

Contemporary Condition Of Physico-Chemical Properties And Heavy Metal Contamination In Groundwater By Tannery Activities, Ambur, Vellore District

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This study was focused to reveal the physico-chemical characteristics and the presence of heavy metals in groundwater samples. This research was done at the site of the tanneries, Ambur taluk in Vellore district Tamil Nadu, estimates the pollution indices and risk assessment to assess the rightness of groundwater for human consumption. The knowledge focused physico-chemical parameter and heavy metals, like lead, chromium, copper and zinc contamination on groundwater samples. Flame atomic absorption spectrometer (AAS) technique was used to assess the heavy metals concentration. The analytical results showed that chromium concentration is significantly higher in groundwater samples at the site of the tannery locality. Also lead (Pb), copper (Cu) and zinc (Zn) metals strength was found to be slightly high in groundwater at the site of the tannery areas. The calculated pollution indices, namely contamination index (CI) and index of environmental risk (IER) for the heavy metals propose that majority of the studied groundwater samples are in the highly contaminated zone. All physical and chemical parameters within the limits and metals contamination in groundwater is answerable for the maintenance of harmfulness in farming crops and domestic uses.

KEYWORDS

Heavy metals, Tannery activities, Groundwater quality, Ambur, Vellore district

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Bioremediation Potential Of Macrophytes In Jakkur Wetland

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Aquatic macrophytes are important components of wetland ecosystems as they help in the uptake of nutrients and hence help in maintaining the chemical integrity of the respective ecosystem. These plants mobilize mineral elements from the bottom sediments and provide shelter to aquatic macro invertebrates and fishes. The current study investigates the diversity, biomass, nutrient and metal uptake potential following the standard protocol. *Polygonum glabrum* and *Typha angustata* had higher biomass at both inlet and outlets. Carbon content was higher in *Typha angustata*, nitrogen and phosphorus was highest in *Spirodela polyrhiza* in the outlet. Cadmium concentration was within normal range with *Alternanthera philoxeroides* and *Pistia stratiotes* accumulating highest in inlet and outlet. *Typha angustata* in inlet had copper concentration in critical range whereas in outlet all species had normal range with *Ludwigia sp* the highest. Lead, zinc, nickel and chromium were in higher concentration in *Typha angustata* than other species in inlet. Nickel was above normal range in *Typha angustata* in inlet and in all species in outlet. In the outlet *Typha angustata* (lead), *Pistia stratiotes* (zinc and nickel) and *Alternanthera philoxeroides* (chromium) had higher concentrations. Thus the study highlighted the remediation potential of macrophytes from Jakkur lake.

KEYWORDS

Macrophytes, Bengaluru, Jakkur lake, Heavy metal

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Consideration Of Environmental Factor In Dumper Performance Calculation Of Coal Mines

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The pollution impacts of heavy-duty vehicles on the environment are increasing day by day, as these vehicles become older and older. Carbon dioxide (CO₂) emissions are primary greenhouse gases and it is produced when the fuels are completely burned. When the dumper becomes older, it emits more gases, such as carbon monoxide (CO), nitrogen oxides (NO_x), particulate matters (PM), total hydrocarbons (THC) and unburnt fuel rather than CO₂. These gases are very hazardous for the environment as well as for the human being. This pollution creates a lot of health issues in the nearby mining area. Hence, while calculating the performance of dumper, it should also be considered as a factor which was previously not considered. In this research, the environmental factor is proposed to calculate by the multiplication of carbon tax index and engine index. A case study has been taken to illustrate the proposed methodology.

KEYWORDS

Environment factor, Dumper, Carbon dioxide, Carbon tax index, Engine index

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Computer Vision For Predicting Unhealthy Region Of Rice Leaves - A Review

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Rice (*Oryza sativa*) is a very important food crop of Indian overall agricultural economy. Moreover, it is the staple food of southern and eastern India. Since the consumption is more the rice plant has to be analyzed well with its diseases and proper disease control measures should be taken with rice otherwise it gives major economic loss and reduce grain quality. This paper reviews the importance of rice plant infection due to plant pathogen. In the last two decades the scientist draws the attention on automatic plant disease identification from visible symptoms due to the quick development of computer technology, it makes researchers to automatically identify the diseases in plant from early symptoms. This review summarizes completely different survey with numerous ways supported on colour conversion, segmenting the pigment, extracting the features and classifying the disease. Though advancement has taken place some of the challenges were still lacking. To overcome the problem, it concludes with intensive studies on the prediction and classification of rice plant diseases for each methodology.

KEYWORDS

Crop disease, Computer vision, Segmentation, Feature extraction and classification

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Experimental Investigation On Performance Combustion And Emission Characteristics Of Direct Injection Diesel Engine Using *Calophyllum Inophyllum* Methyl Ester

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Globally, the need for energy is increasing rapidly while the supply is not growing at the same pace, thus creating huge deflection in power and cost in many parts of the world. Because of the increased in worlds economy, it causes a huge demand for the transportation sector and power generation equipment, which increases the demand for diesel fuel. So we are in a situation to find suitable alternative fuel to replace the standard diesel fuel. Biodiesel produced from *Calophyllum inophyllum* oil was blended with diesel in the ratio of 30:70 on a volume basis (B30) was used to investigate the performance, combustion and emission characteristics of a single cylinder direct injection diesel engine and the results were compared with B20 and base diesel fuel. The results revealed that the brake thermal efficiency was increased by 6% and BSFC was reduced by 5% than B20. Moreover, the entire tested fuels show similar in-cylinder pressure and heat release rate for B30 is higher than B20. The NO_x emission got reduced for both the blends than diesel and HC emission was lower at low loads for the blend B30 than diesel. Other emission, such as CO and smoke was higher than diesel fuel.

KEYWORDS

Biodiesel, *Calophyllum inophyllum*, Emissions, Engine performance

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Impact Of Municipal Solid Waste And Groundwater Quality Assessment: A Case Study At Landfill Site Near Rajendra Nagar, Patna

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Groundwater contamination is serious global issue nowadays. In several parts of India, groundwater is largely affected by the improper disposal of municipal solid waste, which deteriorates the groundwater quality. In our country, more than 60% of the irrigation requirement and 85% of drinking water supplies are dependent on groundwater [1]. According to UNESCO report, a majority of Indian population has no access to safe drinking water and that about 66 million people rely on unsafe groundwater for consumption. The present work is aimed at assessing the impact of municipal solid waste on water quality near landfill, Rajendra Nagar, Patna. All the samples were analyzed following different parameter have been considered, namely pH, EC, TDS, TH, alkalinity, calcium, magnesium, phosphate, sulphate, chloride, fluoride and bacteriological test. All these parameters were analysed using APHA and the obtained results were compared with the Indian standard drinking water specification BIS:10500-2012 [2,3]. After analysis, it has been observed that the groundwater is significantly contaminated around the study area. In most of the sampling site of the study area had found poor and marginal water quality. In all the water samples, the parameters, like TDS, hardness and alkalinity were found above acceptable limits as per BIS [3]. In bacteriological analysis, 25% of the total sample were contaminated and hence unfit for drinking purpose. This study suggests that the analysis of water and its management practices should be carried out periodically for the protection of groundwater quality.

KEYWORDS

Solid waste, Municipal landfill, Contamination, Water quality, APHA, BIS

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Particulate Pollution (PM₁₀) Dominance For The Metropolis Kolkata

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The air quality for the city of Kolkata is deteriorating day by day. In fact, the huge number of respiratory tract related ailment reported for the metropolis is actually reflective of this. The present study focussed on presenting an in depth analysis of the particulate matter (PM₁₀) and sulphur dioxide (SO₂) and nitrogen dioxide (NO₂) for two busy and highly traffic congested parts of Gariahat (22°31'9.67^½ N, 88°21'55.78^½ E) and Moulali (22°33'19.79"N, 88°21'55.30"E) of Kolkata over a period of one year from June, 2017 to May, 2018. The study has also reported the seasonal variation of these pollutants over the period and also tried to interpret the possible sources through the adoption of Hysplit back trajectory model. The meteorological parameters, such as humidity, temperature and rainfall data alongwith wind speed have been also reported in the study for better data interpretation. The basic objective of the study is to report the dominance of PM₁₀ on the air quality of Kolkata.

KEYWORDS

PM₁₀, SO₂, NO₂, Air pollution, Meteorological parameters, Hysplit back trajectory model

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Isolation And Characterization Of Surfactant Degrading Bacteria (*Pseudomonas Sps*) From Detergent Contaminated Soils

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Surface active agents (surfactants) are chemical compounds which are largely used as raw material in detergent production and their introduction into the environment in large concentrations causes harm to the aquatic bodies and terrestrial environment. Microorganisms were isolated from samples collected from outlets of laundry and dish washing areas. Bacteria were isolated from soil at the outlet of these detergents and identified by morphological and biochemical characterization. Methylene blue photometric assay and methylene blue active substance assay were used to determine the amount of degradation by the bacteria. *Pseudomonas sps.* had shown better degradation for cloth washing detergent. Degradation percentage was maximum for sample-4 (Rin) 99.37% after 48 hr on incubation. Followed by sample-3(tide) degradation 95.26%, are showing sample 2 and 1 are showing almost similar degradation percentage (84.12 & 84.22%).

KEYWORDS

Biodegradation, Biosurfactant, Detergents, Methylene blue active substance, *Pseudomonas sps*

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Advanced Sensor Materials Based Real-Time Soil Moisture Content and Temperature Monitoring Using IoT Technology In Smart Agriculture

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In this work, we discuss the monitoring of soil temperature and volumetric water content using self-fabricated, advanced materials based dual probe heat pulse (DPHP) sensors using internet of things (IoT) technology. In DPHP soil moisture and temperature sensor, the temperature sensor is nanoceramic powder based thermistor (27 nm) and the heater is made from ITO nanopowder (32 nm). The temperature sensor and the heater are energy efficient, low-cost and accurate that result in efficient, low power and cheap system. The heater and the temperature sensor probes are separated at a distance of 6 mm. The embedded system consists of both hardware and software components. The hardware components are NodeMCU, dual probe heat pulse (DPHP) moisture sensor, thermistor, 3D printed box and stainless steel cylindrical tubes while the software components are Arduino IDE and ThingSpeak. The system monitors the soil parameters through ThingSpeak.com web via a private account at a distance. The system can measure both soil temperature and moisture content upto 3 digit precision.

KEYWORDS

NodeMCU, IoT, ThingSpeak, Thermistor, DPHP, ITO nanopowder heater

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Improving The Performance Of Water Cooled Chiller Using Wastewater From Air Handling Unit

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Water cooled chillers produce cold water in very huge quantities in industrial space cooling as well as process cooling applications. The water entering the chiller generally will have the atmospheric temperature around 32°C by reducing the temperature below 32°C. The energy consumption can be decreased as less work is involved. The water vapour in the surroundings gets condensed at the air handling unit (AHU) to give 60 kL of water on a daily basis and is rejected to surroundings. By this project, we plan to collect this drain water and it is made used to cool the feed water to the chiller. This method helps to improve the efficiency of the chiller and the overall energy consumption can be reduced. This project mainly aims at the recovery of condensate water which otherwise goes waste. Utilization of low temperature in the condensate to cool the condenser side of the refrigeration unit is made possible through applying the condensate recovery project. Thus this proposed project helps to improve the efficiency of the chiller, improves the effectiveness of the cooling tower and reduction of water consumption.

KEYWORDS

Water cooled chiller, Air handling unit, Efficiency of chiller

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Remediation And Decolourization Of Distillery Spent Wash By Using Advanced Oxidation Processes – A Review

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Distillery industries are highly responsible for the tremendous generation of effluent known as distillery spent wash (DSW). Distillery spent wash is caramelized, recalcitrant toxic pollutant, comprehensive undesirable intense dark brown colour non-consumed liquid accompanied by high COD, BOD, highly acidic pH, containing organic and inorganic poisonous ingredient which depends on the raw material furnished. Distillery spent wash also contains sugar decomposition products, such as anthocyanin, tannin and xenobiotic compounds. It causes aquatic and soil pollution due to strong brown colour recalcitrant melanoidin pigment which results in the obstruction of photosynthesis, eutrophication and low pH that acidifies the soil, affecting crop growth. Thus, creating an ecological imbalance and big environmental hassle. Hence, there is the urgent need for removal of colour and pollutants from distillery effluent which has become essential for green chemistry and is approved hygienically. Novel advanced technologies have been used to reduce colour and COD. The current review paper gives an insight of electrocoagulation process and advanced oxidation processes, such as ozone, fenton, UV, hybrid treatment to treat distillery spent wash.

KEYWORDS

Ozonation, Advanced oxidation, Wastewater, COD, Colour, Electrocoagulation, Distillery spent wash, Biodigested effluent

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Treatment Of Low Strength Wastewater Using Upflow Anaerobic Sludge Blanket-Clariflocculator Integrated System

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In this study, the performance of upflow anaerobic sludge blanket (UASB)-clariflocculator integrated system was evaluated while treating low strength wastewater. The COD of the wastewater was removed upto 85% in the UASB reactor of the integrated system. The effluent of the UASB reactor containing nutrient was treated in the clariflocculator of the integrated system. Water treatment sludge (WTS) was used as a coagulant in a clariflocculator for removing total kjeldahl nitrogen (TKN). The UASB-clariflocculator integrated system removed TKN around $80.32 \pm 1.44\%$ at WTS dose of 1000 mg/L. In order to achieve dose of WTS, a dose in the range of 600–1600 mg/L of WTS was varied and found maximum removal of TKN at 1000 mg/L dose of WTS. The results suggested that reuse of water treatment sludge as a coagulant for the post-treatment of UASB reactor effluent would be an attractive option. This technique may save the cost of fresh coagulant chemicals required for the coagulation process.

KEYWORDS

Upflow anaerobic sludge blanket reactor (UASB), Clariflocculator, Total kjeldahl nitrogen, Water treatment sludge

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Assessment Of Groundwater Qualities Of Some Areas Of Imphal East District Of Manipur During Monsoon – 7th Phase

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Fifteen groundwater samples (S-1 to S-15) were collected from different sampling sites (handpumps) of Imphal east district of Manipur during monsoon period (June) of 2017. They were analyzed for physico-chemical parameters, such as temperature, pH, total dissolved solids (TDS), electrical conductivity (EC), total alkalinity (TA) (and), total hardness (TH), Ca^{2+} , Mg^{2+} , Na^+ , K^+ and Cl^- . Only groundwater represented by S-4 (Heingang Awang Leikai (3), near foothill), S-13 (Kaina Tourist Home, Kaina) and S-15 (Nungaipokpi, near foothill and Meirashang) are found to be fit for drinking purpose as the values of their physico-chemical parameters are below/within the acceptable limits of BIS standard for drinking water as well as that of WHO. Other remaining groundwater (S-1 to S-3, S-5 to S-12 and S-14) may also be used for drinking purpose in absence of alternate sources. However, some suitable treatments are necessary so as to keep the values of total alkalinity for S-1 to S-3, S-5 to S-12 and S-14, total hardness for S-1, S-10 and S-12 and concentrations of Mg^{2+} for S-10 and S-12 below their corresponding acceptable limits of BIS standard drinking water in order to make them perfectly fit for drinking purpose. All the groundwater may also be used for other domestic and irrigation purposes. Based on correlation coefficient data, moderately high values of TDS for ground waters, are attributed to the presence of mainly dissolved bicarbonates of Na^+ , Ca^{2+} , Mg^{2+} and K^+ , and chlorides of Ca^{2+} and Mg^{2+} . Alkalinity for different groundwater, is due to the presence of dissolved NaHCO_3 , KHCO_3 , CaHCO_3 and MgHCO_3 . Further total hardness for different groundwater is due to the presence of mainly bicarbonates and chlorides of Ca^{2+} and Mg^{2+} .

KEYWORDS

Physico-chemical parameters, Drinking, Irrigation, BIS, WHO

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Devolatilization Kinetics Of Sewage Sludge

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Solid waste management is the key element of 'Swachh Bharat Mission' of Government of India. Many municipalities / industries installed sewage treatment for treating liquid waste. One of the byproduct for sewage treatment is the sewage sludge. It is cumbersome in treating the solid sewage sludge. This paper analyzes the possibility of using the sewage sludge as the fuel for combustor / gasifier. Also the paper attempts in elucidating the kinetics of the sewage sludge.

KEYWORDS

Sewage sludge, Kinetics, Devolatilization

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Analysis Of Thermal Barrier Coating On Engine Valves Using Biofuel

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Due to the depleting resources of petrofuels and the emission of hazardous gases, alternative fuels have found a place in recent times. In the present study, the inlet and exhaust valves of a single cylinder four stroke DI diesel engine is coated with stellite 6 material with waste fish fry oil (WFF) as the engine fuel. Two test fuels, in different proportions, are prepared using transesterified waste fish fry oil. The performance and emission characteristics of a diesel engine show that WFF B10 and WFF B20. Out of these two blends, WFF B20 show less HC, CO, CO₂ emission and smoke compared to WFF B10 and petro diesel in the stellite 6 coated inlet and exhaust valve engine. Also, coated valve engine shows improved thermal efficiency and power output compared to the uncoated one.

KEYWORDS

Biodiesel, Diesel engine, Emission, Performance, Waste fish fry oil

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Changes In Physico-Chemical Properties Of Different Soils Depending On Soil Temperature

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Soil surface shows conditional variation depending on the soil temperature in terms of emission and absorption of energy in the medium. During this temperature variation, there is an exchange of free radicals, ions, moisture nutrients, nitrogen gas, oxygen and other gaseous parameters as well. Thus, many chemical reactions taking place on the soil surface depends directly (or) indirectly on the soil temperature. In addition, the vegetation of a particular area is mostly concerned about the soil temperature and nutritional parameters as well. In this study, an attempt has been made to correlate the soil temperature based on seasonal variation and its impact on physical properties, chemical parameters, growth of earthworms and other microorganisms.

KEYWORDS

Seasonal variation, Correlation, Nitrogen and oxygen, Earthworms

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