstract

Background: Face masks are personal protective equipment and most of the available masks are disposable and made of plastic layers. When a large number of masks are discarded in the environment, it causes the accumulation of thousands of tons of contaminated waste in the environment, which becomes a pollutant and causes environmental and social problems and issues related to disposal and waste management. The new SARS-CoV-2 virus has caused an increase in the use of face masks and, as a result, their waste. The purpose of this study is to investigate the environmental pollution caused by face masks and its reduction methods.

Methods: In this study, we have selected (number of articles) the peer-reviewed publications on mask usage and its environmental pollution by utilizing the ScienceDirect, Google Schoolar databases. By reviewing the literature, the structure and types of face masks were identified based on the performance and efficiency of filtration, as well as plastic pollution (microplastic) in land and water environment and ecological changes were investigated. Moreover, ways of managing and dealing with the negative impact of mask waste on the environment were studied.

Results: The results showed that disposable face masks usually have a three-layer structure and the most used types of face masks are surgical and respiratory types. Face masks contribute to microplastic pollution, which mask microplastics also contain a diverse range of harmful compounds. Mask waste also causes global warming by releasing CO2 and greenhouse gases. One of the most used methods of mask waste management is burial and burning, recycling, and reuse. In addition, it is possible to replace face masks based on plastic polymer with biodegradable masks based on biopolymer.

Conclusion: All in all, a strict regulations should be taken by the government sectors to improve the masks disposal to avoid the environmental pollution.

Keywords: Face Mask, Waste Management, Microplastic, Mask Environmental Pollution, COVID-19.

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Application of hormesis in environmental health research

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Abstract

Hormesis refers to the positive biological effects of exposure to low doses of a stressor that is toxic at higher doses. These effects include enhanced defense system and stimulation of plant/microorganism growth and reproduction. Hormesis has emerged as a fundamental concept with widespread relevance to environmental health. Its use in the assessment of environmental effects and environmental toxicity can reduce the uncertainties created by extrapolation from high to low doses of pollutants. Similarly, taking it into account in risk assessment can help to deal with toxic hazards from chemical mixtures. In addition, it can maximize the effectiveness of new agrochemicals applied at the lowest possible concentrations, thus reducing their environmental and human risks. Hormesis-based interventions, such as plant priming and stimulation of beneficial insects and waste-degrading microbes, can reduce chemical loads in the environment and thereby increase environmental health. Incorporating hormesis into strategies to control harmful organisms, such as pests, pathogens, and harmful algal bloom organisms, can help combat chemical resistance. Studies involving hormesis also provide useful information on appropriate pollutant tolerance levels for microorganisms and plants during bioremediation and phytoremediation, thus enhancing environmental remediation. Overall, hormesis offers several potential applications in health and environmental research.

Keywords: Hormesis, Environmental Risk Assessment, Dose-Response Relationship.

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Comparison of four sampling methods in order to estimate the amount of cigarette filters left on the recreational beaches of Mazandaran province and to estimate the amount of metals that can be released into the environment through them

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Abstract

Background: Cigarette butts are a major source of environmental pollution, leaching chemicals into the environment. A standardized method is needed to assess the amount of filters on beaches. Understanding the release of metals from these pollutants is crucial for addressing beach pollution.

Methods: In this combined experimental and meta-analysis study, four sampling methods were compared to estimate the amount of cigarette butts left on the recreational beaches of Mazandaran province and the potential release of heavy metals into the environment through them. The sampling methods included circular methods with diameters of 5, 10, and 15 meters, as well as a rectangular method with an area of one meter by ten meters parallel to the waterline. The study utilized systematic study methods, meta-analysis, and information fitting.

Results: The results of the Kruskal-Wallis test showed that the average in at least one of the sampling methods has a significant difference with other methods ($P<0.006$). Therefore, in the continuation of Mann-Whitney U non-parametric tests, the average data did not have a significant difference in the circular method. But all of them had a significant difference with the rectangular method ($P<0.05$). Therefore, the difference between the averages in the circular method was less than the rectangular method. Also, the minimum and maximum amount of released metals in terms of micrograms per square meter of the shores of the Caspian Sea were related to mercury and manganese.

Conclusion: Circular methods with different diameters are equally effective in reducing cigarette filter accumulation from coastal waves and wind. They can be used as a standard method to estimate the number of filters on seashores. Cigarette waste is a source of metal pollution, and rapid leaching of metals can harm coastal and marine organisms.

Keywords: Sampling, Cigarette Filter, Seashores, Pollution, Metals.

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Integrated removal of metronidazole in aqueous solutions: investigation of synergistic effects of hybrid sono-photocatalytic process (UV + US + TiO2 + H2O2)

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Abstract

Background: The aim of the study is to investigate the amount of metronidazole antibiotic removal by the sono-photocatalyst process in the presence of H2O2 using TiO2 nanoparticles. TiO2 nanoparticle was fixed on glass as a substrate.

Methods: The structure of the synthesized nanoparticles was investigated by X-ray diffraction (XRD) and electron microscopy (SEM). The effect of the processes involved in the sono-photocatalytic process (UV + US + TiO2) in the presence of H2O2 (photolysis, absorption, sonolysis, sonolytic, photocatalyst and photocatalyst + H2O2) were compared. The effect of the effective parameters on the process such as the initial concentration of the dye, the initial pH of the solution and the contact time on the rate of degradation and sonophotocatalytic decomposition in the presence of H2O2 in the removal of the antibiotic metronidazole was investigated.

Result: The maximum amount of removal was achieved at the initial concentration of metronidazole antibiotic equal to 5 mg/liter, pH equal to 7 and catalyst concentration 1 g/l in a period of 20 min to the extent of 93%. Degradation of metronidazole antibiotic by the sono-photocatalyst process in the presence of H2O2 followed pseudo-first-order kinetics (R2=0.977). The stability of stabilized TiO2 nanoparticles during 5 stages of recycling in this process was investigated and it was found that these nanoparticles have high stability.

Conclusion: Therefore, the sono-photocatalyst process in the presence of H2O2 as an advanced oxidation hybrid process with high efficiency in a short period of time is able to decompose and remove resistant organic pollutants in the environment and can be used in industry.

Keywords: Sono-Phtocatalyst, Stabilization, Metronidazole Antibiotic, Advanced Oxidation, H2O2.

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Comparison of adapted mortality rate due to arsenic pollutants in drinking water of province Hamadan

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Abstract

Background: Considering the importance of the known effects of exposure to arsenic through drinking water and the threat to the health of consumers of contaminated water, the present study aims to determine the relationship between the mortality rate due to mortality rate and the concentration of arsenic in the groundwater of Hamadan province.

Methods: In this study, the data of deaths due to various types of malignancies, separated by the cities of Hamadan province, related to recent years, were obtained from the Health Vice-Chancellor of Hamadan University of Medical Sciences. Sampling of drinking water from all the cities of Hamedan province was done by the experts of the environmental health unit of the deputy health department and the arsenic concentration was measured in the reference laboratory using the polarography method. All data were collected in an Excel file. At the end, the cleaned data was entered into Stata software and analyzed using appropriate descriptive and analytical statistical methods.

Results: According to the results of Poisson regression, among the various causes of death, congenital anomalies 1.28 (1.28-2.10), diabetes mellitus 4.05 (3.5-5.37), Alzheimer's is 5.94 (3.67-9.61), and digestive organs cancer 5/86 (3.38-10.16), and meninge and brain cancer 1/57 (1.02-2.41), showed the highest relationship with arsenic pollution at a significant level (p value<0.05).

Conclusion: Based on the results, a positive relationship was determined between the exposure to high concentrations of arsenic in contaminated areas and mortality due to stomach, liver, breast,

meningeal and brain cancers, diabetes mellitus 4.05 (3.5-5.37), Alzheimer's in contaminated areas. Therefore, due to the toxic and carcinogenic properties of inorganic arsenic species and various health complications resulting from drinking water, it is necessary to use appropriate management and executive measures in contaminated areas. These measures and solutions include continuous monitoring of arsenic, basic education to the people of the region, use of effective methods to remove arsenic at the point of consumption and source.

Keywords: Arsenic, Mortality Rate, Hamadan.

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Non-carcinogenic inhalation risk assessment of bacterial bioaerosols at the Hospital waste decontamination station

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Abstract

The existence of bioaerosols in the air of hospitals poses a significant concern. There is insufficient research on bioaerosols in hospital waste decontamination stations. This study aimed to investigate the non-carcinogenic inhalation risk of bacterial bioaerosols in a waste decontamination station at a teaching hospital in Mashhad. Sampling was done in active manner, in five days, at three locations (yard, rest room, and autoclaves' room) with two replications, using BioStage 200 and a 15.14 liter per minute sampling pump for 10 minutes, at average human breathing height (150 cm above the ground). After calculating the bacterial bioaerosols concentration, the inhalation risk assessment was performed using Crystal Ball software. The concentration of bacterial bioaerosols was obtained as 217.09 (230.17) $^{CFU}/_{m^3}$. There was no significant difference between the concentration of bioaerosols in different sampling locations. However, the rest room with a median concentration of 321.9 (793.52) $^{CFU}/_{m^3}$ of bacterial bioaerosols was the most contaminated location and the presence of more people in that place significantly increased the concentration of bioaerosols. The autoclaves' room and the yard had the next levels of bioaerosol concentration, with median of 230.26 (160.77) and 193.38 (126.32) $^{CFU}/_{m^3}$, respectively. The predominant bacteria were gram-positive cocci, which can cause various health effects. The non-carcinogenic risk level was acceptable in the yard and autoclaves' room, but in the rest room was in a concerning level (HQ=2.07) and requires corrective measures to control the bacterial bioaerosols concentration. The concentration of bacterial bioaerosols was higher than the recommended amount by Pan American Health Organization (PAHO). The results obtained will be useful for managerial decisions in the hospital waste decontamination station to reduce the exposure of bioaerosols and to develop a useful guideline.

Keywords: Bioaerosol, Risk Assessment, Inhalation Risk, Hospital Waste Decontamination Station.

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Aloe vera leaf-wastes derived adsorbents for Bisphenol A removal from aqueous media

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Abstract

Bisphenol A in the body can increase the production of reactive oxygen species such as superoxides, peroxides, and hydroxyl radicals. Therefore, it is necessary to reduce the exposure of human societies to this compound by using economically and technically justified processes. The use of agricultural wastes as biodegradable absorbents can fulfill the problems mentioned above. Aloe vera is a plant widely cultivated in some specific areas of Iran due to suitable climatic conditions. Therefore, in this research, carbon produced from aloe vera leaf wastes modified by H2SO4 and HNO3 as a green absorbent was used to remove bisphenol A from aqueous solutions. The adsorbents were characterized using FTIR, SEM, XRD, TGA, ZP, and BET techniques. It was found that under optimal conditions (solution pH of 3, contact time of 45 min, 20 mg.L-1 of Bisphenol A and 2 mg.L-1 of the adsorbent), the adsorption process follows the Freundlich isotherm model with and the pseudo-second-order kinetic model (R2>0.99). The maximum uptake capacities for bisphenol A on the carbon-based adsorbent modified by HNO3 and H2SO4 are 40.27 and 39.15 mg.g-1, respectively. From thermodynamic studies, it is also clear that the adsorbent process is spontaneous and endothermic.

Keywords: Activated Carbon, Green Adsorbent, Aloe Vera Leaf Waste, Bisphenol A.

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Sulfamethoxazole antibiotic removal from aqueous solution and hospital wastewater using photo-Fenton process

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Abstract

The presence of antibiotics in the environment can threaten the ecosystem. The current work was an aim to degrade the sulfamethoxazole (SMX) antibiotic from the aqueous solution and hospital wastewater by the photo-Fenton process. The experiments were carried out in a quartz reactor and effects of operational parameters such as pH, H2 O2 :Fe2+ ratio, reaction time, and SMX antibiotic concentration were evaluated. After optimizing the parameters, the efficiency of the photo-Fenton process was tested for eliminating SMX from the hospital wastewater. The optimal conditions for SMX removal by the photo-Fenton process were obtained at pH 3, H2 O2 :Fe2+ ratio of 11:2, the initial SMX concentration of 25 mg/L, and the reaction time of 15 min. At optimized conditions, the removal efficiency of the SMX and chemical oxygen demand was attained 98.06 percent and 87.65 percent percent, respectively. The efficiency of the photo-Fenton system for removing SMX antibiotics from the hospital wastewater was obtained 67.42 percent. The pseudo-first-order kinetic model was well fitted the data for SMX removal using the photo-Fenton process. Accordingly, the photo-Fenton process is an effective method for removing SMX antibiotics from aqueous solutions and hospital wastewaters.

Keywords: Sulfamethoxazole, Hospital Wastewater, Photo-Fenton Process, Antibiotic Residues, Pseudo-First-Order.

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Photocatalytic degradation of RR 195 dye by application N_doped FeNi3/TiO2 magnetic nano composite as a novel photocatalyst: mechanism and kinetic

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Abstract

Dyes are one of the most dangerous chemical compounds in industrial wastewater, including textile wastewater. Reactive dyes have many uses in the textile industry because due to the high solubility and stability of these dyes in water, the discharge of wastewater containing these dyes into receiving waters prevents the transmission of sunlight to aquatic environments and reduces photosynthesis and also disrupts It happens in biological processes. The aim of this study was the synthesis of N_doped FeNi3/TiO2 nano photocatalyst and to investigate the degradation efficiency of reactive red dye 195 from aqueous medium. Characterization test was including FT-IR (Fourier-transform infrared spectroscopy), FESEM (Field Emission Scanning Electron Microscopy), BET (Brunauer–Emmett–Teller) and VSM (Vibrating Sample Magnetometer Systems) showed that N-doped FeNi3/TiO2 nanocomposite specifications containing morphology, magnetic properties, and formed functional groups were confirmed. The results of photo-catalytic experiments were showed that the degradation performance of RR195 dye under optimal condition (pH = 3, photo-catalyst dose 2 g/L, dye concentration = 20 mg/L) reached to 96%, and COD results were approved the formation of intermediate compounds. Moreover, the results of reusability study demonstrated that the degradation percentage of R195 was decreased to 65 % during 5 cycles. It can be concluded that N-doped Fe-Ni3/TiO3 nanocomposite has a good potential and practical ability to eliminate RR195 from aqueous media

Keywords: N-doped FeNi3/TiO2 Synthesis, Reactive Red Dye 195, Photocatalytic Degradation.

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The study of peroxymonosulfate (PMS) activation by bromide (Br-) for Reactive yellow 145 removal from aqueous solution

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Abstract

Background: Reactive yellow 145 (RY-145) is one of the common pollutants in wastewater produced from textile, printing and tanning industries, which has mutagenic and carcinogenic effects on humans and aquatic organisms. There are several methods for the treatment of dyestuff effluents. Meanwhile, advanced oxidation processes (AOPs) are very efficient for the decomposition of organic compounds. The basis of the advanced oxidation process is based on the formation of OH radical and sulfate radical (SO42-), which can produce SO42- radical from the activation of peroxymonosulfate (PMS). On the other hand, halide ions including bromide (Br-) are widely present in various aqueous environments and play a significant role in PMS activation. In this study, the reaction between PMS and Br− in an aqueous solution for the degradation of (RY-145) was investigated.

Methods: In this experimental study, the effect of the initial pH of the solution, reaction time, Br− and PMS dosage, RY-145 dye concentration, coexisting anions and humic acid on the efficiency of the process were experimented. In the next step, scavengers such as ethanol, nitrobenzene, TBA, L-Histidine and PBQ were used to identify the possible radicals formed and finally Toxicity assessment using Lepidium sativum seed germination method was experimented to investigate the possible detoxification of RY-145 dye by the PMS/Br− process.

Results: The results indicated that the synergistic effect of the simultaneous presence of Br− and PMS for RY-145 dye degradation was measured to be 11.89 (73.99% degradation efficiency). Based on scavenger experiments, HOBr/OBr−, •O2–, and 1O2 play a dominant role in RY-145 dye degradation. Conditions including severe alkaline pH and the presence of CO32– led to disruption in the optimal performance of the PMS/Br− process for RY-145 dye degradation.

Conclusion: Examining the results of this study regarding the degradation of Reactive yellow 145 in the PMS/Br- process indicates that PMS in aqueous solutions containing Br- can be effectively activated and degradation of organic pollutants. However, the standard values of bromide should be considered in this method.

Keywords: Reactive Yellow 145, Peroxymonosulfate, Bromide, Advanced Oxidation Process.

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Taguchi optimization of Catalytic Ozonation Process Using Modified Bone Char Ash - MgO - FeNO3 for Removal of Reactive Red 198 from Aqueous Solutions

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Abstract

Reactive dye is an environmental contaminant that have been mostly used in textile industry. In this research Bone Char Ash modified with MgO - FeNO3 catalyst applied for removal of RED198 dye in COP system and operational parameter such as initial RED198 concentration, pH, Catalyst dose, and contact time were optimized with Taguchi method. Accordingly the best condition for removal of RED198 obtained as initial RED198 concentration: 10 mg/L, pH: 10, Catalyst dose: 0.1 g/L and reaction time: 15 min. Also optimization experimental showed that The initial RED198 concentration had a significant influence on RED198 removal in COP process (54.03%), and reaction time had lower contribution (2.04%.).

Keywords: RED198, MgO-FeNO3, Bone Char Ash, Catalytic Ozonation, Taguchi.

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Investigating interactions and biological interactions between two emerging pollutants, tetrabromobisphenol A (TBBPA) in the presence of microplastics (MPs) from waste disposed of in beaches and aquatic ecosystems

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Abstract

The presence of emerging organic pollutants such as tetrabromobisphenol A (TBBPA) along with microplastics (MPs) through unprincipled disposal of electronic and plastic waste into the sea and beaches have attracted concerns. Due to the decomposition of plastic waste, MPs with their small size, specific surface area and hydrophobic nature act as carriers of hazardous chemicals and come in contact with TBBPA and adhere to it. MPs in combination with TBBPA creates more synergy. Therefore, the presence of MPs in seas and beaches affects the fate, bioavailability and toxicity of TBBPA through the adsorption-desorption process. Considering these factors, our aim of this review study is to investigate and biological interaction between two new emerging flame retardant pollutants TBBPA in the presence of MPs from waste disposed on beaches and aquatic ecosystems. Current review of international electronic databases; PubMed, Science Direct, Web Of Science, Scopus were conducted using the main keywords Microplastic, Aqueous environment, Tetrabromobisphenol A and equivalent words in Mesh until 2023. The results of the studies showed that MPs along with TBBPA flame retardant enter the sea through different ways, especially urban waste, and cause pollution of the environment, beaches and the sea. The presence of MPs in sediments greatly affects the transport of TBBPA between solid and aqueous phases. Surface adsorption, intraparticle diffusion, and mass transfer may be involved in the adsorption process of TBBPA to MPs, which can be enhanced with higher ionic strength and less dissolved organic matter. Adsorption capacity for TBBPA with high ratio and small particle size of MPs was observed in MPs-S sediments. Considering the health and ecological risks of dumping waste into the seas and the introduction of emerging pollutants such as TBBPA and MPs, the use of new methods for waste disposal, separation at the source and the establishment of stricter laws to prevent unprincipled disposal of this waste into the aquatic environment it is suggested.

Keywords: Microplastic, Aqueous Environment, Tetrabromobisphenol A, WEEE.

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Urinary concentrations of parabens amongst Iranian women and its association with personal care products using behavior

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Abstract

Parabens are commonly used as preservatives in various personal care products (PCPs) mainly due to their antimicrobials properties. However, new evidences have shown that higher exposure to parabens could result in endocrine disruption and somehow increase malignancies. In this study, the concentrations of methylparaben (MP), ethylparaben (EP), propylparaben (PP), and butylparaben (BP) in urine samples from 153 Iranian women were measured and their relationship with the use of 19 distinct PCPs was examined. Detection frequency of parabens varied in the range of 86-100%, and their median concentration was 8.53-93.4 µg/L, representing wide exposure of participants to parabens. The highest daily intake (DI) was related to MP (Median=13.4 µg/kg-BW/day), however, it was lower than the acceptable daily intake (ADI). The difference in the level of parabens between three groups of PCPs users (low, moderate, and high) was significant ($P<0.05$). So, the parabens' level of exposure in Iranian women has associated with their PCPs using habits, and the levels of urinary parabens were different based on the type of used products. These findings could serve as a basis for more extensive studies to investigate the extent of exposure to parabens and to determine appropriate strategies for reducing paraben exposure.

Keywords: Biomonitoring, Women, Urinary Parabens, Personal Care Products, Exposure.

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Investigation the effectiveness of zeolite and activated carbon impregnated with monoethanolamine for adsorption of carbon dioxide from combustion gas of methane

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Abstract

Background: Absorption of carbon dioxide from combustion gas reduces the emission of this greenhouse gas and helps to deal with global warming and climate change. Therefore, finding a suitable absorbent for this purpose is very important. Considering that monoethanolamine is one of the known adsorbents of carbon dioxide, the aim of this study was to determine the effectiveness of zeolite and activated carbon coated with monoethanolamine in absorption of carbon dioxide from methane combustion gas.

Methods: Granular activated carbon (GAC) and natural clinoptilolite were coated using different amounts of monoethanolamine (MEA) by impregnation method. 5.0 grams of adsorbents containing amines were separately filled inside a copper tube with a length of 20 cm and a diameter of 1.5 cm, and methane combustion gas with a flow of 100 ml/min was passed through it by a suction pump. Carbon dioxide absorption experiments were performed with an initial concentration of 2000 ppm at temperatures of 25°C, 50°C, and 75°C by placing the tube containing absorbent material in a hot water bath equipped with a thermostat. Carbon dioxide concentration was continuously measured and recorded by ND IR-CO2 analyzer.

Results: The absorption capacity of carbon dioxide by zeolite coated with monoethanolamine at a temperature of 50°C was 20 mg/g, which was 10 mg/g under the same conditions for activated carbon. Zeolite and activated carbon without amine did not absorb carbon dioxide. By increasing the temperature to 75°C, the amount of carbon dioxide absorption increased by about 20%. As the temperature increased, the saturation time of the adsorbent decreased.

Conclusion: zeolite coated with monoethanolamine showed better performance than activated carbon containing amine for carbon dioxide absorption. Considering the cheapness of zeolite, it is a suitable sorbent for carbon dioxide from the combustion gas stream.

Keywords: Carbon Dioxide, Zeolite, Activated Carbon, Amine.

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Spatio-temporal variations, secondary transformation, and health risk assessment of BTEX compounds in urban air of Margheh, Iran

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Abstract

Background: The present study aims to investigate the Spatio-temporal variation of benzene, toluene, ethylbenzene, and xylenes (BTEX), their emission sources, and health risk assessments in urban ambient air of maragheh, Iran.

Methods: Air samples were collected using active samplers with charcoal sorbent tubes in the morning and evening from 15 points with low, medium, and high traffic areas from February 2021 to November 2021. Inverse distance weighting (IDW) was used to map the spatial distribution of BTEX compounds. The carcinogenic and non-carcinogenic risks due to BTEX exposure were assessed using Monte Carlo simulation.

Results: According to the results, the concentration of BTEX in high traffic areas was 5.16 times higher compared to low traffic areas ($p < 0.001$), because of higher population and heavy traffic in high traffic areas. The highest mean concentration of BTEX was observed during the winter due to emission from houses' heating systems, atmospheric inversion, stable atmosphere, and declined dilution of pollutants. In addition, heavy vehicular traffic and lack of hydroxyl radicals (%OH) for reacting with the target compounds resulted in higher BTEX concentrations during rush hours compared to non-rush hours (1.67 times).

Conclusion: The inhalation lifetime cancer risk (ILCR) for benzene and ethylbenzene in three age groups of infant, children and adults was estimated to be in the range of 2.63 × 10-7 – 5.14 × 10-6 and 1.29 × 10-8 – 2.53 × 10-7, respectively, indicating that the ILCR value of benzene in age groups of children and adults exceeded the WHO and EPA recommended values.

Keywords: BTEX Compounds, High Traffic Areas, Spatial Distribution, Health Risk Assessments.

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Examining the methods of removing pharmaceutical pollutants using nanotechnology

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Abstract

Background: One of the important resources for life on earth is water, and one of the most important problems and challenges in the world is related to water pollution. One of the biggest challenges around the world is the treatment of water and wastewater, which must be overcome, because these substances contain pollutants, including pharmaceutical pollutants, and pharmaceutical effluents contain some of the main residues. are related to water pollution.

Methods: Choosing the right method to remove these pollutants has always been of interest, the most important of which is the use of nanoscale materials. The use of nanotechnology to remove pharmaceutical contaminants such as antibiotics, hormones, antiviral drugs, etc. from sewage has increased in recent years.

Results: Nanoscale materials have unique properties such as wide surface area, environmentally friendly, high affinity for inorganic and organic compounds, as well as high absorption.

Conclusion: With the help of this research, some applications of nanotechnology for the treatment of drug-based wastewater were introduced. Among the different methods of water purification, the use of nanotechnology is the best option for wastewater treatment.

Keywords: Nanotechnology, Pharmaceutical Pollutants, Removal.

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Investigating the efficiency of removing reactive red 198 from aqueous solutions using the advanced analysis method: ultrasound/zinc oxide nanoparticles/monosulfate proxy

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Abstract

Wastewater includes domestic, municipal, or industrial and hospital liquid waste, which is usually disposed of through a pipe or sewer (sanitary or combined) and sometimes in a sewage tank. With the growth and development of industrial production, new compounds are introduced into the environment as pollutants. Among these pollutions, we can mention the pollution caused by colors. The discharge of colored wastes into the environment is one of the important sources of pollution that disturbs the beauty of the environment, and corrosion, rust and soil pollution are among the most important reasons for collecting water and industrial wastewater. Red reactive dye 198 belongs to mono azo dye, which is widely used in the textile industry of the country. The level of toxicity of reactive dyes is higher compared to other dyes and they cause factors such as irritation, cancer and mutation in humans. This study was conducted with the aim of investigating the efficiency of dye absorption process on zinc dioxide nanoparticles and peroxymonosulfate from industrial wastewater and other water environments.

Keywords: Reactive Red.

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Investigating the carcinogenic risk of radon and its association with the concentration of PM10, PM2.5, and PM1 in indoor air

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Abstract

Background: Since people spend a considerable amount of their time indoors, the amount of their exposure to radon as a natural radioactive and the second cause of lung cancer after smoking in indoor air is of paramount importance.

Methods: This study was conducted in the university campus of Ahvaz University of Medical Sciences, where the concentrations of radon, airborne particles in 10, 2.5 and 1 micrometers, along with meteorological parameters were measured. The measurements were performed in three educational and therapeutic sampling points at both ground and underground levels during cold and hot seasons.

Results: The results showed that in 3.44% of the samples, the concentration of radon exceeded the permissible limit (148 Bq/m3) recommended by the United States Environmental Protection Agency (USEPA). Factors affecting the increase of radon concentration in indoor air included cold season, underground sampling points, air pressure, and humidity. Concentration of particles in the air did not have any effect on radon in the indoor air. The annual effective dose of exposure to radon (DR), the annual effective dose of lung (DE) and the risk of lung cancer cases (LCC) during both cold and hot seasons and at ground and underground levels were lower than the permissible values recommended by the Intercommittee International Council on Radiation Protection (ICRP). Also, the concentration of radon in sampling sites did not show a risk in terms of excess lifetime carcinogenic rate (ELCR).

Conclusion: According to the obtained results, in order to reduce the effects of exposure to radon, more attention should be paid to indoor air parameters including temperature, humidity, pressure, ventilation, and adequate air exchange.

Keywords: Radon Concentration, Particle Concentration, Meteorological Parameters, Risk Assessment, Ahvaz.

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Estimation of Emission and Modeling of Natural Gas Pollutants Distribution Using AERMOD Model and Geographic Information System (GIS) (Case Study: Sirjan Non-Governmental Industrial Town)

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Abstract

Background: Assessment, control and management of air pollution is one of the most important challenges facing the country's industrial towns.

Methods: The purpose of this research in the first step was to estimate the distribution modeling of air pollutants, CO, SO2, from Sirjan industrial town. The next step was to model and study the distribution of these pollutants up to a radius of 50 km using the AERMOD model and geographic information system (GIS) in the non-governmental industrial town of Sirjan.

Results: The results of this research showed that for the SO2 pollutant, the maximum concentration was in the eastern direction and in an approximate radius of 5 km from the source with a concentration of 50 ug/m3. The one-hour maximum during the modeling period is equal to 0.46 ug/m3, which is very insignificant compared to the standard value of 395 ug/m3, and the concentration of this pollutant within a radius of 50 km from the source is less than 5 ug/m3. Also, for the CO pollutant, the maximum concentration of the pollutant has occurred up to an approximate radius of 20 km from the source with a concentration of 50 ug/m3. Also, the maximum one-hour concentration of CO during the modeling period is equal to 118 ug/m, which is very small compared to the standard value of 40,000 ug/m3, and the concentration of this pollutant reaches 15 ug/m3 within a radius of 50 km.

Conclusion: The investigation of air quality in the intended study area also showed that the AERMOD emission model was a suitable model for determining the average hourly and annual concentration of pollutants from point emission sources. In general, according to the evaluation of the forecasts, the performance of AERMOD software in predicting the concentration of pollutants can be considered acceptable, so that the dispersion model of AERMOD can be considered as a suitable scientific tool for the analysis of control and policy strategies to reduce and prevent Air pollution used.

Keywords: Air Pollutants Dispersion, Pollution Concentration, Geographic Information System, Critical Points Of Pollution.

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Comparative study of the prevalence of keratosis in villages of Kabootar Ahang regione and its relationship with arsenic level: a cross -sectional study

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Abstract

Arsenic is one of the toxic elements for humans, which has been confirmed by the World Health Organization as a carcinogen. Long-term exposure to arsenic has serious and irreversible effects on human health. Considering that the level of arsenic in water is higher than the standard level in some villages of Kabootar Ahang city of Hamadan province, a study was conducted to check the codes of keratosis skin complication in these areas. In this cross-sectional study, during which 189 and 224 residents of villages with arsenic and without arsenic were studied, respectively. Medical examinations were performed by a trained doctor. The data related to arsenic in water was also obtained from the Health Vice-Chancellor of Hamadan University of Medical Sciences. According to the data announced by the relevant organization, the average concentration of arsenic in contaminated and uncontaminated villages was reported as 37.9 and less than 2 micrograms per liter, respectively. Systolic and diastolic blood pressure in infected villages were 99.71 and 95.59 mm Hg respectively, and in control villages 65.48 and 64.37 mm Hg, no significant difference was observed between the two groups (p=0.18). The occurrence of keratosis as a result of long-term exposure to arsenic was significantly increased in the exposed group compared to the control group (OR: 26.30, <0.001). The effect of long-term exposure to arsenic in the place of keratosis It was also meaningful. The state of drinking water in some villages of Hamadan province has caused the spread of arsenic exposure complications such as skin diseases. Therefore, due to the high level of arsenic in the water of these areas, it is necessary to continuously monitor the supply of safe drinking water.

Keywords: Arsenic, Keratosis, Skin Complications, Hamadan.

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Application of hydrothermal carbonization process in urban and industrial waste management: relying on plastic waste

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Abstract
Along with urbanization, changes in consumption patterns, and the expansion of industries and services, the quantity and quality of generated waste have also undergone changes. The increase in waste volume and the heterogeneity of its composition highlight the importance of selecting appropriate management approaches. Improper waste management and disposal lead to significant harm to the environment and human society. Plastic is one of the most widely used materials in industries. Municipal and industrial wastes include significant amounts of plastic wastes. Currently, the global production of plastic is more than 350 million tons annually. Plastic waste leads to many environmental and health damages. In the production of plastic, additives are used that humans can be exposed to through ingestion, skin contact, and inhalation, and these additives may be carcinogenic or endocrine disruptors. Another effect of insufficient plastic waste management is the production of microplastics, which create a widespread form of pollution. Due to the high calorific value of plastic waste, the use of thermal processes can be a suitable solution for energy recovery and material recycling from this type of waste. Hydrothermal carbonization is one of the thermochemical processes employed for the treatment of wastes in the presence of water at mild temperatures ranging from 180 -250°C and retention times of 5-240 min with automatic production pressure. Hydrothermal carbonization operates at lower temperatures compared to conventional thermal processes. The reaction time is also shorter in this process. Since hydrothermal carbonization occurs in the presence of water, the necessity of drying the waste, which is an energy-intensive and costly process, is eliminated. The final products of this process include a carbon-rich solid known as hydrochar, which has many valuable applications in industry and the environment, as well as a liquid phase and a relatively small amount of gas.

Keywords: Waste, Plastic Waste, Hydrothermal Carbonization.

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Strategic planning of Ghayen city waste management by SWOT method

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Abstract

Background: Today, the production and management of solid waste has undergone significant changes due to the development and progress of science and technology. Municipal solid waste management depends on factors such as production, collection, transportation, waste disposal and recycling. Therefore, the management scope of this issue is very wide and variable, and for such an organization there is no other way than strategic management. One of the most appropriate planning techniques in this field is the SWOT matrix (Strengths, Weaknesses, Opportunities and Threats Analysis), which is used today as a new tool to analyze performance and identify gaps. Therefore, in this research, the strategic planning of Ghayen city waste management is presented.

Methods: In order to develop a strategic plan for waste management in Ghayen city, in this research, the hierarchical analysis method (AHP) was used in SWOT to determine the priority of SWOT criteria. Opportunities, threats, strengths and weaknesses were used to analyze, and then by completing the IFE and EFE strategic planning table, the priorities of actions were determined. Also, the opinions of experts and specialists have been used for further research.

Results: The evaluation of the results of the matrices of internal and external factors shows that the waste management of Ghayen city has weaknesses in terms of internal factors, and the evaluation of external factors indicates the effective use of opportunities and responding to threats. However, it can perform well by enhancing opportunities and countering threats.

Conclusion: The strategic priorities obtained in this research can be considered as a fundamental step in the path of sustainable development to achieve the goals of urban waste management in Ghayen. On the other hand, municipalities and local organizations can adopt the necessary policies to strengthen local innovation and creativity in organization and implementation. Also, families, industries and businesses, departments and service providers in the field of waste management are required to implement the municipal waste management system.

Keywords: SWOT, Waste Management, Ghayen.

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Toxicity of burnt waterpipe tobacco leachates on Peronia Peronii in aquatic and sediment media

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Abstract

This study was aimed to survey toxicity of burnt waterpipe tobacco leachates on Peronia Peronii in two aquatic and sediment environments as exposure media. The in-vivo toxic effects of five concentrations of waterpipe tobacco waste leachates on P. peronii were evaluated. The LC50 values of BTTs (burnt traditional tobacco) leachates to P. peronii were 17.50, 16.05, 11.31 and 9.38 g/L in 24, 48, 72 and 96h, respectively in aquatic media. These values for BFTs (Burnt fruit-flavored tobacco) leachates 14.86, 12.38, 9.53 and 7.46 g/L in 24, 48, 72 and 96h, respectively. In the case of sediments media, The LC50 values of BTTs leachates were 15.33, 13.70, 9.09 and 6.70 g/L in 24, 48, 72 and 96h, respectively. These values for BFTs leachates were 12.00, 10.32, 8.20 and 5.65 g/L in 24, 48, 72 and 96h, respectively. The toxicity of tobacco leachates for P. peronii was significantly higher for traditional tobacco leachates than fruit-flavored tobacco leachates. Our findings also showed a significant difference between the LC50 values of different leachates in two of water and sediment matrixes. The results of this work demonstrated that even tiny amounts of tobacco waste can lead to mortality of P. peronii and may pose a threat to aquatic and benthic organisms. Moreover, the results obtained from the present study can be as a baseline data to assessment indigenous effects causing from unsafe disposal of post-consumption tobacco waste in beach areas worldwide.

Keywords: Toxicity, Lethal Concentration, Tobacco Waste, Sediment Media, Peronia Peronii.

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Spatial Distribution and Source Apportionment of Heavy Metals in Road Dust of Qom City and Assessing the Attributed Ecological and Human Health Risks

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Abstract

Background: Heavy metals in road dust, pose health risks due to their potential impact on ecological systems and human health. The aim of this study is to identify sources, concentrations, spatial distribution of Pb, Cd, Cu, Ni, Zn, and Cr in order to inform strategies for sustainable urban development and safeguard public health.

Methods: Road dust samples were collected from the road surfaces in Qom. After drying and debris removeal, the sample were digested using HCl, HNO3, and H2O2 according to the US Environmental Protection Agency method. ICP-OES was employed for heavy metals measurments. Concentrations, correlations, spatial distribution, geo-accumulation index, ecological risk hazard index, and carcinogenic risk assessment were determined. Pearson's method and Kolmogorov-Smirnov test were used for statistical analysis.

Results: In the warm season, the mean concentrations of all HMs were higher, with total mean concentrations in the order of Pb = 130.1, Cd = 2, Cu = 78.7, Ni = 94.2, Zn = 227.3, and Cr = 39.5 mg/kg. Spatially, Pb, Zn, and Ni exhibited higher concentrations in the outskirts of Qom, while Cu, Cr, and Cd were relatively uniform throughout the city. The geo-accumulation index categorized all HMs as uncontaminated, except for Pb and Zn. Ecological risk analysis indicated a lower risk for all HMs, with a higher potential ecological risk index observed in the warm season compared to the cold season. Hazard index and carcinogenic risk assessment values suggested negligible health risks for individuals.

Conclusion: Positive matrix factorization (PMF) revealed four dominant factors influencing HMs, attributed to traffic-related and anthropogenic activities with 39 percent and natural sources with 32 percent during the cold and warm seasons.

Keywords: Risk Assessment, Heavy Metals, Health Impact Assessment, Road Dust.

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Investigating the efficiency of ceramic filter impregnated with green iron nanoparticles in removing hexavalent chromium: an effective approach in purifying domestic drinking water

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Abstract

Background: One of the toxic and dangerous pollutants in the environment is hexavalent chromium, which must be removed from the environment due to its accumulation properties in the environment and subsequent carcinogenesis in humans.Many studies have investigated the removal efficiency of ceramic water filters (CWF) impregnated with silver nanoparticles in order to remove microbial agents, however, little information is available about the performance of these filters in removing inorganic and organic pollutants.Therefore, this study was conducted with the aim of investigating the efficiency of ceramic filter impregnated with green iron nanoparticles in removing hexavalent chromium.

Methods: In this study, iron nanoparticles were prepared by green synthesis method. Then the nanoparticles were loaded on the surface of the ceramic filter through the painting method. After drying in the oven for 24 hours, it was placed in a continuous reactor and samples were taken from the filter at different concentrations of hexavalent chromium (1, 5 and 25) and at hourly and daily intervals.Finally, after filtration of the samples, the amount of hexavalent chromium absorption was measured by a spectrophotometer.In order to investigate the chemical composition, structure and morphology of the ceramic filter surface impregnated with iron nanoparticles, FESEM and EDS analyzes were performed.

Results: Based on the results obtained from the continuous tests, the absorption percentage decreases with the increasing in hexavalent chromium concentration.Also, two stages of efficiency reduction were observed in the absorption process. A decreasing trend after 7 hours, when the ceramic filter lost its effectiveness in removing chromium, and also after 28 hours, the removal efficiency decreased sharply, which indicated the second point of failure.According to FESEM and EDS analysis, the surface of the porous ceramic filter became smaller after impregnation, and the presence of deposits on the surface indicates that the nanoparticles are well loaded on the filter

surface. Also, the increase in the amount of iron on the surface of the filter impregnated with iron nanoparticles is a proof of the loading of nanoparticles on the surface.

Conclusion: Considering the high efficiency of ceramic filters in absorbing hexavalent chromium, it can be concluded that ceramic water filters impregnated with iron nanoparticles areapractical, low-cost and acceptable alternative for removing heavy metals from water at the domestic level.

Keywords: Green Iron Nanoparticles, Hexavalent Chromium, Surface Absorption, Ceramic Filter.

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The effects of micro and nanoplastics on the health of the human digestive system

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Abstract

Background: The extensive utilization of plastics in our daily lives has transformed them into a perilous threat to both human health and the environment. Plastics undergo degradation through diverse mechanical, chemical, biological, and environmental mechanisms, ultimately emerging as environmental pollutants known as microplastics and nanoplastics. The ingestion of microplastics is a primary route through which they enter the human body, infiltrating the digestive system and potentially leading to unidentified complications. Consequently, it is imperative to thoroughly examine the impact of microplastics and nanoplastics on the well-being of the human digestive system.

Methods: Mainly the search results were obtained with the keywords "Digestive System", "Microplastic", "Nanoplastic" and without considering the time limit until 2023 in international electronic databases including PubMed, Science Direct, Web of Science, Scopus and Google Scholar.

Results: In this discussion, we delve into these matters and reveal the intricate relationship between MNPs and humans. Different effects have been reported, including alterations in microbiota and the production of digestive enzymes, inflammation in the respiratory system, disorders in the circulatory and reproductive systems, as well as neurotoxicity leading to behavioral changes. Both in vitro and in vivo studies have demonstrated harmful effects on various organs and systems, which depend on the dose, size, and chemical properties of plastic particles.

Conclusion: The importance of addressing plastic pollution to safeguard human health is emphasized by the accumulation of plastic particles in the digestive system, their harmful effects on the nervous system, and the potential interaction with chemical pollutants. Taking necessary actions to minimize the risks posed by micro and nanoplastics to the human digestive system and overall well-being requires implementing crucial steps like reducing plastic waste, improving waste management systems, and researching alternative materials.

Keywords: Microplastic, Nanoplastic, Digestive System.

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Production of Single Cell Protein from Grape waste using Saccharomyces Cerevisiae

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Abstract

The increasing trend of agricultural waste is one of the serious challenges of developing countries. Burying, burning and abandoning agricultural wastes are among the environmental problems of the country. Reusing agricultural waste or recycling it is one of the methods of agricultural waste management. This study was aimed at producing single cell protein from Grape pulp and waste using Saccharomyces cerevisiae. Grape waste was pre-treated with 2% H2SO4 (v/v) and used as substrate for the production of single cell protein with peptone D-glucose medium as control under fermentation. The acid-treated Grape waste supported the single cell protein production with a growth value (measured at 670nm) of 0.366 optical density (O.D.) on the 7th day, and the maximum for the peptone D-glucose medium was 0.237 (O.D). The protein content and the non-protein content of the single cell protein produced from the acid-treated Grape waste as determined using Kjeldahl method was 35% and 65% respectively. The result indicated the feasibility of using agricultural wastes as substrates for single cell protein production and the production of this fungal biomass on fruit and other agricultural wastes will not only minimize environmental pollution associated with these wastes but may provide protein supplements for nutritional purposes.

Keywords: Agricultural Waste, Single Cell Protein, Grape Pulp, Saccharomyces Cerevisiae.

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Investigating the impact of mineral activities (mining and tailings dam) on underground water using GIS (Case study of Central Iron Ore Company of Iran - Bafq)

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Abstract

Background: Due to its special geographical location, Iran also has a dry and semi-arid climate, and this doubles the importance of paying attention to groundwater, so the purpose of this study is to investigate the impact of tailings dam on groundwater using GIS (case study). Central Iron Ore Company of Iran - Bafq.

Methods: In order to carry out the research, firstly, scientific sources, statistics and available information were collected, and in the next step, in order to determine the effect of the tailings dam on the quality of underground water tables and to prepare a zoning map of groundwater pollution, sampling and water pollution index tests were carried out. On drinking, industrial and agricultural water wells and surface waters of the region. In the next step, the collected data were entered into attribute tables in Ilwis software and with the Link water well map. In the next step, using geostatistical methods, interpolation was done on the maps and Finally, classification of groundwater pollution maps was done using GIS system, and in the end, a solution was presented and environmental management guidelines were developed in order to sustainably exploit the mine and prevent groundwater pollution in the city.

Results: The results of the discussions of the previous chapters indicate that the underground water resources of Bafq city are currently facing quantitative and qualitative challenges. The prospect of the development of the region (exploitation of mines) in the long term without developing strategies for the optimal use of these resources will not only increase the challenges, but the region will face a crisis in terms of the potential of water resources both quantitatively and qualitatively. will do.

Conclusion: The results of the chemical analysis of 22 wells and springs in four seasons in 1401 indicate that the majority of pollutants, especially heavy metals, were within the permissible limits, however, it is possible that in the long term, the concentration of underground water pollutants will exceed the permissible limits to pass.

Keywords: Spatial Analysis, Groundwater Quality, GIS, Central Iron Ore, Bafq.

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Optimization of rhodamine B dye removal using amine-rGO@BiOI@Ag3PO4 hybrid photocatalyst by surface response methodology

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Abstract

Due to their special molecular structure, industrial effluents, such as effluents containing colored compounds, have one or more benzene rings with a resistant structure. This type of colored compounds is toxic and difficult to decompose. These effluents should be treated before being discharged into the environment, and thus treating the wastes containing dyes is one of the major environmental challenges and need to be conducted using an appropriate approach. In this study, describes the synthesis of a hybrid photocatalyst nanocomposite, amine-rGO@BiOI@Ag3PO4, and its efficiency in the photocatalytic decomposition of Rhodamine B dye in a LED visible light photoreactor. The process was optimized by investigating four time variables (10-70 minutes), photocatalyst dose (100-900 mg/L), initial pH (11-3), and rhodamine B dye concentration (2.5-12.5 mg/L) using surface response analysis with the central square method (CDD). The results showed that the fitted quadratic model was accurate and valid, with a high F-value, a significance of the p-value parameter (less than 0.00001), a small percentage of the coefficient of change, high correlation coefficients of 0.9736, non-significance of the misfit parameter, and lack of autocorrelation based on the results of the D-W test. The optimal conditions were defined as an initial concentration of 5 mg/L, a reaction time of 55 minutes, a photocatalyst dose of 424.8 mg/L, and an initial pH of 5, and the efficiency of the photocatalytic decomposition process was 99.41%.

Keywords: Advanced Oxidation, Rhodamine B, Hybrid Nanocomposite Amine-rGO@BiOI@Ag3PO4, Central Square Method (CDD).

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Optimization of herbicide degradation in a three-dimensional sono-electro-Fenton (3D/SEF) system with PAC/Fe3O4 as magnetic particle electrode using Taguchi method

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Abstract

The consumption of pesticides and chemical fertilizers in agriculture, which is done for enhancing the productivity of fertile lands has been associated with contamination of water resources with a variety of pollutants, e.g., herbicides. The evaluation of parameters that can affect the efficiency of three-dimensional sono-electro-Fenton (3D/SEF) with PAC/Fe3O4 particle electrodes using and SS316/β-PbO2 anode in 2,4-D degradation, and those parameters were optimized by Taguchi design technique. Different analyses (i.e., Field emission scanning electron microscopy (FESEM), X-ray diffraction analysis (XRD), energy-dispersive X-ray spectroscopy mapping (EDX-mapping), vibrating sample magnetometer (VSM), and Fourier Transform Infrared Spectroscopy (FTIR)) could approve the fruitful synthesis of PAC/Fe3O4 and G/β-PbO2 anode. By employing LC-MS analysis, the intermediates generated from pollutant degradation were spotted, and degradation pathways was proposed. The pH of the solution (with percentage contribution of up to 39.52%) was as the most influential factor. The optimal conditions for removal of 2,4-D were determined to be as follows: 2,4-D concentration= 50 mg/L, pH= 3; FeSO4= 0.08 mg/250 mL, electrolysis time= 60 min, H2O2 concentration= 0.2 mL/L, current density= 5 mA/cm2, catalyst dose= 5 g/L, and Na2SO4 concentration= 0.3 g/250 mL; in these conditions, removal efficiencies of the 2,4-D, COD and TOC were 96.2%, 92.31% and 86.5%, respectively. Moreover, significant reduction was detected in the biological toxicity of the outlet effluent from the 3D/SEF process. Considering obtained results, the wastewater containing pesticides such as 2,4-D herbicide can effectively treated by 3D/SEF process, and it could offer acceptable results.

Keywords: 2,4-D Herbicide, 3D/SEF Process, PAC/Fe3O4 Particle Electrodes, Taguchi Method.

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Concept of circular economy in urban waste management

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Abstract

Background: The increasing production of urban waste due to the economic development of societies and considering their negative effect on economic growth, environment and human health is considered as a fundamental problem for waste management systems. The World Bank has estimated that by 2025, waste generation will increase by about 70 percent due to population growth, rising average incomes, and rapid urbanization. Therefore, it is necessary to evaluate a new model such as the circular economy model. The circular economy is a vital aspect of sustainable development that can be an alternative to the linear economy model based on the theory of using natural resources. This approach emphasizes reducing waste generation and maximizing resource recovery through recycling, reuse and recycling. According to the Ellen MacArthur Foundation's prediction, a circular economy can reduce waste production by 90% by 2030. Therefore, the need to investigate the concept of circular economy in urban waste management is felt as one of the important research needs.

Methods: This article has reviewed the topic by reviewing library sources and authoritative articles.

Results: The concept of circular economy, the effectiveness of this approach in waste management and the potential consequences of this approach in the urban waste management system were discussed. It also highlights successful case studies, innovative strategies and the role of key stakeholders, including governments, businesses and communities, in moving towards a circular economy. Strategies such as promoting recycling, reuse and composting, encouraging the use of recycled materials in the production process, challenges and obstacles to implementing this model, as well as the benefits of adopting this approach in urban waste management were investigated.

Conclusion: In general, the circular economy approach in urban waste management provides a comprehensive and sustainable solution for the challenges caused by waste management. It has the potential to significantly reduce waste and offers a promising framework to address the challenges of municipal waste management and transition to a more sustainable and efficient system. It also leads to reducing environmental pollution, preserving natural resources, creating new job opportunities and promoting economic growth. Therefore, the adoption of the circular economy

approach in urban waste management has great potential for sustainable development, which requires comprehensive and more research to be integrated into urban waste management practices.

Keywords: Circular Economy, Waste Management, Linear Economy, Sustainable Development.

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Degradation of dibutyl phthalate from synthetic and real wastewater using ultrasound/hydrogen peroxide system

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Abstract

Dibutyl phthalate (DBP) is the most prevalent phthalate ester (PAE) found in different environmental samples. DBP is considered a hazardous substance for the environment. The degradation of DBP using an ultrasonic/hydrogen peroxide (US/H2O2) system has been studied in this study. Designing the experiments and determining optimal conditions were accomplished using the response surface methodology (RSM). The effects of the solution pH, H2O2 and DBP concentrations, and reaction time on the DBP degradation were studied. Kinetics and thermodynamics models, mineralization of DBP, production of intermediates, and biotoxicity analysis were also investigated. Finally, the real industrial wastewater treatment was tested using the US/H2O2 system. The result of the kinetic model showed that the removal kinetic of DBP can be described by the first-order model (R2 = 0.99). The positive value of ΔHo (0.3 KJ/mol) and negative values of ΔGo indicated that the removal process of DBP by US/H2O2 was endothermic and spontaneous. In addition, a positive value of the ΔS˚ (1.054 J/mol. K) showed a high degree of disorder in the transition state compared to the ground state. A relatively high degree of mineralization and improvement in biodegradability occurred. A biotoxicity test was performed using the wheat grains, and an increase in the values of GP (%), GS, and GI parameters of wheat grains was observed with the increase in effluent dilution. The EC50 had an increasing trend at first (24 to 48 h) and then decreased (48 to 96 h). The average removal efficiency of DBP from industrial wastewater by the US/H2O2 system was 70.53%.This finding showed a relatively good potential US/H2O2 system to degrade an aqueous medium polluted with DBP.

Keywords: Dibutyl Phthalate, Ultrasonic, Hydrogen Peroxide, Industrial Wastewater.

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Synthesis of Fe3O4@PAC as a magnetic nano-composite for adsorption of dibutyl phthalate from the aqueous medium: Modeling, analysis and optimization using the response surface methodology

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Abstract

A magnetic nano-composite of Fe3O4@powdered activated carbon (PAC) was synthesized and evaluated its ability to adsorb dibutyl phthalate (DBP) from aqueous media with a focus on optimization by the central composite design (CCD)–based response surface method (RSM). The synthesized nano-composite structural properties were studied. The effectiveness of pH, initial DBP concentration, absorbent dose, and contact time on DBP adsorption were investigated. The synthesized Fe3O4@PAC nano-composite had high specific surface area (264.04 m2/g) and magnetic properties (39.53 emu/g). In optimal conditions, the DBP adsorption efficiency using Fe3O4@PAC in the real (Sample # 1 = 81.85% and Sample # 2 = 85.22%) and synthetic wastewaters (87.55%) was satisfactory. Furthermore, kinetic and isotherm studies indicated that second-order kinetic and Langmuir models better describe DBP adsorption on the Fe3O4@PAC. The thermodynamic analysis depicted that the process of adsorbing DBP using Fe3O4@PAC was endothermic and spontaneous. After five runs, the Fe3O4@PAC demonstrated high efficiency and chemical stability. The adsorption process had a good efficiency in removing the toxicity of wastewater samples. The cost of treating 1 m3 of wastewater containing DBP (10 mg/L) with Fe3O4@PAC was 17.745 USD/m3. Our results indicated that the Fe3O4@PAC effectively adsorbed DBP from wastewater.

Keywords: Dibutyl Phthalate, Adsorption, Nano-Composite, Activated Carbon, Aqueous Medium.

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Effects of drying Urmia Lake on heavy metal levels in wet atmospheric precipitation in Urmia city

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Abstract

One important tragedy in this decade, in the northwest of Iran, attributed to the drying Urmia Lake which emitted toxic metals into the atmosphere. The aim of this study was determination some heavy metals and sodium values, spatial trends, and source identification in the wet atmosphere in Urmia city. Wet precipitation was collected from rainwater. Metal concentration was detected using ICP-OES. The mean values of As, Cd, Cr, Cu, Pb, Ni, Zn and Na in the precipitation samples obtained 0.14, 0.18, 1, 3.7, 2.9, 5.6, 6.3 (µg/L) and 2.6 (mg/L), respectively. So, the mean values of metals are ranked in the order of Na > Zn > Ni > Cu > Pb > Cr > Cd > As. The correlation test between Pb with Cd, Cr, Cu, and Ni represented a fragile correlation. Enrichment factor for arsenic and sodium propose minor enrichment and Zn is extracted in the moderately severe class of enrichment. EF values for Cd, Cr, Cu, Ni, Pb found extreme enrichment. The distribution map clearly shows the south and western parts of Urmia are highly polluted areas with As, Ni, Cr, Zn, and sodium. It appears the main origin of As, Zn and sodium associated with the drying bed of Urmia lake and Cd, Cr, Cu, Ni, Pb attributed to vehicle traffic and fuel combustion. Finally, in Urmia, drying Lake Urmia, traffic and fuel combustion could lead to air pollution in terms of heavy metals. Also, wet deposition with heavy metals may be used as a good metric for the identification of air pollution.

Keywords: Atmospheric Deposition, Elemental Composition, Principal Component Analysis, Urmia City.

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