

Remediation Of Colour Pollutant Malachite Green Dye With Mesoporous Walnut Based Particles As Efficient Adsorbent: Isotherms, Kinetics And Batch Adsorption Equilibrium Study

V. Arora and D.P Tiwari*

Deenbandhu Chhotu Ram University of Science and Technology, Department of Chemical Engineering, Sonapat

*Corresponding author, Email : dptiwari3@gmail.com; er.vijetaarora85@gmail.com

Adsorption of cationic malachite green (MG) dye was performed by chemically modified bioadsorbent activated walnut shell powder (AWSP) in the present study. AWSP was successfully prepared in mesoporous particle zone from walnut shell powder dissolved in 98% sulphuric acid at 1:1 wt/wt ratio at room temperature of 30°C. Various characterization techniques were employed to understand the nature of AWSP adsorbent, such as FTIR which reveals the presence of C=OH group responsible for adsorption, SEM identifies the porous structure and BET determine the high surface area (122.67 m²/g), total pore volume (0.087 cc/g) and pore diameter (3.346 nm). The study investigated the potential of formulated AWSP to decolourize MG dye coloured water with analyses of optimized conditions by the set of kinetics and equilibrium study under various conditions (time, MG dye concentration, adsorbent dosage, pH). The adsorption isotherm models describe the best suitability depicting monolayer adsorption. The kinetic study explains the adsorption process to be followed by pseudo second order model. This study provides an eco-friendly and cost-effective approach to remove MG from wastewater with mesoporous AWSP as an adsorbent.

KEYWORDS

Adsorption, AWSP, Malachite green, Acid formulated synthesis

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Effects Of Antioxidant Additives On Biodiesel/Diesel Performance And Emission Characteristics Of CI Engine

R. Rajasekar¹, S. Ganesan^{1*}, U. Logesh², N. S. Praveen² and M. Mohammed Javed²

1. Sathyabama Institute of Science and Technology, Department of Mechanical Engineering, Chennai - 600 119

2. Sathyabama Institute of Science and Technology, Department of Automobile Engineering, Chennai - 600 119

* Corresponding author, Email : gansuma@gmail.com, sekarauto@gmail.com

Diesel fuel emits harmful substances, such as nitrogen dioxide, carbon dioxide, sulphur dioxide and soot. But biodiesel emits a reduced level of exhaust emissions compared to diesel fuel particularly with respect to unburned hydrocarbon, carbon monoxide emissions and particulate matter. In addition, it is readily available, environmental friendly and easily decomposable in nature. This study investigates the impact of antioxidant additives to wintergreen oil methyl esters (WGME) blend on the performance and emission characteristics of compression ignition (CI) engine. The antioxidants, such as N,N-dimethyl-p-phenylenediamine-dihydrochloride(NPPD) and N-phenyl-p-phenylenediamine (DPPD) are dispersed at proportions of 1000 ppm with and without the addition of WGME. An experimental investigation was conducted on a single-cylinder four-stroke CI engine to analyze the performance and emission characteristics of WGME blended with diesel at 20% by volume (B20). The experimental results revealed that NPPD and DPPD treated B20 blend decreased the brake specific fuel consumption (BSFC) by 2.4% and 1.4% and increased the brake thermal efficiency (BTE) by 1.57% and 0.15%, respectively compared to B20. The NPPD and DPPD treated B20 blend produced mean reductions in NO_x emission of 12.1% and 9.7%, respectively compared to B20. The hydrocarbon emission (HC) and carbon monoxide (CO) of NPPD and DPPD treated B20 were increased by 14.1%–16.7% and 10.2%–11.5%, respectively compared to B20.

KEYWORDS

Antioxidant additives, Wintergreen oil methyl esters, N-dimethyl-p-phenylenediamine dihydrochloride, N-phenyl-p-phenylenediamine, Emission performance

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Modelling Soil Loss Using Remote Sensing And GIS in Tifnout Askaoun Watershed, Southern Of Morocco

Abdellaali Tairi^{1*}, Ahmed Elmouden¹, Lhoussaine Bouchaou¹ and Mohammed Aboulouafa²

1. *Ibn Zohr Agadir, Laboratory of Applied Geology and Geo-Environment, Department of Geology, Faculty of Science, Morocco*

2. *Ibn Tofail University, Laboratory of Materials, Electrochemistry and Environment, Department of Chemistry, Faculty of Science, Kenitra, Morocco*

*Corresponding author, Email : abdellaali.tairi@edu.uiz.ac.ma

Soil loss is a serious environmental threat in many parts of Morocco. The degradation of fertile soils in mountain watershed influences agricultural productivity negatively. The revised universal soil loss equation (RUSLE) and geographic information system (GIS) techniques were adopted to quantify the annual rate of soil loss in the Tifnout Askaoun mountain watershed of 1488 km² in the south of Morocco. The spatial distribution of the annual rate of soil erosion was obtained by integrating geo-environmental variables into a GIS, including the erosivity of rainfall (R), the soil erodibility factor (K), the length and duration of soil erosion, slope inclination (LS), vegetation and management factor (C) and practice factor support (P). The result shows that the Tifnout Askaoun watershed has an average annual soil loss rate of 49.60 tonne/ha/year. The result obtained correlates with all the factors of the RUSLE equation. The maps produced in this study can be used as a database for future interventions to fight against erosion in the Tifnout Askaoun watershed.

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Additive Regression Algorithm Predicts The Atmospheric Pollutant Concentrations With Higher Precision

Adven Masih*

Ural Federal University, Department of System Analysis and Decision Making, Graduate School of Economics and Management, Ekaterinburg, Russian Federation

*Corresponding author, Email : adven.masikh@urfu.ru

Due to increased number of deaths related to air pollution, prediction model development has become a key focus for researchers. No doubt, machine learning algorithms based on artificial neural network and support vector machine (SVM), such as multilayer perceptron (MLP), radial base and linear base are the most reliable and widely employed data mining tools for air pollution modelling. However, ensemble learning techniques, such as random forest (RF), bagging, additive regression (AR) have recently emerged as efficient machine learning tools. In view of prediction modelling, the study employs independent classifiers, such as RF, SVM, regression tree using M5 algorithm (M5P) and simple linear regression (SLR) during first phase. Considering the concept of composite modelling, during next phase, all classifiers were combined with AR to assess the prediction performance of each classifier. The study uses emission and meteorological dataset to predict the atmospheric concentration of nitrogen dioxide (NO₂). The prediction performance of each model was evaluated in terms of correlation coefficient (R²). The model performance was validated by comparing the results of independent classifiers against composite classifiers. The results obtained suggest that adopting independent classifiers within additive regression as base classifiers improve their prediction accuracy and reduce error values.

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Production Of Bioethanol And Activated Carbon From Artichoke Stalks- Application Of Non Linear Models To Dye Adsorption

Benadjemia Mohamed, Benderdouche Nouredine* and Bestani Benaouda

University of Mostaganem, SEA2M Laboratory, Department of Process Engineering, Faculty of Science and Engineering, Mostaganem - 27000, Algeria

*Corresponding author, Email : benderdouchen@yahoo.fr; benadjemiamohamed@yahoo.fr

Extensive use of fossil energy has generated numerous ecological problems and alternative renewable energy production as well as novel materials for pollution remediation is now the subject of numerous research works. In this work, artichoke stalks are processed to produce bioethanol and activated carbon. Bioethanol production was performed by expressing the sugar-rich juice from the stalks which was then placed in contact with yeast (*Saccharomyces cerevisiae*). The process conditions, such as pH, temperature, contact time were varied to obtain maximum bioethanol production. The optimum process conditions giving maximum ethanol production (14.2%) were: pH=4.5, temperature=32°C and a contact time of 5 days after the steam explosion. On the other hand, the residue from the stalks was washed repeatedly and dried overnight at 110°C before impregnation with 20% phosphoric acid for 2 hr at 170°C. The residue was then activated at 600°C for 90 min under inert nitrogen atmosphere. The resulting activated carbon exhibited a 1168 m²/g BET surface area, in comparison to Aldrich commercial activated carbon with 1301 m²/g and ability for nylosan red (2-RBL) removal of 214 mg/g comparable to that of the commercial activated carbon with 242 mg/g. Globe artichoke stalks can represent a two-fold advantage being simultaneously a raw material for bioethanol production and a precursor for active carbon preparation.

KEYWORDS

Bioethanol, Artichoke stalks, Agricultural solid waste, Activated carbon

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Microstructure Analysis Of Concrete : Utilizing Bagasse Ash Waste As Partial Replacement Of Cement

Pooja Jha, A. K. Sachan* and R. P. Singh

MotiLal Nehru National Institute of Technology, Department of Civil Engineering, Allahabad - 211 004

*Corresponding author, Email : sachan@mnnit.ac.in; rce1607@mnnit.ac.in

The sugarcane industry produces a large amount of sugarcane bagasse waste in India. Generally, this waste is burnt and the resulting ash is utilized for landfill purpose, which causes severe environmental problems. In order to reduce the environmental problems, researchers are trying to search for new ways to utilize this bagasse ash (BA), one of the ways is to use as supplementary cementing material. In the present investigation, several techniques are used, like x-ray fluorescence (XRF), x-ray diffraction (XRD), scanning electron microscopy (SEM) and energy dispersive spectroscopy (EDS) for the microstructure analysis of samples (cement and bagasse ash). The chemical composition of cement and bagasse ash sample was determined using the XRF technique. Microstructure analysis of both bagasse ash and cement sample was done by XRD and SEM techniques. Highest peaks show quartz in bagasse ash and tricalcium silicates (C_3S) in cement by using the XRD techniques. SEM alongwith the EDS shows different micro-structure for bagasse ash and cement. It can be observed from the analysis that silica is a prominent element in bagasse ash and calcium is the prominent element in cement. Therefore, BA can be useful as pozzolanic material and it may also be used as a partial replacement for cement.

KEYWORDS

X-ray fluorescence, X-ray diffraction, Scanning electron microscopy, Energy dispersive spectroscopy, Microstructure analysis

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Design and Performance Analysis Of Ecofriendly Vapour Compression Micro-Refrigerator

S. Parashurama¹, M. S. Govindgowda^{2*}, S.B. Anjappa³, S. Ahamed Saleel C.⁴ and S. A. Khan⁵

1. Golden Valley Integrated Campus, Department of Mechanical Engineering, Madanapalle

2. Vivekananda College of Engineering and Technology, Puttur - 574 203, D.K.

3. Sir Visveswaraiah Institute of Science and Technology, Department of Mechanical Engineering, Madanapalle

4. KKU, Department of Mechanical Engineering, KSA

5. IIU, Department of Mechanical Engineering, Malaysia

*Corresponding author, Email : msggowda1964@gmail.com; parasurams@rediffmail.com

In this research article design and performance analysis of vapour compression micro refrigerator was carried out in ANSYS and MATLAB. Here micro-refrigeration system was designed for cooling of electro-mechanical components which improves its efficiency and durability. Electromechanical components liberate huge amount of heat during operation, unlike mechanical components cooling system by fin or oil based cooling mechanism, the electromechanical component needs an effective cooling mechanism which can be attained by the micro-refrigeration system. Main challenges faced in micro-refrigerator system were limitation to space. Study of R1234yf and R290 working properties relating to environmental effects in the micro-refrigeration system and simulations in electromechanical micro-refrigeration system executed effectively. From results obtained from setting up various parameters of refrigeration systems are simulated and calculated, also discussed possible impacts on electromechanical components with an effective cooling mechanism. As per our results, the thermodynamic performance of R290 is better than that of R1234yf.

KEYWORDS

Micro-refrigeration, Electromechanical cooling, R290, R1234yf, Refrigeration cycle simulation

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Changing Characteristics Of Ambient Aerosols In The Smaller Urban Center In India

Mani Singh*

APS University, School of Environmental Biology, Rewa

*Corresponding author, Email : drmanisingh.india@gmail.com

Air pollution is no longer confined to metro cities only. Fast-paced urbanization during the last two decades in India has exposed even smaller cities to the unsuspected high level of pollution. Increased economic activities marked by a rise in construction and automobiles have overburdened infrastructure resulting in degraded air quality. However, most of the pollution studies in India have been focused on major cities alone. As a pioneering work for the typical small city Rewa of central India, the study involved elaborate air sampling to analyze atmospheric dust load and toxic heavy metals-major irritants. The annual average concentrations of atmospheric dust recorded regarding respirable suspended particulate matters (RSPM) and suspended particulate matters (SPM) were several times higher than any permissible standards. The concentrations of atmospheric heavy metals recorded for lead, copper and manganese were within limits but not less than major cities either. Findings not only provided valuable maiden reference database for the city but underscored grave air pollution conditions, especially in the wake of established carcinogenicity of air pollution. The study may provide insights into the air quality of other small cities in India and other developing countries having common dynamics of the economy, demography and infrastructural factors.

KEYWORDS

Air pollution, Lead, Copper, Manganese, Particulate matter

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Design Of Green Building With Practical Application Of Manual

Sushovan Sarkar* and Diptarka Mukherjee

Dr Sudhir Chandra Sur Degree Engineering College, Department of Civil Engineering, Kolkata-700 074

*Corresponding author, Email : hod_ce@dsec.ac.in; diptarka07mukherjee@gmail.com

A simplified design of a green building satisfying necessary requirements stipulated in GRIHA has been made in this research. The aim of this research is to make a practical application of the rules of the manual on green building even on the smallest scale for sustaining with the environment with an economic cost and maintenance. In this research, the rating of GRIHA manual version 2015 has been highlighted on the area, like renewable energy, water conservation, using low impact construction materials, waste management, the conservation of vegetation, etc.

KEYWORDS

Green building, Energy efficient, Eco-friendly, Water conservation, Waste disposal, Manual

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Effect Of Ethanol - Biodiesel - Diesel Blend On Combustion Characteristics Of DI Diesel Engine

Sharad P. Jagtap¹, Anand N. Pawar^{2*} and Subhash Lahane³

1. Jawaharlala Darda Institute of Engineering and Technology, Department of Mechanical Engineering, Yavatmal

2. Maharashtra State Board of Technical Education, Regional Office, Aurangabad

3. Marathwada Institute of Technology, Department of Mechanical Engineering, Aurangabad

*Corresponding author, Email : anpawar5000@gmail.com; jagtapsp@gmail.com

The combustion characteristics, such as ignition delay (ID), premixed and diffusion combustion phases, rate of pressure rise (ROPR) and combustion duration are one of the important tools to optimize performance and emission characteristics of diesel engine. Due to moderate change in properties of diesel and biodiesel blends, both fuels exhibit different combustion characteristics with respective load condition. The main aim of this study is to determine various combustion characteristics of diesel fuel, biodiesel- diesel blend (B08) and ethanol-biodiesel-diesel (EBD) blend (E05B08) and compare with each other at rated load condition and constant speed of 1500 rpm. It is observed from experimental analysis that ID decreased with biodiesel-diesel blend by 0.38° CA and with ethanol-biodiesel-diesel by 0.23° CA as compared to diesel fuel. Similarly the maximum ROPR is also decreased with biodiesel-diesel blend upto 6.16° CA and with ethanol-biodiesel-diesel upto 6.15° CA from 6.33° CA of diesel fuel. The total combustion duration increased with biodiesel-diesel blend by 1.97° CA and with ethanol-biodiesel-diesel by 0.11° CA as compared to diesel fuel.

KEYWORDS

Biodiesel, Diesel engine, Ethanol-biodiesel

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Life Cycle Assessment Of Asphaltic Pavement: A Literature Review

Samuthirakani V¹ and Ashutosh Das^{2*}

1. PRIST University, Department of Civil Engineering, Vallam, Thanjavur – 613 403

2. PRIST University, Centre for Research and Development, Vallam, Thanjavur – 613 403

*Corresponding author, Email : acadas@gmail.com; vskani@gmail.com

The energy consumption and the greenhouse gas emission are increasing in the world day by day in a drastic manner and the transportation sector plays a major role in this. Life cycle assessment is a technique which quantifies the environmental impact by the process involved in an activity. The transportation sector which includes the construction of pavement, maintenance and vehicular traffic consumes a considerable amount of the total energy and leaves the corresponding amount of emission during its operation. Various research papers dealt with the life cycle assessment of highways pavement and quantify the carbon footprint during the process of construction, maintenance and vehicular traffic. In this paper, the research articles in the life cycle assessment of pavements are analyzed in detail and the outcomes of each paper are abstracted and a discussion is made.

KEYWORDS

Life cycle assessment, Greenhouse gas, Carbon footprint, Energy, Emission, Pavement

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Assessment Of Environmental Pollution With Heavy Metals In The Soil Of Mosul City

Aws Maseer Nejres* and Shaema Khalaf Mohamed

University of Mosul, Department of Pharmaceutical Chemistry, College of Pharmacy, Mosul, Iraq

*Corresponding author, Email: aws.m.nejres@uomosul.edu.iq

The concentration of some heavy metals in the soil of the city of Mosul was determined after the military operations that lasted from 2015-2017 to assess the level of contamination of heavy metals and the identification of concentrations of heavy metals. In general, it has been found that they exceeded the threshold levels for vanadium (V), chromium (Cr), manganese (Mn), zinc (Zn), selenium (Se), iron (Fe). As some of the areas reach the pollution levels for the metals (Se, As, Cr, Zn, Fe, Mn) and others, such as Hg, V, Pb, Co lie within the prescribed limit in the soil. Enrichment factor (EF), pollution factor (CF), pollutant load index (PLI) and geographical accumulation index (Igeo) methods were used whose values indicates that the source of pollution is human activities, such as military activity, traffic, industrial or other activities, confirming their occurrence within the divisions of moderate pollution.

KEYWORDS

Heavy metals, Pollution, X-ray fluorescence analysis, Enrichment factor, Pollution factor, Pollutant load index, Geographical accumulation index

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Effect Of Aquatic Weed Waste *Eichhornia crassipes* On Microbial Gut Flora Of Earthworm

Snehalata Ankaram^{1*} and Kothur Raghavender Rao²

1. Vasantrao Naik Mahavidyalaya, Aurangabad

2. Walchand College of Arts, Commerce and Science College, Solapur

*Corresponding author, Email : asnehalata@yahoo.in

Aquatic weed water hyacinth (*Eichhornia crassipes*) was efficiently converted into vermicompost by employing earthworm species *Eudrilus eugeniae*. Earthworm gut provides an ideal habitat for diverse beneficial microorganisms. Two feeding substrates water hyacinth and cow dung were used. The earthworm intestinal microbiomes, such as nitrogen fixers, phosphate solubilisers, actinomycetes and fungi were seen enhanced when fed with water hyacinth substrate followed by cow dung. The weed waste can be diverted into manure by the coordinated role of earthworms and its gut microorganisms thereby enhancing soil health.

KEYWORDS

Water hyacinth, Vermicompost, *Eudrilus eugeniae*, Gut, Microbiome

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Improving Thermal Resistant Properties Of Concrete By Marble Chips Waste (Obtained Natural Cooling System)

N. Sathyakumar* , L. Sabharinath and Rakesh Raj

Bannari Amman Institute of Technology, Department of Civil Engineering, Sathyamangalam - 638 401

**Corresponding author, Email : sathyakumarn@bitsathy.ac.in*

The temperature of the earth has been increasing due to many factors. These things should be considered in many pieces of research. The objective of this research is to reduce the usage of air conditioners and other artificial sources for reducing the temperature and protect the environment by avoiding the above and reduction of inside temperature of the building and marble waste can be reused and preventing the dampness. The usage of air conditioners causes a harmful effect on the environment. In this research, the above is obtained by replacing the nominal coarse aggregate by marble chips with the addition of potash alum, as alum being coagulant which increases bond strength. Being a metamorphic rock in natural marble has its own property of reducing the temperature with the drastic increase in strength of concrete. Thus this material can be a replacement material for countries in the tropic zone, where it is mainly a problem.

KEYWORDS

Marble chips, Potash alum, Gypsum, Permanent texture, Compressive strength

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Surface Water Quality Assessment And Modelling (ArcGIS) Of Aliyar And Noyyal River Basin

V. Mohanapriya*, M. Ezhilarasi, S. Manoj Kumar, R. Ananda Prakash and T. Sri Sudhan

Karpagam College of Engineering, Department of Civil Engineering, Coimbatore

*Corresponding author, Email : priyavelu7071@gmail.com

A systematic study has been carried out to evaluate the quality of surface water on the Noyyal and Aliyar river basin. The sampling locations were identified and the water samples were collected from identified sources. The physical, chemical and biological parameters have been identified to establish water quality criteria of the river basin. The collected samples from various sampling locations were analysed for the major water quality parameters, such as pH, total hardness, alkalinity, dissolved oxygen, nitrate, chloride, sulphate and the results of water quality parameters were found to be high in some of the sampling locations due to the discharge of industrial wastewater which contains high amount of organic pollutants. The modelling for the identified sampling locations was done in ArcGIS (geographic information system) spatial distribution mapping to identify the processes that underlie river water quality problems in a basin. To overcome the pollutants problem in the river, proper disposal of the effluents and wastes from various sources should be controlled by proper waste disposal management.

KEYWORDS

Physico-chemical parameters, ArcGIS modelling, Sampling location

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