

Sorption Studies Of Fluoride From Aqueous Solution Using Activated Red Mud

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These papers describe the sorption studies of fluoride from aqueous solution using red mud (RM) and activated red mud (RMA, RMH, RMAH) in line with the batch technique. For sorption studies, experimental information confirmed that most sorption at pH 4.2 and it took two hours for equilibrium and afterward no important sorption. Langmuir and Freundlich sorption isotherm models are applied to these studies and it had been found that the Langmuir isotherm fits well with the obtained experimental information compared to Freundlich isotherm. The obtained experimental information is then subjected to different kinetic models that have enabled us to review the sorption rate of fluoride. Consequently, the sorption capacities are found to be 0.5991 mg/L, 0.7380 mg/L, 0.454 mg/L and 0.318 mg/L for RM, RMA, RMH and RMAH, respectively at room temperature. Accordingly, the kinetics of sorption of fluoride onto RM and RMA have analyzed insight of pseudo-first order, pseudo-second order and intraparticle diffusion model and found that the pseudo-second order kinetics is that the best fitting model to explain the sorption of fluoride onto RM and RMA compared to pseudo-first order kinetic model. This means the active interaction of RM and RMA towards fluoride in the method of sorption. Further, analyzing the thermodynamic parameters of fluoride sorption show the negative values of Gibbs free energy that indicate the spontaneous nature of the sorption of fluoride process and, therefore, the positive entropy values indicate the rise in the randomness of the surface.

KEYWORDS

Red mud, Acid treatment, Fluoride, Adsorption

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Physico-Chemical, Microbial, Heavy Metals And Pharmaceutical Analysis Of Water Samples From Bengaluru Lakes

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In spite of Bengaluru not being blessed with any river source for its water needs, it has sustained itself so far on the bedrock of a thriving man-made lake system. This study aims to evaluate the quality of potable drinking water from 12 lakes in and around Bengaluru. The physical properties of samples were assessed using standard methods for the examination of water and wastewater by the American Water Work Association. The heavy metals concentration and evaluation of antibiotic resistance were carried out using standard methods. Total hardness in Hennur lake (791 mg/L) has exceeded the recommended range as specified by the Bureau of Indian Standards (BIS). The ammonium (662.2 mg/L) and phosphate concentration (169.4 mg/L) were high in Vartur lake and chloride concentration (366.886 mg/L) in Hennur lake has exceeded the permissible range. Microbial analysis showed the presence of seven dominant bacterial strains. Toxicity screening for heavy metals showed all the lakes were within the recommended BIS range for cadmium (<0.01) but has exceeded the permissible limit for lead (<0.05) and nickel (<0.02). Antibiotic profiling of Hennur and Rachennahalli lake samples clearly highlighted the presence of diclofenac (1.0 µg/L and 0.38 µg/L) in both the samples, respectively. Proper water management practices and constant monitoring of water bodies should take place to sustain the ecosystem and aquatic life in the lake.

KEYWORDS

Bengaluru lakes, Heavy metal poisoning, Water quality, Urbanization, Pollution

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Evaluation On The Possibility Of Using Greywater Recycling Systems In UKZN Residential Halls

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South Africa is currently having an estimated population of 50.59 million people according to the 2011 mid-year population released by the Department of Statistics, South Africa. It is estimated that the population growth of 2.01% is expected by 2025, which will shift water use from the current 27-35%. The water demand of the country is increasing rapidly due to population growth, agricultural practices and infrastructure development. These situations make the country to depend on expensive potable water for its use, therefore, there is a need to look at alternative approaches to ensure water availability critically. As a result of these water crises, this study will focus on finding a solution on how to conserve water in the province of KwaZulu-Natal (KZN) using greywater recycling (GWR) systems. The objective of this research is to reduce the consumption of potable water in the University of KwaZulu-Natal (UKZN) residential halls by assessing the feasibility of implementing greywater recycling. This research will also include an assessment on how to optimize this system while considering the viability of social, environmental, management, public health and economic issues within the system. The perception survey through the use of questionnaires was carried out. The survey aims to provide information on per capita consumption by isolating the individual components of water usage and also find the potential of implementing this system for toilet flushing. Outcomes of this research support that the UKZN community has a high possibility of greywater use and approximately 90% of residents agreed to use it as an alternative water resource. It has been concluded that greywater use for the non-potable purpose can significantly reduce the overall demand for potable water consumption in UKZN school residential halls.

KEYWORDS

Greywater recycling system, Potable water, Water management

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FTIR Imaging Techniques For Estimation Of Microplastics In Waste Water And Sediments

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Plastic and polymer materials and other packaging materials have a great impact on the environment as they are not biodegradable and take a very long period for decomposing. Hence the usage of plastics and polymer material need to be minimized to have a more pollution free environment. Manufacturers are using reduce-recycle-reuse (3R techniques) in handling polymers and plastic materials. In this paper, we have proposed Fourier-transform infrared spectroscopy (FTIR) imaging techniques for estimation of microplastics in wastewater and sediments. FTIR spectroscopy is a very useful technique of analysis used in various scientific research areas in different disciplines. From the analysis, it is observed that the proposed technique is suitable and gives more accuracy and reliable results for identification of microplastics in wastewater compared to existing dispersive type instruments.

KEYWORDS

Microplastics and polymers, FTIR, 3R techniques, Pollution free environment

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Evaluation Of Pongamia Seed Cake As A Carbon Adsorbent

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Climate change is one of the serious issues the world is facing presently. Emission of greenhouse gases (GHG) into the atmosphere results in global warming causing various climatic changes leading to direct and indirect effects on human. Carbon dioxide is most emitted amongst the greenhouse gases. The various sources of CO₂ emission are thermal power stations, industries, transport, residential and other sectors. The present work aims to develop a low cost sustainable and effective biomass derived adsorbent for CO₂ capturing from point sources. Pongamia oil is a major feedstock used for biodiesel production. For every one tonne of biodiesel produced, approximately two tonnes of oil cake is produced. Due to its bitter taste, pungent odour and presence of toxins it is not widely used for other applications. Hence, pongamia oil cake is taken for developing the adsorbent for CO₂ capturing. The pongamia oil cake is initially subjected to hydrothermal carbonization then treated with potassium hydroxide to get activated char. The surface area, pore size and pore volume of the activated char produced from the different condition is analyzed using BET surface analyzer. The activated char with the highest micropore volume is considered to have the highest carbon capturing capacity.

KEYWORDS

CO₂ emission, Point sources, Carbon capturing, Adsorption, Pongamia seed cake

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Water Quality Index During Pre-Monsoon Season Of Ganga River

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In this study, the water quality index (WQI) during pre-monsoon season was determined for the Ganga river in Patna (Bihar). For this, five locations (Kali Ghat, Krishna Ghat, Gandhi Ghat, Gulbi Ghat and Loharwa Ghat) were selected in a stretch of 4 km in length. Water samples were collected from these selected locations and was analysed for eleven physico-chemical parameters, like pH, electrical conductivity (EC), total dissolved solids (TDS), dissolved oxygen (DO), total hardness, alkalinity, turbidity, nitrate (NO_3^-), sulphate (SO_4^{2-}), temperature and biochemical oxygen demand (BOD). The WQI of river Ganga at selected locations was calculated using the weighted arithmetic water quality index method and was found in the range of 97.22-144.76 when turbidity parameter was considered. This value shows the good quality of water at Gulbi Ghat and poor quality of water at the rest of the locations.

KEYWORDS

Water quality standard, Water quality index, Ganga river water, Physico-chemical parameters, Pre-monsoon season

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Dayalbagh : An Ecofriendly, Economical, Efficient Smart Village - A Review

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The development of any country depends mainly on villages. Cities are always dependent on villages and the physical development of cities causes the migration of villagers to the city. It is a root cause of why the cities are in bad condition. Although we get fresh air, food and water in villages, lack of education, health, security, employment and justice are the major reason for migration. Particularly with respect to India, we have to develop villages with the vision of Mahatma Gandhi. One of the finest examples is Dayalbagh where we can see the spiritual as well as the modern theme. In this paper, we present an outlook (E3) of Dayalbagh as shown in figure 1. Dayalbagh teaches us selfless service and sacrifices for society and nation. If we develop such villages all over the world it will lead to the graceful, green earth.

KEYWORDS

Eco-friendly, Economical, Efficient, Smart village, Dayalbagh

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Laboratory Soil Column Studies On Transport Of Petroleum VOCs In Different Subsoils

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A four-phase study was conducted to determine the rate of loss and concentration profile of petroleum BTX in alluvial, black and red soils for initial leak phase, subsequent volatilization and leaching by infiltration using soil columns. The study showed higher retention of petroleum contaminants in soils with lower density and higher organic matter. Volatilization of BTX in unsaturated soil showed dependency on soil density and vapour pressure. Effect of competitive volatilization was observed in alluvial and black soil for toluene with a higher concentration in petrol. Leaching of BTX indicated benzene is the most mobile volatile organic compound (VOC) in all soils. The final phase of the study showed, moisture content affected ~2.8-4 times lower rate of volatilization in comparison with unsaturated soil. Lower rates of leaching and volatilization in alluvial soil are attributed to higher organic matter, clay and agglomeration of soil because of moisture content. The study showed that volatilization is the dominant mechanism for VOC transport from unsaturated as well as saturated soil.

KEYWORDS

BTX, Leaching, USEPA, VOC, Volatilization

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Radiation Risk Assessment In Some Dwellings Of North-Western Himalayas

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This article is aimed at to investigate the indoor radiation in term of radon in Hamirpur district of Himachal Pradesh by using LR -115 type II solid state nuclear track detectors (SSNTDs). Radon concentration is measured for sixty different houses. Absorbed doses, equivalent dose and effective dose (to lungs) have been calculated and presented. Radon concentrations found varies from 0.5-78.8 B/qm³, absorbed dose found to varies from 0.002-0.99 mSv/year, equivalent dose varied from 0.04-19.88 mSv/year and effective dose (to lungs) varied from 0.01-2.38 mSv/year. All these values are in a safe zone and well within the recommended action level (200-600 B/qm³) recommended by the International Commission on Radiological Protection (ICRP).

KEYWORDS

Radon, LR -115, Dwellings, SSNTDs

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Fertilizing Power Study Of Wastewater From Dar El Gueddari WWTP- Grain Corn Case

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The main objective of this study is to evaluate the fertilizing value of the domestic wastewater of Dar Gueddari and the influence of these waters on the growth and yield of grain corn. For this, six elementary parcels are cultivated and irrigated with raw and purified wastewater at different percentages of dilution in comparison with the waters of the groundwater considered as a control. We followed the influence of the nutrients contained in irrigation water, soils and plants. From the results obtained, it appears that the parcels treated with treated wastewater diluted to 50% have high growths with respect to the vegetative matter (average length of the plant: 2.64 m, number of leaves: 14) and grain yield (9.1 tonnes/ha) compared to the control without fertilizer. For raw sewage, the high load of suspended matter and salts has a negative effect on the growth and yield of the plant, but they have a very high input of nutrients on the soil.

KEYWORDS

Wastewater, Dar El Gueddari, Fertilizing power, Salt, Nutrient

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Temporal Distribution of Macroinvertebrates and their Co-relationship With Physico-chemical Parameters From Ropar Wetland

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Monthly samplings were conducted at four sites for a period of one year from October 2015 to September 2016 at the location of Ropar wetland. The water samples and bottom sediments were collected and analyzed in the laboratory. 20 genera of benthic macroinvertebrates belonging to 10 orders and 2 phyla at all the sites have been recorded. Among these phyla, Arthropoda (79.26%) was dominant at S4 followed by the Mollusca (38.12%) at S1. It was observed that the most abundant order having maximum genera was Coleoptera with 5 genera followed by Gastropoda with 4 genera. Maximum total benthic diversity was reported at S2 followed by S1. The abundance of benthic macroinvertebrates at S1 ranges from 69-436 individuals/m² (mean 253.08 individuals/m²), at S2 abundance ranges from 31-466 individuals/m² (mean 282.83 individuals/m²), at S3 it ranges from 15-401 individuals/m² (mean 247.33 individuals/m²) and at S4 abundance ranges from 18-310 individuals/m² (mean 185.66 individuals/m²). The seasonal variations between the benthic fauna population have also been recorded and many marked differences were noticed during the study period. Macroinvertebrates show a positive correlation with dissolved oxygen, carbon dioxide content and calcium hardness at all the sites. Diversity indices have revealed that this wetland is moderately polluted which can severely affect its food chain.

KEYWORDS

Wetlands, Benthic macroinvertebrates, Biodiversity, Pollution, Bioindicators

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Adsorption Of Textile Dyeing Industrial Effluent Using Low-Cost Agricultural Byproduct Sago Waste

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The textile industry effluents containing a huge amount of toxic pollutants. These effluents require previous treatment before being discharged into the water bodies to prevent water pollution. The aim of this study is to investigate the agricultural waste (sago waste) used as a low-cost adsorbent for the removal of textile dyeing industrial effluent from aqueous solution by batch adsorption technique. Adsorption experiments were carried out to investigate: variation of contact time, initial dye concentrations, adsorbent dosage, desorption, etc. The experimental data were analyzed using the Langmuir isotherm model. Kinetic data well fitted for pseudo-second order model. Thermodynamic parameters have also been calculated. The properties of sago waste were characterized by FTIR and SEM. The low-cost adsorbent was found to be efficient for the dye removal process.

KEYWORDS

Adsorption, Sago waste, Textile dyeing industrial effluent, Dye removal

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Non-Enzymatic Antioxidants Activity Of Selected GLVs Grown In Freshwater, Crude Silk Dyeing Effluent And Biotreated Effluent

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The research work has been focused on the non-enzymatic antioxidant studies of the leaf tissues in the green leafy vegetables (GLVs), namely mustard (*Brassica juncea*), fenugreek (*Trigonella foenum*), sirukeerai (*Amaranthus polygonoides*), araikeerai (*Amaranthus tristis*) and agati (*Sesbania grandiflora*). The prepared extracts from the GLVs grown on freshwater as a control. The total phenol content was significantly high in *A. polygonoides*, *A. tristis* and *S. grandiflora* grown in biotreated effluent whereas it was highly reduced in *T. foenum* followed by *B. juncea* and *S. grandiflora* grown in untreated effluent. The tocopherol level of each of the GLVs did not vary much between freshwater and biotreated effluent. The vitamin C level of the *T. foenum* grown in freshwater and biotreated effluent was maximum when compared to the other GLVs. The levels of ascorbic acid of all the GLVs grown in 75% effluent were reduced significantly. Thus *Pseudomonas fluorescens* biotreated silk dyeing industrial effluent can be used for the growth of plants to improve the non-enzymatic antioxidants.

KEYWORDS

Pseudomonas fluorescens, *Azospirillum sp.*, Silk dyeing effluent, Mustard, *Brassica juncea*, Fenugreek, *Trigonella foenum*, Sirukeerai, *Amaranthus polyg-onoides*, Araikeerai, *Amaranthus tristis*, Agati, *Sesbania grandiflora*

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An Assessment Of Bioremoval Capacity Of Heavy Metal By Algae

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Various anthropogenic activities are responsible for the release of heavy metals into waterways. It is important to treat them because they are toxic and not biodegradable. They pose a threat to living things because they persist in the environment. In this chapter, we review the methodologies that have been used to detoxify, or remove, heavy metals from the aquatic environment, with special emphasis on microalgae. A literature survey indicates microalgae have developed a wide spectrum of absorption mechanisms for coping with heavy metal toxicity. Also addressed are the mandatory requirements to bring this heavy metal removal potential to an applicable, commercial stage.

KEYWORDS

Heavy metals, Microalgae, Bioremediation, Absorption

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