

Energy And Cost Estimation Of Biodiesel Production From Neem Feedstock - A Parametric Study

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The current energy scene of fossil fuels tends to viable alternative fuel sources. Among many resources of fuel, biodiesel is one of the promising fuels for sustainability. Vegetable oil cannot be used directly in the diesel engine due to its high viscosity, high density, high flash point and low calorific value. Amongst several approaches of bio-diesel production, transesterification process with alkali catalyst provides better conversion of triglycerides to their corresponding methyl ester as biodiesel. At the same time, for sustainability, it is highly essential to analyze the life cycle of biodiesel production in terms of energy and cost issues. This study will help to confer the future prospects and create path of development of biodiesel programme in India. This paper presents the life cycle assessment in terms of energy utilization and related cost to find out biodiesel cost using neem as a feedstock. The neem (*Azadirachta indica*) tree in India, a widely cultivated crop, fruits bear in tree from 5–6 years of age and continue for about 100 years. In the study of soil-to-oil of neem, it comprises different aspects of cultivation, oil extraction and finally biodiesel production. The energy and cost were estimated in order to cultivation of neem in the area of 1 ha, 400 numbers of plants at the space of 5 m x 5 m for a single seasoned fruited till 30 years. It was observed that net energy gain and ratio are 9.54 MJ/ha/year and 13.05, respectively. The cost of biodiesel after selling off byproduct in India at the end of 30th year was estimated and found around 50, 51.5 and 49.3 rupees corresponding to the assumption of biodiesel yield from raw neem oil of 80%, 90% and 94%, respectively. This concludes that biodiesel from neem oil offers significant benefit in terms of energy and cost as well.

KEYWORDS

Neem biodiesel, Cost analysis and energy analysis of biodiesel production from neem feedstock

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Kinetic, Equilibrium Isotherm And Thermodynamic Study Of Adsorption Of Congo Red Dye On Low-Cost Adsorbent

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The potential of masoor crop seed husk powder for the removal of congo red (CR) dye from aqueous solution was investigated. The adsorption experiments were carried out in batch techniques. The various parameters, like contact time, adsorbent dose, initial CR dye concentration and temperature were investigated. The kinetic data were analysed using pseudo-first order and pseudo-second order models. It was found that pseudo-first order kinetic model was the most appropriate model than pseudo-second order, describing the adsorption kinetics. Adsorption equilibrium was attained within 24 hr. The equilibrium data were best fitted by the Langmuir isotherm model than Freundlich model. Thermodynamic properties, like free energy (ΔG), enthalpy (ΔH) and entropy (ΔS) indicated spontaneous and exothermic nature of adsorption for masoor crop seed husk powder adsorbent. The study revealed that masoor crop seed husk powder can be used as efficient adsorbents for the removal of CR dye solution.

KEYWORDS

Congo red dye, Masoor crop seed husk powder, Adsorption, Adsorption isotherms models, Equilibrium, Kinetics, Thermodynamics

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Phytostabilization Of Cr (VI) And Growth Promotion In *Tagetes patula* L. By Plant Growth Promoting Bacteria

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Hexavalent chromium pollution is a global threat that has accelerated dramatically due to rapid industrialization and urbanization. Toxic chromium affects both microbial diversity as well as reduces the growth of the plants. Chromium reducing and plant growth promoting PGPR species significantly improved growth of marigold plant grown in the presence of different concentrations of chromium compared to the plants grown in the absence of bio-inoculant. The strain also reduced the uptake of chromium in shoots compared to plants grown in the absence of bio-inoculant. Results showed that inoculation improved plant growth parameters significantly compared to un-inoculated plants. In inoculated pots Cr (VI) contents were decreased in soil upto 62% while plant analysis for Cr (VI) revealed that inoculation decreased uptake and translocation of Cr (VI) from soil to the aerial parts of plant. Concentration of Cr (VI) was upto 36% less in roots and 60% less in shoots as compared to uninoculated plants grown in contaminated pots.

KEYWORDS

Chromium uptake, Cr (VI) reduction, PGP, Hexavalent chromium

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Screening Of Process Parameters Influencing The Biosorption Of Textile Effluents Using Plackett-Burman Design

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Biosorption of textile dye effluents using marine red macroalgae *Gracilaria corticata* as a low-cost adsorbent and its potential was evaluated. The process parameters responsible for adsorption of dye from the aqueous solution, such as pH (4-8), temperature (30-40°C), initial dye concentration (10-20%), biomass concentrations (1-10 g/L), agitation/static and time (120-180 min) were optimized using the statistical approach. Plackett-Burman design of factorial design method was used to identify the most significant parameters affecting the rate of biosorption. The resultant decolourization of the effluent before and after biosorption were compared using UV spectrophotometer. The predicted values and the experimental values were found to be in good agreement ($R^2=0.9794$ and $Adj-R^2=0.9547$). Four out of six operational parameters, namely biomass concentration, pH, dye concentration and static-agitation ($P<0.05$) showed a very good sign in the decolourization process.

KEYWORDS

Biosorption, *Gracilaria corticata*, Statistical approach, Plackett-Burman, decolourization, UV spectrophotometer

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Groundwater Quality And Its Role In Endemic Kidney Diseases-A Case Study At North-East Coast (Uddanam) Of Srikakulam District

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Groundwater level and quality can be obtained through representative sampling. The important attributes of groundwater regime monitoring are water level, water quality and temperature. Marks of groundwater geochemistry, like water levels and quality are determined in the north-east coast of Srikakulam district, A.P. in order to establish a link among chronic kidney diseases (CKD), water quality and depth to water. While the groundwater is used for potable purposes, its quality and depth is of major concern, water is influenced by geogenic elements with depth. The present research concentrated on kidney inflicted areas and has compared the results with non-inflicted areas from March 2014 to February 2015, where majority of people were using groundwater as their potable source. The survey conducted on basic water quality parameters, like EC, TDS and pH alongwith the depth to water table in both inflicted and non-inflicted areas. The in-situ analysis was intended to perpetuate the water quality for pre-monsoon, monsoon and post-monsoon seasons at the study area. Though both the divisions are meeting the required desirable limits division two exhibiting more kidney patients. Specially TDS shows much influence over the function of kidneys. In division two 33% of the stations are not possessing required acceptable limits. However, it is not clear whether TDS is influencing the kidney failures or not. Some deviations are still observed in EC and TDS.

KEY WORDS

Groundwater, Water depth, Water quality, Potable use, Chronic kidney diseases

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Thermoelectricity: A Pollution Free Green Technology To Overcome The Energy Crisis

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The paper presents the importance of thermoelectric materials towards energy production from any of the domestic or industrial regions where the waste heat is available. This technology is pollution free and regarded as green technology over the last few years. In this research work the classical thermoelectric materials (Fe, Cu, nichrome and constantan) from the market are framed as the thermocouples and their thermo emf generation characteristics are investigated in the normal mode and then under the effect of applied magnetic field of various magnitudes. The effect of magnetic field was studied in order to enhance the magnitude of thermo emf as well as the generation of thermo power in some specific directions. Hence, the findings can lead a way towards the pollution free energy production with cheap, safe and non-toxic materials in the safe environment of operation and designing.

KEYWORDS

Energy crisis, Thermoelectricity, Thermo emf, Magnetic field

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Comparison Of Performance And Emission Characteristics Of DI Diesel Engine By Using Ajwain And Cinnamon Biodiesel Blend With Diesel

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In India, current oil consumption rate is 4.2 million barrels/day. India currently is the 3rd largest oil consumer after the United States and China followed by Japan. In India, oil demand increases every year due to rapid development in industrial and transportation sectors. We import 70% of our oil demands which is economically disadvantageous for a fast growing country, like India. So to come over this problem, biodiesel can be a better solution. This study is mainly focused on comparing the performance and emission properties of cinnamon biodiesel fuel with ajwain biodiesel. Both biodiesels were blended in 10%, 20% and 30% in volume with pure diesel fuel and 30 ppm of cerium oxide is added and tested in a four-stroke, single cylinder diesel engine, DI, under different engine brake powers (0.09, 0.9, 1.73, 2.62, 3.39 in kW) and 1500 rpm. Final results show that cinnamon biodiesel fuel (10% of cinnamon biodiesel and 90% pure diesel) gives better performance than all other combinations as well as the ajwain biodiesel.

KEYWORDS

Alternate fuel, Biodiesel, Brake thermal efficiency, Specific fuel consumption, Ajwain biodiesel, Cinnamon biodiesel

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Nutrient Deficiency Detection And Classification Of Plant Leaf Disease Due To Environmental Degradation

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The nutrient status of plant can be affected due to environmental changes. Also the use of fertilizers in agriculture can also contribute to environmental pollution. The aim of this paper is to provide nutrient deficiency detection and classification of leaf diseases in maize crop using image processing techniques. Human beings are prone to error in detection of plant leaf diseases. Most of the plant diseases are caused by bacteria, virus and fungi. This paper addresses a solution for plant leaf nutrient deficiency and diseases based on colour, texture and shape that might affect the crop and give accurate solution to the farmer and improve the productivity. Also it helps the farmers to use appropriate chemical for the land and to find the application injuries in the field crop. This paper also presents an automatic detection of plant nutrient detection, classification and bacteria infected disease using image segmentation technique. Simulation has been done in MATLAB environment. The performance of the method is analyzed with respect to accuracy. The proposed method of nutrient deficiency detection is simple, robust and requires less computational time.

KEYWORDS

Nutrient deficiency, Image processing, Support vector machine, Plant disease detection and classification

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Level Of Correlation In The Depth Of Groundwater Wells : Iron And Chloride

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Groundwater quality in each region is not always the same, this influenced by climate factors, lithology, time, human activities. The purpose of the research that conducted was to see the relationship among the depth of groundwater wells in two different study locations on the concentration of iron (Fe) and chloride (Cl) levels in each sample. This research located in Mattiro Baji village, Pangkep Regency, South Sulawesi and Sindulang Satu Urban village, Manado city, North Sulawesi, Indonesia. The research sample amounted to 18 in the form of bottles of groundwater well samples which evenly taken at the study site. TDS meter is used to quantify Fe concentration and chlorine meter for Cl levels in samples. The outcomes of the study showed that there was no noteworthy relationship between the depth of groundwater wells and the levels of concentration of Fe and Cl. Conditions that are still not contaminated by changes caused by the environment, industrial waste and seawater intrusion.

KEYWORDS

Dug well, Contamination, Groundwater, Water quality

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An Experimental Study Of Anaerobic Digestion Of Flower Waste With Simultaneous Improvement In Biogas Production

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Flower waste from famous Indian temples situated along the banks of rivers is traditionally disposed of in the rivers or landfill, causing environmental pollution. Anaerobic digestion of flower waste is an energy proficient solution to this problem in the Indian scenario. The present experimental study deals with the generation of biogas using flower waste feedstock, improvement in biogas generation at reduced pretreatment cost and improvement of biogas quality by using chemical absorption technique. Alkaline chemical pretreatment is applied to flower waste using sodium hydroxide and sodium carbonate. A novel chemical pretreatment using sodium carbonate is effective in improving the biogas generation by 106% with a simultaneous reduction in the cost of pretreatment upto 96%, as compared to sodium hydroxide pretreatment. The contaminants, carbon dioxide and hydrogen sulphide in biogas restrict its widespread applications. In the present study, the methane content of biogas is enriched upto 96.91% using chemical absorption technique in packed column reactors. Another experimental run gives hydrogen sulphide removal efficiency of 92.41% from biogas, to minimize the corrosion and health hazards of hydrogen sulphide. Large-scale application of these techniques can propagate floral waste as a sustainable energy source for Indian temples and a reduction in river pollution.

KEYWORD

Anaerobic digestion, Flower waste, Chemical pretreatment, Methane enrichment, Hydrogen sulphide removal

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Seasonal Profile Of Heavy Metals In The Water Samples Of Bhopal Industrial Area

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Water is a crucial asset, essential for the survival of all biological systems. The quality of water is degraded throughout the globe due to over-exploitation, industrialization, urbanization and pollution. The surface and groundwater are contaminated with a number of pollutants, like heavy metals, pesticides and biological contaminants. The use of contaminated water for irrigation, domestic and household purposes would lead to various diseases and infections in humans and other organisms. The present investigation was undertaken to analyze the existence of various metals in the water samples of two industrial areas of Bhopal region, namely Govindpura and Mandideep. All the samples were analyzed for the presence of lead (Pb), copper (Cu), nickel (Ni), zinc (Zn), arsenic (As), mercury (Hg) and fluoride (F). The result shows the existence of Pb, Cu and Zn in all the water samples while Ni, As, Hg and F was not detected in any sample. The seasonal variations in the concentrations of heavy metals were also found.

KEYWORDS

Heavy metals, Industrial, Concentration, Contaminants

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Towards Greener Machining: A Review Of Power Saving In EDM Of AMC For Sustainability

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Power or energy saving is important for manufacturing industries towards achieving in today's industrial scenario to achieve overall efficiency. The global focus of manufacturing sectors is towards achieving sustainable manufacturing for obtaining ecological and environmental safety. Sustainable machining of components with reduced energy requirement during machining is an essential aspect of economic manufacturing of quality products with environmental friendliness. The consumption of electric power is the major cause that indirectly influences CO₂ emissions to the environment. The continuous monitoring of the power consumed during machining will lead towards a greener machining by reducing costs as well as threats to the environment. In this paper, we have carried out a detailed review on the electrical discharge machining (EDM) investigation with a focus on power saving in machining of the metal matrix composites (MMCs) which have a wide application in the field of automotive, space and defence sectors due to higher strength and light weight, low processing cost and having isotropic properties. The review of the literature clearly indicates the need for research to optimize the machining parameters and make the manufacturing activities sustainable. There is a scope for intensive research in sustainable machining of aluminium matrix composites (AMCs) reinforced with nanomaterials with an extended scope of considering environmental aspect with saving in power consumption during machining.

KEYWORDS

Greener machining, Power saving, Electrical discharge machining, Aluminium matrix composites, Sustainability, CO₂ emissions

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Assessment Of Ganga River Water Quality In Allahabad

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The earth is full of natural resource needed for the development of mankind. The day by day increased demand has developed new methods of water quality assessment and management. The study was carried out for the river water quality assessment of three different sites of Allahabad. Water is a basic resource for sustaining all human activities, so its provision in desired quantity and quality is most important. The parameters, like temperature, pH, EC, DO, BOD₅, total hardness, Ca hardness, Mg hardness, alkalinity, chloride, turbidity, TDS, sulphate and MPN were analysed as per standards of APHA. All the physico-chemical and biological parameters of Ganga river water at Allahabad are within the permissible limit prescribed by BIS except BOD₅, chloride and MPN which exceed the limits in the month of March and April.

KEYWORDS

Water quality assessment, Ganga river, Parameters

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