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Capture Of Toxic Pollutants By *Pistacia lentiscus* Leaves As A Low-Cost Biosorbent : Equilibrium, Kinetics And Thermodynamic Studies

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Presenting expensive disposal problems during extraction of its essential oil, *Pistacia lentiscus* leaf was chosen in this investigation as a biosorbent for Rhodamine B and Pb^{2+} ions removal from simulated solution. Chemical and physico-chemical methods, such as FTIR analyses, minimum expenditure basket (MEB), mesoporous and microporous available areas and zero point charge (pH_{zpc}) were performed to characterize the biosorbent prior to its utilization. Effect of conventional parameters on biosorption of both pollutants, such as equilibrium time, adsorbent dose, pH and temperature were studied. Well known adsorption isotherms, namely Langmuir, Freundlich and Tempkin were used for adsorption equilibrium data analysis in their linear and non-linear forms. The rate of adsorption was encouraging for *P. lentiscus* waste used as such. Linearized and non-linearized Freundlich-biosorption models are more representative for the experimental data predicting heterogeneous surface coverage of the adsorbents. Magnitudes of R_L and n depict the favourability biosorption processes. Biosorption mechanism found to obey pseudo-second-order kinetic model and indicates that the sorption process is controlled by intra-particle diffusion. Thermodynamic analysis of the adsorption processes of both pollutants confirms their spontaneity and exothermicity. Compared to other biosorbents, *Pistacia lentiscus* leaves as a bio-renewable and affordable biomaterial can be efficiently used in removing organic and inorganic pollutants from industrial effluents.

KEYWORDS

Biosorption, *Pistacia lentiscus,* Isotherm models, Thermodynamics

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Determination Of Rare Earth Elements And Its Distribution Pattern From The Core Sediments By K_o-Instrumental Neutron Activation Analysis

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This work aimed to assess rare earth elements and their distribution pattern from the core sediments from the central coast of Ghana by K_0 instrumental neutron activation analysis. The rare earth element content was evaluated with uncertainty less than 8% (at 95% confidence level) and demonstrated to be accordant with the IAEA-soil 7 certified concentrations. The calculated concentration of light rare earth elements and Fe normalized enrichment factors suggested that sediment samples were not enriched with light rare earth elements (LREEs) obtained from discharges of anthropogenic activities. The chondrite-normalized pattern of rare earth elements exhibited LREEs, Tm, Tb, Eu and Ho enrichment. The total contents of rare earth elements calculated can be used to establish baseline information about environmental contamination determination and to develop the relationships between the Ce/Ce* and Eu/Eu* anomalies and the source appointment of both LREEs elements and heavy rare earth elements (HREEs).

KEYWORDS

Rare earth element, Marine core sediment, Neutron activation analysis, Shale average, Enrichment factor

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Distribution Of Indoor Air Pollutants Relative To Meteorological Parameters In Selected Schools In The Eastern Cape Province Of South Africa: A Preliminary Study

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Particulate matter (PM), gaseous pollutants and meteorological parameters have gained concern recently in indoor air quality (IAQ) assessment. However, information about the nature and concentration of indoor air pollutants and meteorological parameters in the presence and absence of learners is scarce, hence the aim of this study. This study sampled indoor air from 23 classrooms in three urban and four rural schools in the Eastern Cape Province of South Africa. Components of indoor air (O_2, CO_2, NO_2, $PM_{2.5}$, PM_5 and PM_{10}) and meteorology (relative humidity, wet bulb temperature, dew point temperatures, barometric pressure and airflow) were measured. The findings showed that sampled pollutants were present in all the classrooms in different proportions and varied with the presence and/or absence of learners. While CO_2 and PM concentrations were higher than permissible amounts, NO_2 volumes were barely detectable. The meteorological parameters were comparatively much higher in urban than rural school classrooms in the presence and absence of learners. In conclusion, classrooms present different IAQ when learners are present compared to when they are absent considering the concentration of their ambient compromisers. The levels of air pollutants in school classrooms do not only increase with the presence of learners but tend to also increase with the rise in indoor meteorological factors.

KEYWORDS

Indoor air quality, Air pollution, Particulate matter, Gas pollutants, Meteorological parameters

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Mapping Of Aquifer Vulnerability Zones Using Drastic-Lu Model For The Part Of Palwal – Faridabad District, Yamuna Alluvial Aquifer, Haryana, India

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Vulnerability assessment to delineate areas that are more susceptible to contamination from anthropogenic source has become an important element for sensible resource management and landuse planning. The study utilized the DRASTIC-Lu model comprising seven environmental parameters which include depth to the water table, net recharge, aquifer media, soil media, topography, the impact of the vadose zone, hydraulic conductivity. These thematic maps under the GIS environment were used to assess the aquifer vulnerability in Yamuna alluvial aquifer in parts of Palwal - Faridabad district, Haryana, India. The result of the groundwater vulnerability assessment suggests four zones of relative vulnerability as very low, low, medium and highest vulnerable zones. The elevated north-western parts of the study area displayed high aquifer vulnerability due to shallow groundwater depth, open water bodies, urban settlement, soil type and high hydraulic conductivity. While eastern parts show less vulnerability due to low hydraulic conductivity and deeper groundwater table.

KEYWORDS

DRASTIC-Lu, Aquifer vulnerability mapping, Yamuna alluvial, Palwal - Faridabad, GIS

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Development Of Process Parameters For The Clean Synthesis Of Silver Nanoparticles Using The Pernicious Aquatic Weed *Eichhornia crassipes* And An Assessment Of Their Properties

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The effect of several process parameters on the biomimetic synthesis of silver nanoparticles (AgNPs) using ubiquitous and pernicious aquatic weed water hyacinth (*Eichhornia crassipes*) was studied. Aqueous extracts of the plant across a wide range of concentrations were able to successfully induce AgNP formation as well as their stabilization. It was shown with the aid of UV-visible spectroscopic, electron microscopic and dynamic light scattering studies that by manipulating the extract-Ag (I) stoichiometry, temperature, pH and interaction time, different shapes and sizes of nanoparticles can be generated. Conditions under which optimum formation of AgNPs of different shapes and sizes could be achieved were worked out. The efficacy of the AgNPs in free radical scavenging and catalysis was witnessed. The studies thus provide a template for scaling up the AgNP synthesis and utilizing the AgNPs. Given the fact that *E. crassipes* is freely available in large quantities, with no other recognized use, the present method opens up a possibility for large-scale utilization of it in synthesizing AgNPs of tunable shapes and sizes in a rapid, non-polluting, energy frugal and inexpensive manner.

KEYWORDS

Silver nanoparticles, Water hyacinth, *Eichhornia crassipes*, Biomimetic synthesis, Antioxidant activity, Catalysis

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Identification Of Groundwater Prospective Zones Of Varuna Watershed Using Weighted Overlay Method

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In this work, potential groundwater zones of the Varuna watershed have been identified using the Weighted Index Overlay method. To apply this method, various thematic layers, soil, drainage, slope, land use land cover, and topographic layers have been considered. The comparative weight has been assigned to individual thematic layers and further rank assigned to every category of thematic layers. The overlying of layers has been done in ArcGIS to produce a potential groundwater zones map. Potential groundwater zones (PGZs) of the Varuna watershed have been categorized into three categories: good, moderate and low. Results show that the maximum part of the study area has a moderate groundwater zone. The criterion to categorize PGZs is based on the depth of the groundwater table from the ground surface. This study shows that remote sensing and GIS are the most useful tools to explore the groundwater potential zones and opened new paths to take care of the water resources.

KEYWORDS

Varuna watershed, GIS, Potential groundwater zones

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Effect Of Superplasticizer On Alkali Activated Ground Granulated Blast Furnace Slag Concrete In Ambient Curing Condition For Sustainable Environment

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Concrete is the most widely used construction material due to its mechanical and durability properties. Due to the use of ordinary portland cement in concrete production, CO_2 emissions occur from cement leading to environmental pollution. The objective of the current study is to minimize the cement content in the concrete production. In this regard, cement is replaced with ground granulated blast furnace slag, alkaline solution is used for alkali activation to develop geopolymeriziation process and this type of concrete produced is called as alkali-activated slag based geopolymer concrete. Most of the research works available are related to heat-cured flyash based geopolymer concrete and less work on ambient cured. The present work is one such alternative method in producing ambient cured ground granulated blast furnace slag geopolymer concrete. The compressive strength of ambient cured slag based geopolymer concrete with and without superplasticizer is 5.5% and 8.7% higher than ordinary portland cement concrete, respectively.

KEYWORDS

Geopolymer concrete, Ambient cured geopolymer concrete, Slag based geopolymer concrete, Superplasticizer geopolymer concrete, Sustainable concrete

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Evolution Of Physico-Chemical Parameters And Pathogenic Microorganisms Of Sludge Of Dar El Gueddari Wastewater Treatment Stations (Morocco)

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The purpose of this study is to evaluate the effect of the storage of sewage sludge in Geotube® on the physico-chemical and microbiological parameters of the sludge resulting from the cleaning of the anaerobic basins of the Dar El Gueddari treatment plant between October 2013 and May 2017. The results obtained during this study revealed an increase in the pH of sludge from 6.5-7.2 and a gradual reduction in odour according to the drying time. The dryness reaches an optimal value of 76%, the variation of the C/N ratio goes from 9.62-11.80 (lower than 15), which indicates that these sludges have fast mineralization of organic matter. For nutrients, there was a slight decrease except for total nitrogen, which dropped from 1.3 to 0.8 ppm. The contents of metallic trace elements (Cd, Cr, Cu, Hg, Pd and Zn) and the organic trace components [7 PCBs (28, 52, 101, 118, 138, 153, 180)], fluoranthene, benzo(a)fluoranthene, benzo(b)fluoranthene are in small quantities and well below the French regulatory standards. For the microbiological component, the obtained results showed a decrease in the bacterial load over time and it is eliminated completely from the second year. The so-called dewatering treatments applied to sludge play a major role in the elimination of most or all pathogenic micro-organisms.

KEYWORDS

Sewage sludge, Physico-chemical, Microbiological parameters, Wastewater

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Total Suspended Particulate Matter And PM_{10} Concentrations Related Meteorological Conditions In Daya, Makassar

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Ambient total suspended particulate matter (TSP) and PM_{10} (that is particulate diameter less than 10μm in size) produced by human activities, such as motorized vehicle emissions and industries can affect ambient air quality. On the other hand, the Makassar City Power area as a sampling site which is now turning into a densely populated area due to the rapid development of residential areas and this fact enables more opportunities to many residents and disruption of human health because of the decreased ambient air quality especially due to the presence of particulate matter, while the concentration of TSP and PM_{10} is influenced by meteorological conditions. In this study, Pearson's coefficient of correlation was applied to study the relationship between TSP, PM_{10} and meteorological variables, that is humidity, temperature, wind speed and rainfall. TSP and PM_{10} sampling was done using the high volume air sampler (HVAS) tool, for meteorological factors using the hygrometer, thermometer and using anemometer, while rainfall data was obtained from the Office of Meteorological and Geophysics area IV Makassar. This study concluded that the temperature was found as a significant factor compared with other factors that influence the concentration of TSP and PM_{10}. Increased rainfall, humidity and wind speed have a negative correlation with the average concentration of TSP and PM_{10} in Daya, Makassar.

KEYWORDS

Air pollutants, Particulate matter, Meteorological parameters, Statistical analysis, Makassar

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Identification And Characterization Of Microplastics At Muara Gembong, Bekasi District, Indonesia

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One of the factors causing sea pollution is a large amount of plastic waste. Over the past 40 years, the world's plastic production has increased by 25 times and the material recovered is no more than 5%. According to the World Bank in 2018, Indonesia is a contributor to 9 million tonnes of plastic waste annually. Plastic waste in the sea will be cut into smaller sizes or called microplastics, over 100 years. Microplastics have an impact that can save the lives of marine life. Globally, the growth of plastics has increased significantly, in the 1950s the amount of plastic reached 1.7 million tonnes and in 2014 it had increased to 299 tonnes. Muara Gembong is part of the downstream of the Citarum river in Bekasi Regency which has a dense population and has the potential to contribute to plastic waste in the sea. Based on the results of research, there are four types of microplastics found, namely fibres fragments, films and pellets. Microplastic characterizations found were polypropylene (PP), polystyrene (PS), nitrile, nylon, low-density polyethylene (LDPE) and linear low-density polyethylene (LLDPE) and high-density polyethylene (HDPE). This can happen because of the dense population which will increase the activities of the community around the coastal area.

KEYWORDS

Microplastic, FTIR, Muara Gembong

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Anticipated Performance Index Of Tree Species As An Indicator For Green Belt Development In Traffic Density Area

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Air pollution is one of the major environmental problems in the urban atmosphere and green plants act as living filters to absorb and accumulate pollutants from the atmosphere. To assess the plants' tolerance, the parameters of air pollution tolerance index (APTI) and anticipated performance index (API) in the traffic density area of Visakhapatnam were evaluated. Seventeen tree species were identified growing in the selected study area. The APTI was calculated based on the biochemical analysis of leaf cell sap pH, total chlorophyll content, relative water content (RWC) and ascorbic acid. The air quality in traffic density areas ranged from moderate to high for particulate matter and low to moderate for NOx. Out of 17 species studied, eight tree species (*Ficus benghalensis*, *Eucalyptus citriodora*, *Mangifera indica, Artocarpus heterophyllus, Syzygium cumini*, *Azadirachta indica, Bauhinia purpurea* and *Pongamia pinnata*) have shown API values above 81 and are categorized as excellent and can be grown in urban areas. Among them, *Azadirachta indica* and *Pongamia pinnata* are suitable for avenue plantation in traffic density areas because of their resistance to pollution and extreme winds during cyclones.

KEYWORDS

Urban plantation, Green belt, Anticipated performance index, Traffic density area

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Scope Of Recycling Of Municipal Wastewater

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The present research work is done with a goal of achieving a successful way to recycle the municipal wastewater for non-potable daily uses, like toilet flushing, washing, watering in gardens, etc., with a minimum technical knowledge, cost and labour. Grab samples were collected for characterization and performance study on the municipal wastewater. In order to fulfill this objective a suitable channel is selected carrying municipal sewage water from nearby locality. The disposal of such wastewater without any treatment process is going on day by day and thereby creating the alarming situation in surface water quality. The purpose of the present study was to provide a viable treatment option for the sake of recycling. The research was mainly focused on minimum treatment option for municipal wastewater so that the treated effluent could be recycled for non-potable daily uses.

KEYWORDS

Recycling, Municipal wastewater, Non-potable uses, Characterization, Performance study

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Statistical Study Of The Quality Of Water Intended For Irrigation, Case Study Of Region Of Fez, Morocco

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This work is part of the characterization of the chemistry of water for irrigation in the region of Fez in Morocco. To carry out this study, 22 samples were taken during two different periods of the year (high water period and rainy return period). Principal component analysis (PCA) applied to the data sets revealed that among the eighteen variables studied, fourteen participate in the constitution of the factor axes. The four remaining variables, namely pH, Ni, Co and As, therefore, do not play an important role in determining the typology of the biotope studied. Moreover, the results obtained indicate that the physico-chemical and toxic (heavy metals) quality of the water used for crop irrigation still does not meet the criteria for use in agriculture. The irrigation water used in the stations located downstream of the industrial discharges of the city of Fez is characterized by high percentages of heavy metals, such as chromium. The protection of water resources and the treatment of polluted water are necessary to ensure that this water can be used in agriculture.

KEYWORDS

Principal component analysis, Heavy metals, Physico-chemical, Water quality, Fez, Morocco

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E-Waste Recycling Activities In Global Production And Removal Of Precious And Toxic Metals From Contaminated Water And Soil For Environmental Safety: A Review

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Electronic waste components contain acids, toxic metals and hazardous compounds that may cause health problems and pollute our atmosphere. It is created from anything which is electronic: computers, TV's, monitors, cell phones, vcrs, cd players, fax machines, printers, household equipment's, like vacuum cleaner, microwave/ovens, washing machines, air conditioners, etc., and some smart devices, such as iPhone, iPad, watches, kindles, chromium tablet, etc. Most electronics that are improperly thrown away contain some form of harmful materials, such as lead, copper, cadmium, mercury, beryllium, lithium, barium, nickel, chromium and carcinogenic chemicals which affect the environment and human life. These heavy metals can leach through the soil to reach groundwater which eventually runs to the surface water causing harmful effects to the entire biota either directly or indirectly. Many of these e-waste products can be reused, refurnished, or recycled. Therefore, in the present work, a critical review on environmental effects and removal of toxic metals derived from e-waste recycling activities have been planned. In the present work, the release of these toxic chemicals have been studied and possible remediation processes are discussed.

KEYWORDS

Electrical waste, Toxic metals and compounds, Environment, Recycling activities

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River Water Quality Assessment By Bio-Monitoring Working Party Score Of Macro-inverterbate

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An assessment of river water affected by oil refinery effluent was carried out by biological water quality criteria (BWQC) of macroinvertebrate (organisms retained by mesh sizes of ~200-500 mm) community of 2 rivers Dhansiri and Kaliani of Golaghat distrist of Assam. A total of 35 families of macroinverterbate were recorded during the study period. The point of effluent discharge showed heavy pollution with the water quality class D and all the control stations of upstream showed water quality class B indicating slight pollution, whereas the downstream of contaminated area of the 2 rivers showed water quality class C indicating moderate pollution.

KEYWORDS

Assam, Community, Effluent, Macroinverterbate, Pollution, Refinery

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