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Evaluation Of Low Density Polyethylene Degradation By Bacteria Isolated From Hydrocarbon Contaminated Site

Shailja Singh[1], Vishal Singh Chowdhary[1], Devendra Pratap Singh[1], Shiv Shankar[2] and Shikha[1]*

1. Babasaheb Bhimrao Ambedkar University, Department of Environmental Science, School of Earth and Environ mental Sciences, Lucknow - 226 025, U.P., India
2. Gautam Buddha University, Department of Environmental Science, School of Vocational Studies and Applied Sciences, Gautam Buddh Nagar - 201 312, U.P., India

**Corresponding author, Email : envscibbau@ymail.com; shailhasingh578@gmail.com*

Indiscriminate use and inertness of synthetic polymers leading to increased water and land pollution are of great concern. Many attempts have been made to control the problem by using both chemical and biological methods. Chemical methods resulted in an increase in pollution by releasing noxious gases in the atmosphere whereas biological methods have been proved to be eco-friendly. The current study demonstrates the isolation, characterization and biodegradation analysis of the low-density polyethylene (LDPE) films by the isolated bacteria. Various techniques were used to determine the changes induced in the polyethylene sheet after treatment with bacteria. Gradual reduction, in the weight of degraded LDPE with time, signifies the utilization of polymer by bacteria for nutrients and energy. Analysis through scanning electron microscopy (SEM) of the degraded LDPE films showed morphological damage, like cracks, extensive roughening, fragileness and fragmentations on the surface of the LDPE sheets confirming that degradation had occurred by the action of bacterial isolates. Fourier transform infrared spectroscopy (FTIR) analysis of the degraded LDPE films, showed the presence of alcohols, alkenes, alkanes, amines being produced after 90 days, indicating that degradation had been carried out successfully. Energy dispersive x-ray study revealed the decrease in carbon content which shows that the carbon has been utilized by bacteria for their growth. Hence, the two potential bacterial strains isolated in the present study can be said to be plastic degrading microorganisms.

KEYWORDS

Low-density polyethylene, Scanning electron microscopy, Fourier transforms spectroscopy, Biodegradation, Pollution

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Wadi Larbaa's Water Quality In The North Of Morocco: Statistical Treatment Of Physical And Chemical Parameters

K. Arouya[1,2], H. Tabyaoui[2], H. Taouil[1], J. Naoura[2] and S. Ibn Ahmed[1]*

1. University Ibn-Tofail, Laboratory Materials, Electrochemistry and Environment, Faculty of Sciences, Morocco
2. University Sidi Mohamed Ben Abdellah, Laboratory Natural Resources and Environment, Faculty Polydisciplinary of Taza, Route of Oujda, Taza Station, Morocco

**Corresponding author, Email : sibnahmed@yahoo.fr; arouyakhalid@gmail.com*

This study is part of the characterization of surface water chemistry and the determination of the origin of chemical elements present in the waters of the Taza region of Morocco. To carry out this investigation, 60 samples were collected in July 2017 and January 2018 (30 samples per month). The principal component analysis (PCA) applied to the data sets resulted in three significant factors accounting for 89.46% of the total variance. The F1 factor expresses 53.51% of the total information, called the factor of salinization, water pollution by nitrogen compounds and seasonality. Factors F2 and F3 can be called anthropogenic pollution and seasonality factors. In addition, the stations are well typed and therefore, well structured by their physico-chemical data. In addition, hierarchical cluster analysis (CA) grouped the twenty-five physico-chemical variables studied into five distinct groups related to water-rock interaction, agriculture and anthropogenic sources. Therefore, this work indicates that multivariate statistical methods are an excellent exploratory tool for interpreting a complex set of water quality data and for understanding spatial variations that are useful and effective for water quality management.

KEYWORDS

Multivariate analysis, Surface water, Physico-chemical quality, Northern Morocco

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Identification And Control Of Giant African Snail In Cauliflower Farms By Low Frequency Sound Measurement Technique And Back Propagation Neural Network

Adeline Sneha J.[1], Rekha Chakravarthi[2*], Nor Hisham Khamis[3] and Joshua Amarnath D.[4]

1. Sathyabama Institute of Science and Technology, Chennai - 600 119, Tamil Nadu, India
2. Sathyabama Institute of Science and Technology, Department of Electronics and Telecommunication Engineering, Chennai - 600 119, Tamil Nadu, India
3. Universiti Teknologi Malaysia, Department of Communication Engineering, Malaysia
4. Sathyabama Institute of Science and Technology, Department of Chemical Engineering, Chennai - 600 119, Tamil Nadu, India

**Corresponding author, Email : rekha_2705@yahoo.co.in; j.adelinesneha@gmail.com*

The Giant African snail is the world's largest, destructive and most damaging land pest in agricultural plantations. These pests are sometimes called as the natural enemies of farmers. High devouring capacity of these snails causes heavy damages to vegetation. In this work, various snails are collected and placed in the room temperature. The snails were feed with the consumables, such as cauliflower, tomatoes and soil, indeed the sound frequency is measured. In addition, the various activities also monitored and the respective frequencies are observed. For instance, the movement of a snail, retraction of the head in shell, head movements are recorded from the acoustic room with the recorder. However, monitoring the snail low level sound were challenging for recording. Thus the high precision device is required for recording the signals. The recording has been done for a number of days in order to evade uncertainty. The recorded accurate signals are chosen for the analysis. These signals are analyzed in the time and frequency domain. The statistical features are extracted from the signal. Further, the power spectral density, sound pressure level and equal loudness contour of the signals are calculated. The wide range of frequency of the snail of its various movements is determined. The extracted statistical features from the signals are fed into the neural network for training. Back propagation algorithm is used for classification along with the snail's signal, few noise signals also fed into the neural network to identify the effectiveness of network in the identification of the pest. It gives 99% efficiency in identifying the snail's signal. This work is also compared with capacitance based pest identification. This work has been experimentally validated with low-cost acoustic sensor that wirelessly communicates to the base, to monitor and control snail activity, the work suggested in this paper is a non-destructive form of pest identification which does not harm the crops as well as the environment.

KEYWORDS

Pest identification, African snail, Acoustic, Crops protection

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Investigation Of Groundwater Quality For Agricultural Use In A Lateritic Soil Belt

Mobarok Hossain and Pulak Kumar Patra*

Visva-Bharati, Department of Environmental Studies, Institute of Science, Santiniketan - 731 235, Birbhum

Corresponding author, Email : pulakpatra@visva-bharati.ac.in

Groundwater is a vulnerable natural resource. The problems of its quality for its designated purposes, such as drinking, domestic, industrial and agricultural uses are gaining attention, especially in developing countries. The present study was undertaken to investigate the suitability of groundwater for irrigational purpose in Bolpur block of Birbhum district of West Bengal. Major cations in groundwater samples were found in descending order as $Ca^{2+} > Na^{+} > Mg^{2+} > K^{+}$ whereas, anions were $HCO_3^{-} > Cl^{-} > SO_4^{2} > NO_3^{-}$. Water quality for irrigation was assessed through water quality parameters, such as electrical conductivity (EC), sodium absorption ratio (SAR), soluble sodium percentage (SSP), residual sodium carbonate (RSC), Kelly's ratio (KR) and permeability index (PI). The values of these water quality parameters were found to be suitable for irrigation. Major hydrochemical facies of groundwater of the study area were normal earth alkaline water with prevailing bicarbonate, that is Ca^{2+}-Mg^{2+}-HCO_3^{-} type. Local geological setting and rock-water interactions are a principal factor that governed the formation of groundwater chemistry of the study area. The outcome of the present study may be helpful to the farmers, researchers and policymakers to formulate an effective groundwater management plan.

KEYWORDS

Irrigational water quality indices, Hydrochemistry, Piper diagram, Gibb's diagram, Bolpur block

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Closed Pattern Mining And Causal Analysis Of Pollution Data

S. Sharmiladevi and S. Siva Sathya*

Pondicherry University, Department of Computer Science, Puducherry - 605 014, India

**Corresponding author, Email : ssivasathya@gmail.com; sharmiladevi94@gmail.com*

Mining sequential patterns are of great importance in recent years, as it unveils some of the unknown associative relationships between observations. While in mining sequential patterns many intermediate sequences have to be generated, which is a computationally challenging task when compared to frequent patterns of mining. CloFAST is an algorithm which mines closed sequences without candidate maintenance. Also, CloFAST requires only one step to check closure and prune the search space. It can mine long closed sequences effortlessly from large datasets. In this work, a closed sequential pattern mining of $PM_{2.5}$ pollutant in Delhi is done using CloFAST. Delhi, the capital of the second most populous country on earth has been suffering from severe air pollution problem. Delhi is getting polluted due to diverse reasons, like its geography, burning crop stubble in neighbouring states, vehicular emission, etc. Some of the critical air pollutants found in Delhi are PM_{10}, $PM_{2.5}$, nitrogen oxide, sulphur oxide, carbon monoxide, ozone. The main pollutant being particulate matter ($PM_{2.5}$) as it causes serious health problems when it enters into the alveoli of human lungs. Various micro-level analysis of air pollution is being carried out recently. But macro-level analysis is also required in order to obtain a clear understanding on a broader scale. The patterns obtained are given as knowledge for causal analysis done using the FCI algorithm.

KEYWORDS

Air pollution, $PM_{2.5}$ pollutant, Closed sequential mining, Particulate matter, Delhi

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Effect Of Mutation On Bacillus Species For The Degradation Of Azo Dye And Its Molecular Characterization Using AFLP

Himanshi Mangla[1], Hardik Pathak[1]*, Saurabh Dave[2], Mahesh[3] and D. P. Jaroli[4]

1. JECRC University, Department of Biotechnology, Jaipur - 303 905, Rajasthan, India
2. JECRC University, Department of Chemistry, Jaipur - 303 905, Rajasthan, India
3. Azyme Biosciences, Bangalore - 560 069, Karnataka, India
4. Board of Secondary Education Rajasthan, Ajmer - 305 001, Rajasthan, India

**Corresponding author, Email : hardikaeshu@gmail.com; himanshimangla30@gmail.com*

Azo dyes are frequently used synthetic dye in the textile industries. It is a xenobiotic compound due to the presence of the sulphonic group. These azo dyes release through dye effluent or industrial waste resulting in an acute effect on the environment and also on human health. The present investigation was an attempt to know the degradation of Para Red azo dye at physico-chemical parameters, such as pH, temperature and concentration. An experiment was carried out to degrade the Para Red azo dye using bacterial isolates from the dye contaminated soil. From all the isolates, only Bacillus species was able to degrade the dye. As it has the ability to produce the azo reductase enzyme to catalyze the Para Red azo dye. Approximately 53% of degradation was observed after optimization. But after mutations, the enzyme activity was enhanced and 68.2% degradation was observed. After purification, an increase in fold purification and a gradual decrease in the yield of about 1.13% and 70%, respectively was observed.

KEYWORDS

Azo dye, Effluents, Azo reductase, Enzyme, Mutations

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Sorption Of Cu(II) Ions On Orange Peel

Shubhangi S. Malkhede[1]* and Y. R. M. Rao[2]

1. MIT, Department of Civil Engineering, Kothrud, Pune - 411 038, Maharashtra, India
2. Dr. Pauls Engineering College, Pulichapallam, Villupuram - 605 109, Tamil Nadu, India

**Corresponding author, Email : shub_shekokar13@rediffmail.com ; dryrmrao@rediffmail.com*

An adsorption process is the most effective technique and used for the elimination or reduction of metal ions from wastewater. However, the process is not economical since the activated carbon used as a sorbent is costlier. Hence investigators are inspecting to identify cost-effective, efficient, locally available adsorbent materials. In this research work, attempts have been made to check the efficiency of powdered orange peel (POP) with powdered activated carbon (PAC) in removing Cu^{2+} ions from the aqueous solution. Experiments have been carried out using the batch mode method. In this removal process, the influence of various physico-chemical parameters, like pH, contact time, adsorbent dose, Cu^{2+} ions awareness and adsorbent particle size at the adsorption of Cu^{2+} ions through each POP and PAC were investigated. Results found out that the 69.75% elimination of Cu^{2+} ions was determined with powdered orange peel at pH 5, contact time 60 min, adsorbent dose 3.5 g/L and Cu^{2+} ions concentration of 200 ppm. Whereas, the powdered activated carbon has shown elimination of 77.4% at pH 5, contact time of 45 min, adsorbent dose 2.0 g/L and Cu^{2+} ions concentration of 500 ppm. Equilibrium records had been analyzed using the Langmuir, Freundlich model.

KEYWORDS

Activated carbon, Adsorbent, Adsorption, Batch mode technique, Contact time, Heavy metals, Isotherm, Powdered orange peel

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Integrated Waste Management In Desalination Plants In UAE

Pradeep Kumar V.N., Gabriel Tonga Noweg* and Lau Seng

University Malaysia Sarawak, Institute of Biodiversity and Environmental Conservation, 94300 Kota Samarahan, Sarawak, Malaysia

**Corresponding author, Email : 17010138@siswa.unimas.my ; gtnoweg@unimas.my*

Desalination is a process that primarily involves cleanup and purification of sea water for drinking and irrigation purpose. The process is mainly targeted and widely used in the Gulf Cooperation Council country. To concentrate on waste management, it can be stated that it includes all those operations and activities that highly ensure to minimize the waste by adopting effective waste management tools, such as recycling and effectively reusing brine waste. In the current study, it identifies a perfect understanding of integrated waste management in the desalinization plant in UAE by analyzing the complete set of the research which includes the various techniques in desalination plant adopted in the UAE and also includes the improvement technique in the desalination process. The study also describes the environmental impact of seawater desalination and also examines the techniques to minimize the negative impact of the desalination plant on the environment. In accession to this, the section also describes the finding and discussion which is grounded on the existing literature which includes a summary of the literature by signifying the major concept. At last, the study also describes the summary of the reassessment that helps to make an effective recommendation for the UAE, so that they will be capable to accomplish the successful implementation of waste management effectively.

KEYWORDS

Desalination, Techniques, Environment, UAE

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Coir Pith: A Potential Material For Fabrication Of Low-Cost Particle Board

C.R. Sahoo, T.K. Bastia and B.B. Kar*

Kalinga Institute of Industrial Technology (Deemed to be University), Department of Chemistry, School of Applied Sciences, Bhubaneswar - 751 024, Odisha, India

**Corresponding author, Email : bbkarfch@kiit.ac.in; crsevn@gmail.com*

The objective of this paper is to utilize waste coir pith, generated from coconut cultivation. During the study, the techno-mechanical properties of the particle board are being tested continuously. In this process, waste coir pith is dried and shredded into a size range within 1 cm. These shredded materials are then ground to smaller particle size in the range of 2-4 mm. The factors under consideration are density (900-1000 kg/m^3). The experiments are carried out with variable temperatures in the range of 25-60°C. The boards after fabrication are tested for thickness, moisture content and water absorption. It has been found that all the panel boards are having a much higher density than that of the IS – 3087 standards except urea formaldehyde resin based boards. Similarly, thickness, moisture content, water absorption are within the range of standard IS – 3087. When they are subjected to mechanical parameters, properties such as tensile strength, compressive strength and flexural strength are taken into consideration. The data revealed that as compared to other panels, boards prepared using urea formaldehyde, phenol formaldehyde and melamine formaldehyde resin showed better tensile strength (that is 2 MPa) whereas boards made up of lignin formaldehyde and molasses formaldehyde are of lower tensile strength. Similar results are revealed in terms of compressive and flexural strength as well.

KEYWORDS

Coir pith, Particle board, Urea formaldehyde resin, Lignin formaldehyde

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Removal Of Textile Dye By Titanium Oxide, White Clay And Calcium Oxide

Samir Bekheira, Zohra Dali-Youcef*, Miloud Hamadache and Asma Belaidouni

National Polytechnic School of Oran, Laboratory LABMAT, El Mnaouer Oran, Algeria

**Corresponding author, Email : zohra_dali2002@yahoo.fr; bekheirasamir@gmail.com*

The experimental study envisages the elimination of a purple dye KB which is in the discharges of a textile plant ENADITEX of the industrial zone of the Wilaya Oran, Algeria. This dye, like the other dyes, is a pollutant and hardly degradable. Tree solid adsorbents: Titanium oxide, white clay and calcium oxide were used to remove the organic dye KB (cationic type) used in the textile industry. The kinetic study of the purple dye adsorption process showed that the removal using Titanium oxide, white clay and calcium oxide attained was 87%, 80% and 86%, respectively for respective contact times of 200 min, 60 min, 50 min and that the adsorption of the purple dye by the three solid materials was well described by the pseudo-second order model while the thermodynamic study revealed the adsorption process was physical. On the other hand, the study of adsorption isotherms using different classical models showed that adsorption can be described by the Freundlich and Temkin isotherm models.

KEYWORDS

Titanium oxide, White clay, Calcium oxide, Purple dye KB, Adsorption isotherms

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Heavy Metal Uptake By Wheat And Mustard Crops Grown in Surrounding Of A Coal-Fired Thermal Power Plant, Bathinda (Punjab)

Savita Verma and Anju*

Chaudhary Devi Lal University, Department of Energy and Environmental Sciences, Sirsa - 125 055, Haryana, India

**Corresponding author, Email : anjumalik@cdlu.ac.in; drsavi13@gmail.com*

Plants show natural ability to absorb and accumulate trace metals from soil. The aim of the present research paper is to study the accumulation and distribution pattern of some heavy metals, namely Cr, Cu, Pb, Ni and Zn in different parts (root, stem, leaf and seed) of wheat and mustard crops, grown in fields around Guru Nanak Dev Thermal Power Plant Bathinda, Punjab. For this purpose, the bioconcentration factor (BCF) and translocation factor (TF) of metals between the different plant parts of both the crops and the soils were studied. Findings of the present study indicate that all the studied metals have primarily accumulated in roots of both the crops. In both crops, the concentrations of all the studied heavy metals in plant tissues were diminishing from the root to the aerial parts. The levels of all the trace elements were higher in the mustard crop than the wheat crop. The concentrations of all the metals in both crops were within safe limits of Indian standards for plants.

KEYWORDS

Wheat, Mustard, Heavy metal, Bioconcentration factor, Translocation factor

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Socio-Economic Scenario Of Scrappers And Their Role In Municipal Solid Waste Management In City Of Varanasi

Vijai Krishna*, Dharmendra Kumar, Rajni Srivastava, Himanshu Kumar and Anil Kumar Pandey

Banaras Hindu University, Institute of Environment and Sustainable Development, Varanasi - 221 005, U.P., India

**Corresponding author, Email : vijaikrishna@bhu.ac.in; vdharmendra493@gmail.com*

Scrappers or scrap dealers or scrap traders play an important role in the municipal solid waste management of a city, like collection, storage, sorting, reuse and recycling of waste. Scrapping has become a livelihood practice of a large group of people especially in developing countries, where government authorities are not much efficient in waste management. Scrappers not only clean the cities but also help the city authorities by doing so. But their socio-economic condition is not well. In this research paper the results of a survey have been discussed to assess the socio-economic scenario of scrappers in the city of Varanasi of Uttar Pradesh state in India, like education, health, entertainment, help from NGOs, police harassment and their practice of waste collection, storage, sorting, selling, etc. The results of the survey clearly indicate that the socio-economic condition of these scrappers is very bad and need the attention of government and waste management authorities for the improvement of them.

KEYWORDS

Scrappers, Municipal solid waste management, Socio-economic scenario, Varanasi

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Experimental Evaluation Of *Solanum tuberosum* Peel As Bioadsorbent For Removal Of Nickel And Chromium Ions From Aqueous Solution

Harendra K. Sharma[1]*, Irfan Rashid Sofi[1] and Laxmi Dubey[2]

1. Jiwaji University, School of Studies in Environmental Science, Gwalior - 474 001, M.P., India
2. SMS Govt. Model Science College, Department of Botany, Gwalior - 474 009, M.P., India

**Corresponding author, Email : drhksharmagwl@gmail.com*

The ability of potato peel to act as biosorption medium in the removal of metal ions from aqueous solution was investigated. The adsorbent removal efficiency was determined as a function of contact time, initial metal ion concentration, pH and temperature. Potato peel was characterized by scanning electron microscopy (SEM) and Fourier transformed infrared spectroscopy (FTIR). FTIR results showed that the functional groups providing the active sites are carboxyl, hydroxyl and carbonyl groups. Results from the biosorption experiment showed that potato peel displays a good binding affinity with metals ions [Cr(VI) and Ni(II)] in the aqueous solution. The equilibrium profile fits with the Langmuir isotherm with a coefficient values of 0.93 and 0.99 for Ni(II) and Cr(VI) and Freundlich isotherm having coefficient values of 0.97 and 0.99 for Ni(II) and Cr(VI), respectively. The potato peel was found to be highly efficient in the removal of selected heavy metal ions.

KEYWORDS

Biosorption, Potato peel, Heavy metals, Aqueous solution, Adsorption isotherm

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Treatment Of Slaughterhouse Wastewater By Upflow Anaerobic Hybrid Reactor At Pilot Scale

Rohit Patel[1]*, Hemant Kumar[2], Shobha Ram[2] and Ashish Kumar Sisodia[2]

1. Indian Institute of Technology, Indian School of Mines, Dhanbad - 826 004, Jharkhand, India
2. Gautam Buddha University, Greater Noida - 201 308, Uttar Pradesh, India

**Corresponding author, Email : rohitpatelp7@gmail.com*

The wastewater discharged by slaughterhouse industries is categorized mainly by high COD, high BOD, high suspended and complex mixture of fats, proteins and fibres which needs systematic treatment before the disposal. In the present study, the performance of 3.26 L upflows anaerobic hybrid reactor treating the slaughterhouse wastewater with polyvinyl chloride (PVC) uses as filter media was investigated. For seeding, the reactor is inoculated with activated sludge from a upflow anaerobic sludge blanket (UASB) reactor treating the slaughterhouse wastewater. After seeding, the reactor with maintained, inlet flow of 135.72 mL/hr is loaded with different dilution ratios of the sample (1/10, 1/6, 1/4 and 1/1 or undiluted) with different COD loadings (9.281 kg.COD/m^3 day, 10.149 kg.COD/m^3 day, 9.263 kg.COD/m^3 day and 11.210 kg.COD/m^3 day) with HRT of 24 hr and achieved maximum COD removal efficiency upto 73.32% at COD loading of 11.210 kg.COD/m^3 day. Alongwith the COD, other required parameters, such as phosphorus, BOD, TSS, VSS and volatile acid as acetic acid are also found out to check the efficiency of the reactor.

KEYWORDS

Slaughterhouse waste, Anaerobic digestion, Anaerobic filter, UASB reactor, Chemical oxygen demand

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Improvement In Quality Of AMD Contaminated Water By Treatment With Limestone And Filtration Through Activated Charcoal And Sand Filter

Ribha I. Passah and O. P. Singh*

North-Eastern Hill University, Department of Environmental Studies, Shillong - 793 022

**Corresponding author, Email : opsinghnehu@gmail.com; passahribha@gmail.com*

Unscientific coal mining in Jaintia Hills, Meghalaya has severely degraded the environment of the area. The water of the area has become highly acidic and contaminated with different impurities making the water unsuitable for domestic and irrigation uses leading to scarcity of clean water in the mining area. Acid mine drainage (AMD) has been recognized as the main cause of water pollution. This calls for an urgent action to improve the quality of water to ease the water stress in the area. Laboratory experiments involving treatment of acidic water using locally available limestone and subsequent filtration through the layers of activated charcoal and sand yielded promising results towards the improvement of water quality. Treatment with limestone raised the pH from 2.8-7.31, well within the acceptable limit. Subsequent filtration improved the water quality further by bringing the values of calcium, turbidity, total dissolved solids (TDS), alkalinity and metals, such as zinc and aluminium within the acceptable limits prescribed by Bureau of Indian Standards. The promising results of the present study can be used for designing suitable filtration units for domestic uses as well as for treatment of stream water for irrigation and ecological purposes.

KEYWORDS

Acid mine drainage, Coal mining, Improvement in water quality, Neutralization by limestone, Filtration with charcoal and sand

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