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These lists are arranged in title and alphabetical order.

PREFACE

Dear Colleagues,

We have the pleasure of sharing state-of-the-art knowledge, science and technology with you in the "1st International Conference on Environment, Technology and Management (ICETEM)" organized by Environmental Engineering Department of Niğde Ömer Halisdemir University between 27-29 June 2019 in Niğde (one of the cities of Cappodoccia), Turkey.

This conference provided not only the opportunity to bring experts from all around the World and different disciplines and but also the ideal academic platform for researchers to present the latest research findings. We believe this interaction is a unique platform to come together to discuss critically recent researches and to intensify new collaborations and scientific research in environment, technology and management issues that are intertwined with time. 56 universities and institutions from 13 different countries of the World and Turkey participated in this conference. Scientific papers were presented in Turkish or English.

We believe that this international conference could develop new collaborations and meeting of experts and scientists on the fundamentals, applications, and products of the environment, technology and management fields, during three days.

On Behalf of Organizing Committee

Prof. Dr. Fehiman ÇİNER & Assoc. Prof. Dr. Neslihan DOĞAN-SAĞLAMTİMUR

Co-Chairs of the ICETEM

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THE ROLE OF ALUMINUM METAL IN THE ENVIRONMENTAL POLLUTION AND ITS DETERMINATION IN VARIOUS BIOLOGICAL MATERIALS

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Abstract

Many inorganic and organic naturally occurring chemical compounds are easily penetrated to the body by mouth in some cases through various food products and foods, in some cases through the respiratory system, are collected and accumulated in appropriate organs and tissues, a depo is created in the relevant organs of the organism. Thus, living organisms are chemically loaded with extraneous substances. Chemical load is the total amount of toxic and harmful substances that enter into the body as a result of human activity. Continuous development of chemistry, petrochemical industry in our country leads to contamination of atmospheric air with various toxic and harmful substances as a result of using of pesticides in agriculture, which in turn leads to enrichment and loading of human, animal and plant organs with extraneous chemicals.

Therefore, due to the appropriate environmental safety measures, the positive solution, the environment improvement, and also the production of high quality food products are solved and paid special attention at the state level.

One of the environmentally hazardous substances are heavy metals. Some of the metals are of particular importance in the regulation of normal physiological processes occurring in the body, but in certain circumstances can cause poisoning with severe complications and even death. Therefore, the development of the method for the determination of these metals in various biological fluids (blood, urine) is extremely important and purposeful. One such metal is aluminum. Its extensive use in industry, chemical laboratories, and the environment can pose an ecological threat to humans, and acute and chronic poisoning can occur in certain circumstances. Therefore, we needed to select the aluminum as a research object and conduct relevant experiments. We have solved this issue in our own experimental studies and offered a special method for that. The essence of this technique was presented to the relevant organizations for obtaining a patent.

Keywords: Contaminants, Dental Fluorosis, Ghana, Management Practices, Water Quality

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AN OVERVIEW OF THE QUALITY OF WATER RESOURCES IN THE UPPER EAST REGION OF GHANA

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Abstract

Water is a critical resource for the socio-economic advancement of life on earth since it is indispensable for human health and social wellbeing. Despite the siginificant role water plays, it is globally being threatened by several contaminants ranging from natural to anthropogenic sources. The Upper East region of Ghana is mainly rural and the inhabitants here largely depend on groundwater for domestic and agricultural purposes. This part of the country is inhabited by poverty endemic rural folks who have also for a longtime, traditionally depended on surface water sources and dug-outs to obtain domestic potable water and small scale irrigation water supplies. All these water sources are rain-fed and as a result of the erratic rainfall patterns, indiscriminate felling down of trees and the general variability of the climate, it is getting out of hand in maintaining them. Water quality management practices for these water resources are being overlooked by stakeholders. The water resources are contaminated with coliforms, toxic trace metals, and agrochemicals. The largest watersheds in the area (Vea and Tono dams) are all contaminated with agrochemicals due to intensive irrigation farming activities around these watersheds. Majority of the water quality parameters seriously exceed their acceptable standards for drinking and domestic purposes in the drinking water sources in the various districts. This is largely due to an interplay of processes involving mineral dissolution, mining activities, continuous application of agrochemicals on farms and biological contamination from human and animal fecal matter owing to open defecation. All these have cumulated in the outbreak of several diseases and ailments in the region since the contaminated water sources are still being used for domestic water supply by the rural folks. A key water-related problem in some parts of the region is dental fluorosis. This is very common in the Bongo district and the Bolgatanga Municipality and the source of this menace is attributed to dissolution of the Bongo granites that contain excess amounts of fluorine.

Keywords: Contaminants, Dental Fluorosis, Ghana, Management Practices, Water Quality

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PALEOENVIRONMENTAL RECONSTRUCTION OF THE NORTHEASTERN VOLTAIAN BASIN OF GHANA

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Abstract

This study was conducted to unravel the source and paleodepositional environments of siliciclastic sediments of the Bombouka/Gambaga Group in the NE margin of the Voltaian Basin using facies analysis, paleocurrent anaysis, petrography and geochemistry. Principal component analysis (PCA) was used in interpreting the geochemical data. The area represents largely, a shallow marine depositional environment with records of tidal flats, deltaic and aeolian environments. Two broad facies types were identified; lithofacies and ichnofacies. The lithofacies were observed as (a) asymmetric ripple marks on sandstones, (b) parrallel lamination on silty/argillaceous sediments, (c) straight-crested and bifurcated ripples on shales, (d) flute casts and climbing ripples on sandy shales, (e) bipolar herringbone cross-bedding on quartz-rich sandstones, and (f) wavy lamination and cross-bedding on feldspathic sandstoes. However, the ichnofacies include only *Skolithos* on quartzitic sandstones. From the structural data, about 85% of the paleocurrents flowed from the NE to SW direction with subordinate directions from WNW to ESE. This suggests that the siliciclastic sediments in the NE Voltaian were derived from the basement metavolcanic and metasedimentary Birimian rocks and their associated granitoids, which are located around the NE fringes of the Voltaian. Source discrimination diagrams also support a dominant felsic-intermediate source, traceable to the Paleoproterozoic Birimian Supergroup. The PCA for the major, trace and rare earth elements does not show a strong geochemical signature that reflects the source due to the effects of diagenesis, grain size and hydraulic sorting. Weathered remnants with detrital grains of K, Al, Rb, Sr, U, Y, La, Gd, and Yb were mainly from the granitoids and metasedimentary rocks that outcrop in the Amazonian Craton close to the northern peripheral of the Voltaian Basin. Therefore, prior to the Neoproterozoic times that the sediments were deposited in the NE Voltaian, their source rocks were paleogeographically located in the Amazonian Craton, which were later eroded, transported and transformed into the Birimian Supergroup from which the Voltaian sediments were derived.

Keywords: Paleoenvironmental Reconstruction, Geochemistry, Paleogeography, Provenance, Voltaian Basin

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EFFECT OF PHYSIOLOGICAL CONDITIONS ON SEEDS GERMINATION AND SEEDLINGS GROWTH ON IRANIAN PARSLEY; *PETROSELINUM SATIVUM* AND TURKISH PARSLEY; *PETROSELINUM CRISPM*, AND STUDY THE RATE OF ABSORPTION SPECTRUM OF APIOL UNDER THE EFFECTS OF ZnO (NP)

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Abstract

Parsly is a member of the *Apiaceae* family, with its antioxidant compounds, which are considered by scientists and researchers and has three varieties. Due to physiological conditions, all varieties of the plant may not necessarily be seen in any geographical position or physiological conditions. *Parsley* consists of three major varieties such as common *Parsley* with curly leaves (*Petroselinum hortense*), flat leaf *Parsley* (*Petroselinum neapolitanum*), and fern leaves *Parsley* with tuberous root (*Petroselinum tuberosum*). Observations show that seeds germination and seedlings growth in *P.sativum var.hortese* were significantly increased in Iranian physiology conditions and their seedlings showed a significant and vivid growth. Seed germination in *P.crispm var.hortense* has been delayed in Iran's climatic conditions and lingerie conditions in most of the seeds are due to the presence of a thick skin layer across the surface of the seeds. Therefore Auxin is a kind of growth hormone for plant growth, the Zinc Oxide Nano particle that synthesizes the Tryptophan Amino Acid while being a precursor to Auxin production, is prepared. The results showed that treatments in 3mM and 6mM, significant positive difference in the percentage of germination than control in the rate of seeds germination treated, compared to control was observed such as highest rate of seed germination, also the morphological difference in treated seedlings has seen include of longer root and faster growing up than control, the lamina of their leaves were more extended, while the treatments in 12mM showed the no significant negative difference compared of the other treatments in 3mM and 6mM and control. The observation of increasing the number of leaf vessels ratio to lumina, suggesting the positive results of the plant rate growth that is indicated the maximum of Apiol in the leaves, while the Apiol absorption spectrum is 222 nm. By providing powdered leaves of controlled and treated samples during spectroscopy, the absorbance spectrum of Apiol was observed at 3 mM and 6 mM, while not observed in samples of 12 mM.

Keywords: Apiol, Parsley, *Petroselinum sativum*, *Petroselinum crispum*, Secondary Metabolite, Zinc Nano Particles, ZnO (n)

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DETERMINATION OF DIFFERENT MILK TYPES ADULTERATION IN DAIRY PRODUCTS BY APPLICATIONS OF IMMUNOLOGICAL METHODS

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Abstract

There is various enzyme linked immunosorbent assays (ELISAs) techniques for milk fat adulteration determination in dairy product. ELISAs is proven successful to detect targets of antigens such as casein, lactoglobulin immunoglobulins and protein with milk types adulteration of different species like goat, cow, sheep and buff alo milks. ELISAs techniques were applied to cheeses samples. ELISA in combination with PCR was applied to cheese samples made with buffalo milk. Detection of adulterants in cheese showed more sensitive and reliable essay in adulteration of milk fat from different milks and ripening showed more changes in physic chemical aspect of cheese. There were changes in milk fat protein ratio after specific time and storage period and fat and protein percentage declined from its actual value with the advancement of ripening and maturation in cheese. Future progresses in in detection methods like immunoassay and PCR techniques will improve specificity and sensitivity. Food analyst must have to imply legislations of European Commission by using high quality ELISAs and PCR techniques to confirm and control adulterants usage in dairy industry.

Keywords: Enzyme-Linked Immunosorbent Assay (ELISA), Immunoassay, Milk Adulteration

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EXAMINATION OF PORTABLE GROUNDWATER QUALITY AND AGRICULTURAL ASSESSMENT OF SELECTED TRACE METALS IN PAKISTAN

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Abstract

Groundwater contamination has considerable impact on public health in areas where majority of the people rely on groundwater for drinking and agriculture purpose but it pose a serious threat to healthy lives of community as well as agricultural land..Keeping in view, groundwater samples from 119 public places in flood affected areas of district Sanghar of Pakistan were investigated for physico-chemical parameters (like color, odor, pH, electrical conductivity (EC), turbidity, chloride (Cl), alkalinity, nitrate (NO_3), sulphate (SO_4) and TDS) and essential metals (like calcium (Ca), magnesium (Mg), sodium (Na) and potassium (K)), trace elements (like iron (Fe), zinc (Zn) and arsenic (As)) and microbiological indicators (like c*oliform* and *faecal coliform*). According to APHA standard methods. Microbiological analysis data revealed that 57 and 44% water samples were contaminated with c*oliform* and *faecal coliform* bacteria. On the other hand, chemical analysis data showed that 55, 41, 08, 33, 32, 16, 55 and 46% water samples were having high concentration of Ca, Hardness, Mg, Cl, Na, K, SO_4 and TDS respectively in comparison to GVs. Trace elements like Fe, As and Zn were also high in 49, 26 and 9 % samples respectively. Health risk assessment for plants due to high concentration of Fe, As and Zn was carried out by calculating chronic daily intake (CDI) and health risk index (HRI) for different plants. Arsenic HRI>1 for plants in 32 and 26 samples respectively, posing serious threats to the agriculture land as well as farmer's health and environment.

Keywords: Agriculture, Flood, Groundwater Quality, Risk Assessment, Trace Metals

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ENVIRONMENTAL CONDITIONS AFFECTING THE REMOVAL OF CHROMIUM BY BACTERIA

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Abstract

Heavy metal pollution has become a serious environmental problem. The contamination of environments (soil and water) with various toxic metals is a serious threat for ecosystem and human health, and requires the implementation of appropriate remedial measures. Heavy metals, such as chromium, cadmium, mercury, arsenic, lead etc. are considered as major environmental pollutants due to their toxic effects on environment as well as on human health. Chromium (VI) is one of the most common environmental contaminant due to its tremendous industrial applications. It is non-biodegradable as it is a heavy metal, and hence, of major concern. Therefore, it is pertinent that the remediation method should be such that brings chromium within permissible limits before the effluent is discharged.

The conventional methods used for the removal of chromium (VI) contaminated effluent includes electrochemical treatment, ion exchange, evaporation, chemical precipitation, reverse osmosis, and sorption, however all these physical and chemical methods were observed to have technical and economical constrains like high cost of operation and release of chemical and huge sludge to the environment as by-product therefore the need to replace them with cost effective and environmental friendly biological method of treatments. Biological treatment, based on living or nonliving microorganisms or plants, offers the reduction of toxic metal levels to environmentally acceptable limits in a cost-effective and environmentally friendly manner.

This review focuses on chromium pollution problem, its chemistry, sources, effects, remediation strategies by biological agents and detailed chromium detoxification mechanism in bacteria cell. Together with this, various parameters affecting the sorption, such as initial concentration, biosorbents dose, pH of metal solution, and shaking time for each cell form will evaluated. According to previous studies, it will be stated which type of bacteria is more effective in removal chromium in water-wastewater. After obtaining successful results in bioaccumulation studies, aimed at making comparisons to investigate the role of bacteria in bioremediation of chromium removal.

Keywords: Heavy Metals, Chromium, Bacteria, Removal, Bioremediation

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BIOLOGICAL TREATMENT OF HEAVY METALS BY GEN TECHNOLOGY

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Abstract

Environmental pollution by heavy and toxic metals because of mining, metallurgical processes and other chemical industries is a worldwide problem affecting both human health and the environment. In recent years, several processes have been developed with the aim of reducing or recovering heavy metals from contaminated environments. Physical and chemical approaches are capable of removing a broad spectrum of contaminants, but the main disadvantages of these methods lie in the increased energy consumption and the need of additional chemicals. In recent years, the processes such as biosorption, bioremediation and bioprecipitation are all based on the use of microorganisms that have the ability to solubilize, adsorb, or precipitate heavy metals. Bioremediation based on using the bacteria is very attractive for the elimination of heavy metals comparing to physicochemical methods.

The promising area of improvement of bioremediation processes is genetically engineered bacterial strains which have the increased abilities to accumulate toxic heavy metals. One of the mostly used ways how to enhance the ability of bacteria to withstand metal ions adverse effects is to clone gene for metallothioneins (s) or by over-expressing metal-binding peptides or proteins such as poly-histidines or poly-cysteines. They bind essential (Zn, Ni, Cu) and also toxic (Cd, Pb, Hg) metals. When the microorganisms are exposed to the heavy metal at high doses, cysteine-rich, acid precipitation and thermocoagulation-resistant low molecular weight peptides (metallothionein (MT), glutathione, phytochelatin) are increased and these peptides are complex with heavy metals.

In this study, the metal-binding ability of MT in comparison with that of several wild type bacteria species will be investigated. This review aims to discuss the effects of metal binding proteins and peptides on the bioremediation mechanisms. In this way, appropriate metal binding bacteria alternatives are provided according to the type of heavy metals. Factors affecting heavy metal bioaccumulation process will comprehensively evaluated by using different bacteria.

Keywords: Heavy Metals, Bacteria Strain, Metallothionein, Removal, Bioremediation

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VORTEX ASSISTED IONIC LIQUID DISPERSIVE LIQUID PHASE MICRO-EXTRACTION AND FLAME ATOMIC ABSORPTION SPECTROMETRIC DETERMINATION OF CO AND NI IN FOOD AND ENVIRONMENTAL SAMPLES

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Abstract

Cobalt (Co) and nickel (Ni) are the important trace essential metals for the metabolisms of humans and animals. However, high concentrations of these metal ions may be toxic and lead to some health problems and cancers. Usages of these metals have increased with increasing population and human demands. Heavy metals such as Co and Ni tend to accumulate in environment. The contamination of environment with toxic heavy metals is a serious and undesirable problem. Due to their negative impact on human, it is important to determine the concentration of cobalt and nickel, especially in food and water samples. Therefore, volunteer scientists have made great efforts to determine heavy metal contents of environmental samples.

In this study, ionic liquid dispersive liquid-phase micro-extraction (IL-DLPME) method was developed for simultaneous flame atomic absorption spectrometric (FAAS) determination of Co and Ni. For this purposes, sodium diethyl dithio carbamic acid (Na-DDTC) as a chelating reagent and ionic liquid 1-Hexyl-3-methylimidazolium hexafluorophosphate as an extractor were used. Method parameters including pH, concentration of chelating reagent, amount of ionic liquid and vortex time were investigated and optimized. At the optimum conditions interference effect of matrix ions were examined. Detection and quantitation limits of the method were determined as 1.3 µg/L and 3.8 µg/L for Co and 1.7 µg/L and 4.8 µg/L for Ni, respectively. Method has permitted 15 preconcentration factor. Linear dynamic ranges of the method were determined between 0.1-2.2 µg/mL for Co and 0.1-2.5 µg/mL for Ni. Validation of the method was performed by using certificated reference materials with quantitative results. Finally, method was applied to food and environmental samples for determination of their Co and Ni contents.

Keywords: Cobalt, DLLME, Extraction, FAAS, Nickel

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THE USE OF MULTI-CRITERIA DECISION MAKING MODELS FOR SELECTION OF BEST AVAILABLE TECHNIQUES IN CLEANER PRODUCTION APPLICATIONS

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Abstract

Cleaner production is a proactive environmental protection strategy based on the reduction of resources consumptions, prevention of wastes and emissions with a holistic approach at the source. It is aimed to protect natural resources and environment as a whole with cleaner production applications in industrial plants. The best available techniques (BAT) include a balance between the required costs and benefits are used in cleaner production applications. However, it is an important problem to determine the most suitable BATs for industrial plants in cleaner production applications. When the cleaner production studies carried out in different sub-sectors of the manufacturing industry are examined, it was observed that a significant number of the researchers did not use any systematic or analytical method in the decision making process. However, deciding on the most appropriate BAT in cleaner production applications is very important as it directly affects the savings and benefits. In this study, applications of multi-criteria decision-making (MCDM) methods in the solution of cleaner production and other environmental problems were investigated. In addition, 15 different MCDM models with widespread use were examined and their usability was evaluated in terms of selecting the most appropriate BATs in cleaner production applications. It was concluded that "Preference Ranking Organization Method for Enrichment Evaluations (PROMETHEE)", "Technique for Order Preference by Similarity to Ideal Solution (TOPSIS)", "Multicriteria Optimization and Compromise Solution" (VIKOR)" and "Analytical Hierarchy Process (AHP)" methods can be used in BAT decision-making processes because of their ease of implementation, developable properties and possibilities for evaluation, comparison and ranking of different alternatives. In addition, a new decision-making model can be developed for the decision-making processes of BATs using an effective combination of various MCDM methods.

Keywords: Best Available Techniques (BAT), Cleaner Production, Multi-Criteria Decision Making (MCDM) Method

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WASTE MANAGEMENT APPLICATION IN ENVIRONMENTAL MANAGEMENT SYSTEM: PTT EXAMPLE

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Abstract

Organizations; in the world where the needs are endless and resources are limited, they work to ensure a sustainable environment with the efficient use of resources. They take care to create environmentally friendly materials in order to create less harm to the environment.
The Postal and Telegraph Organization (PTT), which was established in 1840, started to implement the Environmental Management System, which is the most effective system in the protection of the environment. It is implemented as an integrated management system of five (TS EN ISO 9001: 2015, TS EN ISO 10002: 2014, TSE EN ISO 14001: 2015, TSE EN ISO 27001: 2013, OHSAS 18001: 2014) the first time at PTT in Turkey.

In this study, we will introduce application methods, prepared the procedures, the resources (EYS software) used for tracing, reporting and monitoring of data related to wastes delivered in all workplaces in PTT at approximately 4, 188 workplaces (General Directorate Service Buildings, Directorates, Cargo Handling, Postal Distribution, Cargo Distribution, Central Office etc.) The aim is to introduce the Environmental Management System, which is applied in PTT, as an example to other institutions and organizations, both for efficient use of resources and for a cleaner and sustainable environment.

In 2018, the wastes generated as a result of PTT activities were delivered to municipalities or authorized institutions. In this context, 107.498.65 kg hazardous waste, 473.381, 69 kg non-hazardous waste is delivered and 5.644 trees were recovered by recycling paper packaging waste from only non-hazardous waste. As a result, the efficiency of the applied method is revealed.

Keywords: Waste Management, Environmental Management System, PTT

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A KEY FOR COMBACTING CLIMATE CHANGE EFFECT: ANATOLIAN WHEAT LANDRACES

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Abstract

Wheat, from all civilizations in Anatolia, has maintained its importance until today. Nowadays, it is seen as a strategic product and element in human nutrition. According to the IPCC 2014 report the Anatolia region will be affected by strong climatic changes, both in terms of average temperature and of precipitations regime. To implement a climate smart agriculture paradigm and a sustainable increase of agricultural productivity different approaches can be deployed. We need to find good solutions to make sustainable wheat production systems. Wheat landraces are new approaches to develop good varieties which are tolerant to different effect of Climate Changes. World population is increasing and humans on earth need food for surviving their life.

In spite of the contraction in total wheat cultivation areas, the increase in production, the newly developed varieties and the advances in the production technique play a major role. Today, one of the easiest and most effective ways to develop varieties with the desired properties by expanding the genetic variation is the use of wheat landraces. In the breeding activities for increasing both the existing diversity and the yield, wheat landraces which are able to grow successfully in rich and unsuitable environmental conditions are utilized. The wheat landraces being cultivated in different parts of Turkey have many resistance genes are known. Turkey's total wheat area is estimated that 1% of the continued cultivation of wheat landraces in less space, particularly important in terms of creating genetic resources for biotic and abiotic stress factors in breeding programs.

This review is prepared for the purpose of determining the utilization possibilities and utilization of wheat landraces for drought studies, which is one of the abiotic stress factors that constitute a significant part of the breeding studies for future combating of Climate Change effect on wheat production.

Keywords: Wheat Landraces, Climate Change, Drought

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THE EFFECT OF CELL SURFACE HYDROPHOBICITY AND FOAM POTENTIAL ON THE STABILITY OF ACTIVATED SLUDGE FOAM

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Abstract

In activated sludge sources hydrophobic surfactant particles adhering to the hydrophobic surface and flocked bacteria are considered to be hydrophobic molecules. Entering to the wastewater treatment plant surfactants (SAA-surface active agents) not only of household or industrial detergent, but also of the bacteria in the activated sludge is produced. In activated sludge microorganisms, that cause stable foam is called to mycolata. Hydrophobicity-foaming in relation of mycolata group MLSS , hydrophobicity, filamentous organisms and plants relative number and type of other operating parameters (COD, BOD_5 , etc.) increments were found to be associated with the onset of foaming .

In this study, activated sludge ten WWTP's located in Antalya was evaluated seasonal hydrophobicity by the method MATH (Microbial Adherence to Hydrocarbon). For this purpose, SVI, MLSS, pH, Conductivity, BOD5 and COD were used to characterize the microbiological parameters and activated sludge. In activated sludge, the most common species observed **Gordonia** (*Nocardia*) spp. *Microthrix parvicella* . Cell surface Hydrophobicity Index (CSHI) the activated sludge of plant investigated were determined hydrophobicity in the winter low, while in the summer hydrophobicity high.

Keywords: Activated Sludge Foaming, Cell Surface Hydrophobicity Index, Foam Potential, Hydrophobicity

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THE NEOPROTEROZOIC VOLTA BASIN AND ITS HYDROCARBON POTENTIAL, GHANA: A COMPARATIVE REVIEW

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Abstract

The Neoproterozoic structural basin of Ghana known as the Volta Basin (VB) is equivalent to the Taodeni and Tindouf Basins in the central and northern parts of the West African Craton (WAC). Although there are proven Neoproterozoic-Cambrian hydrocarbon systems across the globe, the Neoproterozoic VB which contains discoverable hydrocarbon source rocks has not been given the deserved attention and as such, its petroleum prospects are rarely known. The current review on the less known VB from the perspective of its hydrocarbon potential seeks to compare the VB to other relatively studied Neoproterozoic basins with known hydrocarbon occurrence and to highlight the need to give attention to the search of hydrocarbons in the basin. This review work also proposes current methodologies that can be used in unraveling the hydrocarbon potential of the basin. The Neoproterozoic VB is thickest in its central and southeastern ends with hydrocarbon indications from boreholes drilled for hydrodynamic purposes in Tibagona, Buipe, Prang and Yendi. The boreholes show the presence of a thick succession of argillaceous clastic sediments of the Pendjari Formation with underlying carbonates and conglomerates in some parts, particularly in the Buipe borehole. Black viscous oily bitumen is observed at varying depths in these boreholes within the thick shales, mudstone and fine-grained sandstones of the Pendjari Formation of the Oti/Pendjari Group. This is the most probable source rock of the hydrocarbon shows. The underlying carbonates and conglomerates of the Kodjari Formation of the Oti/Pendjari Group and the sandstones of the Kwahu/Bombouaka Group are possible reservoir rocks. Presence of faults at the Kintampo areas and the southeastern fringes following the Pan – African orogeny as well as the stratigraphic configuration of the VB can serve as traps to the oil shows from the boreholes. The basin's stratigraphic and structural architecture support a hydrocarbon system. Similar analogous basins like the Taodeni Basin (Abolag-1 well) and the Illizy Basin in Libya are known to be hosting hydrocarbons. The single well at Premuasi with poor source rock properties is not enough to preclude the possibility of onshore hydrocarbon occurrence in the VB. Adopting a multidisciplinary approach involving sedimentology, organic petrography and organic geochemical studies on the Neoproterozoic VB of Ghana will be able to unearth the hydrocarbon potential of the basin. Findings from this integrated approach of study will serve as basis and a guide to exploring the hydrocarbons in the basin.

Keywords: Ghana, Hydrocarbons, Neoproterozoic, Review, Volta Basin

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IMPEDANCE CONTROL OF OBSTACLES AVOIDANCE USING ARDUINO CONTROLLER

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Abstract

This paper describes about an obstacle avoidance robot vehicle which is controlled by ultrasonic sensor. The robot is made using ultrasonic sensor and it is controlled by Arduino micro controller. Ultrasonic sensor fixed in front axle of the mobile robot. The sensor gets the data from surrounding area through fixed sensors on the robot. The sensor senses the obstacle and deviate its path to choose an obstacle free path. The sensor will send the data to the controller is compared with controller to decide the movement of the robot Wheel. The robot wheel movement and direction will be based on the sensing of the ultrasonic sensor and also using a wheel encoder. This vehicle is used for detecting obstacle and avoiding the collision.

Keywords: Obstacle, Arduino, Mobile Robot, Avoidance

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THE CONTROLLING OF EXTRUDER TEMPERATURE IN 3D PRINTER

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Abstract

In this study PID control of the 3D printer extruder was performed. The extruder temperature in the 3D production printer directly affects the quality of the 3D product. The effects of Kp, Ki, Kd coefficients on the response of the system in PID controller was observed and the most suitable PID controller for the system was designed. The effect of each coefficient on the response of the system with 240 units of unit step input was observed. Simulation was modeled using MATLAB Simulink software. For each simulation, the input and output signals were compared and time graphs of the control signal were generated. Then graphics were interpreted

Keywords: 3D, Printer, Extruder, PID Control

Acknowledgement: This study was supported by Karamanoglu Mehmetbey University, Research Center of Engineering Faculty. The authors would like to thank Research Assistant of this center.

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VALIDATION OF FORWARD OSMOSIS PROCESS: IMPACT OF MEMBRANE TYPE

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Abstract

Forward osmosis (FO) process is based on the transition of water molecules through a semi-permeable membrane from a feed solution which is less concentrated to a more concentrated draw solution. FO have demonstrated a great potential in desalination, water treatment, food processing, pharmaceutical applications etc. due to low pressure requirements compared to pressure driven membrane processes. To optimize the mass transfer in FO process, a comprehensive simulation should be performed to identify the most important parameters in the process. In this study, experimental validation of a computational fluid dynamics (CFD) model used to simulate FO experiments with asymmetric polymeric thin film composite reverse osmosis membranes. Experimental results obtained from using two different membrane types are compared with simulation results. CFD analysis is performed with the commercial software ANSYS Fluent and it's found that the numerical study results are in a good agreement with the experimental ones.

Keywords: Forward Osmosis, CFD, Membrane

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USING ETFE MATERIAL IN ARCHITECTURAL DESIGN

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Abstract

With regarding to the importance of energy in buildings, one of the most important ways to achieve a sustainable environmental architecture is to employing intelligent architecture and building management system. This goal, tries to accompany nature rather than overcoming the nature and using renewable energy instead of fossil fuels, thereby, preventing the deterioration of natural resources and environmental pollution. And it reduces energy consumption and provides favorable conditions for residents of the green building. Most of the countries buildings are without technical criterions that is one of the most important agents in inappropriate consumption of energy.

One of the considering challenges to promote sustainable development in the building industry is the utilizing of ETFE panels. This technology minimizes the heat exchange between the interior and exterior of the building. On the other hand, the energy crisis is considered as one of the very important issues of the today's world. Therefore, smart materials can try to adapt to environmental conditions and react to changes in the environment. Hence, it is better to apply such high-performance materials at designing sustainable buildings, which are environmentally compatible and can increase the useful life of the building.

This paper, with respecting to the library studies, attempts to introduce the usage of the intelligent ETFE materials and its function and the advantages of using it in the architecture of contemporary buildings. There was an effort to associate optimized energy consumption in building, create comfort and safety and modern design in architecture by opening new ways through new technologies in building. In the following, the authors represent the main aim of using intelligent materials and their performance, and also they describe how they must be used and behaved in buildings. The most important advantage of this materials is to optimize and intelligent energy management to achieve sustainable architecture.

Keywords: Energy Consumption, Technology, Architectural Covers, Modern Design

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THE INFLUENCE OF THE GREEN WALLS IN IMPROVING ENERGY CONSUMING AND ITS ROLE IN SUSTAINABLE DEVELOPMENT

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Abstract

In the last recent decades every day the level of the artificial environments is increasing. By following this trend in most countries the structure of urban living has been changed to apartment living without having any natural environment and in the meanwhile humans still need an environment in their nature. On the other hand, in all over the world due to some fundamental problems such as global warming, pollution of the weather, irregular energy consuming and the high economical costs of that, taking advantage and using sustainable architecture and specially in building green buildings it's becoming very important. In this way, using green surface can be the best solution for solving these existing problems and bringing up effective sustainable architecture. Looking into the contemporary architecture, reveals that in the own style countries in this field, an item named "green Building" has formed. Green roof, and green walls, is living surfaces that can adjust temperature up to ten degrees. In green buildings, selecting the type of plant and its bed making, considering the type of climate is of a great importance.

In this descriptive and analytical article which research base is on survey and studying book, green walls have been analyzed for improvement of buildings energy consuming and also the role of this system in visual beauties of the city in the way of sustainable developing has been studied. It seems to take advantage of green walls can be the beneficial way to decrease the energy consuming, in furtherance of the sustainable architecture goals.

Keywords: Sustainable Development, Architectural Design, Green Walls, Inactive System, Vegetation

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THE URBAN INDICATORS FOR SUSTAINABLE CITIES: INTERVENTIONS FOR EFFICIENT URBAN METABOLISM IN THE CITY OF IZMIR

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Abstract

As cities demand more food, water and energy which are all in direct relation with ecosystem services, they cause problems in ecosystems by resource-use, land encroachment and pollution. These impacts on the environment also effect urban economic activity and public health, which result in increased population density and socio-economic disparities. This challenge of today's cities threatens public health and the quality of life citizens.

For providing a sustainable urban development, social, economic, environmental and governance factors must be considered altogether according to the city's character. Green spaces and green buildings, public transport, producing local resources and efficient waste disposal systems are some of the indicators of that meaning.

In this research, to be able to construct science-driven policies for sustainable development of the city of İzmir, a number of sustainability goals will be searched. Socio-economic factors, resource use in terms of building stock and any other processes which contribute to the city's metabolism will be studied. Creating indicators and urban metabolism frameworks will provide not only an environmentally-friendly city but also improve the well-being of its citizens.

Keywords: Building Stock, İzmir, Sustainable Cities, Urban Indicators, Urban Metabolism

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BORON WASTES AND THEIR EVALUATION

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Abstract

Boron is one of the rare elements in earth crust. The boron content of the soil is about 10-20 ppm. Sea water contains 0, 5 - 9, 6 ppm boron and fresh water between 0, 001 - 1, 5 ppm. Boron is not found free in nature. Boron mines are found in the form of mineral salts on the earth. After being removed from the soil, it can become ready for use by the related industries after a very simple process such as crushing, sieving, washing and grinding. In nature there are about 230 kinds of boron minerals with strategic importance. Commercially, borax, kernite, colemanite, ulexite, propertite, pandermite and borasite are the most utilized compounds of boron. The rapid increase in production and consumption due to our age has brought with it many problems and the studies on the evaluation of the wastes seen as secondary raw material sources which may be an alternative to the existing raw material resources have been brought into the agenda. As with all industrial activities, wastes occur as a result of the operation of mines. Waste of boron minerals which are strategic importance for Turkey is also one of them..For this reason, evaluation possibilities of boron wastes should be considered in the future.

In general, the importance of boron waste and its evaluation are emphasized in this review.

Keywords: Industrial Raw Materials, Environmental Pollution, Boron, Boron Wastes

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EVALUATION OF PERFORMANCES OF TURBULENCE MODELS FOR CFD SIMULATION OF CYCLONE SEPARATORS

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Abstract

This study aims at performance evaluations of several turbulence models in Computational Fluid Dynamics (CFD) simulations of cyclone separators using Ansys Fluent v15.0. The study is a preliminary step to a more comprehensive modeling work in the scope of an ongoing research project.

The pressure drops in a Stairmand high-efficiency type cyclone separator at various inlet velocities (10, 13.5, and 17 m/s) were obtained from a previous study. New experiments with the lab-scale cyclone separator system were performed to obtain collection efficiencies at the same inlet velocities. The collection efficiencies were used together with particle size distribution data to predict cut diameters. Experimental pressure drops and cut diameters were used for calibrating the CFD model.

Three turbulence models, namely κ-ε model, κ-ω model, and Reynolds Stress Model (RSM) were employed in CFD simulations. For all models, the discrepancies between the experimental and simulated pressure drops were lower than 11%, while the discrepancies between cut diameters range from 1.57% to 30.5%. Of all turbulence models, RSM proved to be the one that simulates complex flow properties within cyclone separators. RSM predicted pressure drops with an average discrepancy of 2.82% ± 2.24%. In terms of cut diameter prediction, RSM errors were the lowest (5.62% ± 3.58% on average). Reynolds Stress Model should be used as the turbulence model for simulating cyclone separators using CFD.

Keywords: CFD, Collection Efficiency, Cyclone, Pressure Drop, Turbulence Model

Acknowledgment: This study was a preliminary step to a more comprehensive modeling work in the scope of an ongoing research project supported by the Scientific and Technological Research Council of Turkey (TUBITAK) under contract no. 116Y061.

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ARTIFICIAL NEURAL NETWORK MODELING OF DISCRETE SETTLING PROCESS

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Abstract

Computerized simulation of wastewater treatment plants/processes, either Computational Fluid Dynamics (CFD) based or Activated Sludge Model (ASM) based, requires writing and simultaneously solving sets of a great number of ordinary or partial differential equations, which takes a very long time even on fastest computers. These sets of differential equations also comprise those written for primary and secondary sedimentation tanks.

In modeling sedimentation units, usually Takacs approach is employed, which is an advection-settling model with the assumption that the sedimentation unit consists of 10 complete-mix layers. For simulation purposes, the primary and secondary treatment units can be considered separately. Thus, employing a simpler and faster model for primary sedimentation tanks could speed up the simulation process due to reduced number of ordinary differential equations to be solved. Also, this approach does not disturb the accuracy of the models for the secondary treatment units. The purpose of this study is to evaluate the performance of artificial neural networks in predicting the suspended solids removal efficiency in discrete settling processes. For this purpose, an imaginary primary sedimentation tank was simulated with varying influent flowrates, split ratios, particle densities, particle diameters, and wastewater temperatures. The calculated removal efficiencies were used for training and validating the artificial neural network.

Results showed that artificial neural network with logistic activation function predicts the suspended removal efficiency in a discrete settling process once influent flowrate, split ratio, particle density, particle diameter, and wastewater temperature is known. The calculated mean square errors ranged from $3.46*10^{-5}$ to $2.28*10^{-4}$ with an average value of $8.79*10^{-5} \pm 4.44*10^{-5}$.

Keywords: Artificial Neural Network, Discrete Settling, Removal Efficiency, Suspended Solids, Takacs Model

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APPLICATION OF CONSTRUCTED WETLANDS FOR DOMESTIC WASTEWATER TREATMENT OF RURAL AREAS IN SIVAS, TURKEY

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Abstract

Due to several advantages (low construction and operation costs, simple in operation, and high removal efficiencies of some pollutants) of the constructed wetlands (CWs) compared to the conventional systems, they are widely used for the treatment of municipal wastewater of small settlements (up to 3000 p.e.). In the last two decades, the use of CW rapidly expanding in both developed and developing countries.

Domestic septic systems are generally designed as a pre-treatment unit which is applied to eliminate solids while subsequent treatment stages consist of a constructed wetland as a natural water treatment technology. Although the efficiency of organic matter removal in the CWs often meets the specified design target, nitrogen removal efficiency is mostly poor. The CW is considered to be a complex bioreactor and a number of physical, chemical, and biological processes take place with microbial communities, emergent plants, soil, and sediments accumulated in the lower layer of CW.

This paper presents the results of CWs effluents analysis in four rural areas located in the Sivas 4 Eylul Dam Basin. In this study, samples were collected in the dry season and values of the pollutants were compared with the results of rainy season presented in another symposium. Additionally, general physical situations and operational conditions of the CWs were evaluated.

Unfortunately, general situations of the CWs were not convenient in order to achieve target value of pollutants elimination. Pretreatment unit were clogged with the cow manure wastes and effluent of the pretreatment unit contained more pollutants than the influent. The samples point of influent and effluent of some CWs were not fully functional and samples could not be taken (control). The effluent from some CWs contained higher concentrations of COD and ammonium than the rainy season. Most of the people in the villages have complained the bad odor from the CWs area in the summer season.

Keywords: Constructed Wetlands, Rural Wastewater, Treatment

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COPPER EFFECT ON NITRIFICATON PROCESS IN BATCH UNITS

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Abstract

Biological nitrogen removal involves a sequential conversion of ammonium–nitrogen (NH_4^+–N) to nitrite– nitrogen (NO_2–N), nitrate–nitrogen (NO_3–N) (nitrification), and nitrogen gas (denitrification). Because of low growth rate of nitrification organisms, nitrification process is the controlling step in biological nitrogen removal process. Biological treatment of industrial wastewaters, which are mostly contains heavy metals, presents some difficulties due to its composition.

Copper and NH_4^+–N are widely encountered in the industrial wastewaters. Effect of copper on the nitrification process was evaluated in this batch experimental study. Experiments were carried out by varying the concentrations of Cu^{2+} (0(control)–10.0 mg/L) in three batch units for each concentrations. Over about 95% NH_4–N removal was observed for the applied Cu^{2+} concentrations. Because of the inhibition effects of Cu^{2+} on the nitrification organisms, NO_2–N concentrations increased in the batch units when the applied Cu^{2+} concentrations to the nitrifying biomass increased.

Keywords: Copper, Heavy Metals, Nitrification

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MODIFIED CLAYS IN WATER TREATMENT TECHNOLOGY

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Abstract

The adsorption capacity of clay material is high due to its high surface area. Clays stand out as suitable adsorbents for removal of most ionic species and organic compounds such as heavy metals, pesticides and dyes in contaminated water. However, adsorption capacity of raw clay material is poor for specific contaminants because of the permanent negative charge (due to isomorphic displacement) or for its other characteristics. In these cases, the clay surface can be modified and the modified adsorbents with higher adsorption capacity can be obtained. Heat activation, alkyl-ammonium salts, long chain polymers, acid-base applications, organo-clay formations are widely used practices in the clay modification. The aim of the study is to investigate the raw and the modified clays used in the treatment of contaminated water and to examine the additional adsorptive features gained to the clay by modification. In this context, modification processes will be investigated for different clay types with the effects of zeta potential, pH, surface area and other conditions. Applications used in the clay modifications will be outlined and removal efficiencies of contaminants on the raw and modified clays will be compared in the study.

Keywords: Organo-Clays, Modified Clay, Adsorption, Contamination

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PHYTOREMEDIATION IN WASTEWATER TREATMENT

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Abstract

Various mechanical, chemical, physicochemical and biological methods are used individually or in combination in the treatment of wastewater. Most of these treatment techniques are applied in highly contaminated waters. These techniques are not sufficiently suitable for the treatment of dispersed pollutants in the water from agricultural, industrial or contaminated areas. Phytoremediation is a natural treatment method which contains different processes for different environments, contaminants and plants. Microalgae and various plants are used in phytoremediation and it has a wide range of use in the treatment of various wastewaters such as urban, textile and dairy wastewaters. Organic and inorganic contaminants are removed by phytoremediation. Especially, heavy metals such as copper, lead, zinc and nickel; metalloids such as arsenic, selenium, radionuclides, phenols; nonmetals and other organic compounds such as pesticides are successfully removed by phytoremediation. Phytoremediation allows to contaminant degradation, removal or immobilization at the same time. It is a cost-effective and eco-friendly method and is not required any special equipments during the application and allows the applied area to be reused. In this way, it is a preferred wastewater treatment method. The disadvantages of this method are that the long recovery periods and insufficiency in the remediation of heavily contaminated areas in a short time. The aim of this study is to determine the advantages of phytoremediation technology used in wastewater treatment and to evaluate the studies in this field.

Keywords: Phytoremediation, Wastewater Treatment, Contamination, Heavy Metals

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MICROALGAL TREATMENT OF BIOGAS SLURRY UNDER BATCH CONDITIONS

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Abstract

Global energy demand and consumption continue to increase day by day. There is a need for alternative energy sources due to the fact that fossil fuels are not infinite and the need for energy will not decrease. Another reason for the need for other fuels which are alternative to fossil fuels is the global warming problem which has the effect in recent years. Microalgae as alternative and renewable biomass feedstock provides many advantages, such as noncompetition for farmlands, productivity per unit area, rapid growth, and capability of mitigating waste CO_2 released from a point source like power plant. Recently, use of biogas slurry that has rich N and P in microalgae production for biofuel has gain a great deal of interest. It is suggested that algal biomass from biogas slurry can not only carry out nutrient removal but also obtain biomass for the production of biofuels. In this study, nutrient removal and biomass removal potential from synthetically prepared biogas slurry were investigated by using mixed culture microalgae under batch conditions. Mixed culture was used for nutrient removal and biomass production as it is difficult to reproduce and keep pure cultures alive in real conditions. The study was carried out with 12 h dark/12 h light and light intensity (2275 Lux) in an artificial white light environment, in an orbital shaker at 25°C with an agitation speed of 60-65 rpm and with air supply to erlenmeyer flask (2000 mL) by air pump. As a result of the 78-day incubation period where the algal growth ended due to light limitation, COD, ammonia nitrogen, and phosphate phosphorus values were reduced to 125 mg/L, 211 mg/L, and 12 mg/L, respectively, in the biogas slurry having 1070 COD mg/L, 346 mg NH_4-N/, and 24.5 mgPO_4-P/L content, Biomass production was determined both by optical density and dry weight, as well as by chlorophyll a to distinguish algal and bacterial biomass. As a result, the concentration of chlorophyll a 16.94 mg/L and biomass concentration was found to be 1180 mg SS/L. This study, which is a preliminary study, has shown that biogas slurry has algal biomass production and nutrient removal potential.

Keywords: Biofuel, Biogas Slurry, Microalgae, Nutrient, Treatment

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MANAGEMENT OF EMPTY PESTICIDE CONTAINERS IN TURKEY AND IN THE WORLD

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Abstract

The aim of this study is to address the collection and disposal of empty pesticide containers in Turkey and the World. For this purpose, we performed a systematic literature study revealing the situation in Turkey and in the World. Examples of countries, that have done successful case studies on collection and disposal, were used. From the 1970's plastic was used to make pesticide containers. Nowadays, plastic pesticide containers are made of high density polyethylene (HDPE), polypropylene (PP), polyterephthalate (PET) or COEX multilayer bottles. Empty pesticide containers are the most common agrochemical wastes posing a potential threat to human health and environment because of containing pesticide residues. In studies, researchers observed that in some countries, if farmers do not burn in the open, they leave empty containers to fields or put next to the canals and streams and they revealed this with the conducted surveys. In some poor countries empty containers are used to store water and food. Dioxins, dibenzofurans (PCDD's/PCDF's), polycyclic aromatic hydrocarbons (PAH's) and suspended solids (PM10 and PM2.5), which are formed by the combustion of HDPE pesticide packages, are introduced into the air. The burying of pesticide containers (even after rinsing three times) is not suitable because they use empty spaces and contaminate groundwater and soil. They cannot be biodegradable, and when they are buried, the empty space inside and low density cause to increase gradually to the surface, generating environmental pollution. Similar findings in Turkey, Greece, Iran, Oman, Vietnam, South Africa, Ethiopia and Tanzania are reported. On the other hand, successful empty pesticide packaging collection programs are shown as examples in USA, Canada, Europe and Asia. The management of agricultural plastic container wastes should be taken seriously because of generating a new raw material or energy source. In Turkey, no rules are applied to the way of collecting empty pesticide containers after pesticides are sold. Empty pesticide containers must be returned or taken to an appropriate collection program. Because of not having safe return or disposal of pesticide containers, end users should make lobbying activities for the organization of such programs by distributors and local authorities.

Keywords: Empty Pesticide Containers, Environmental Effect, Pesticide Container Collection

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THE EFFECT OF CONDUCTIVE MATERIALS ON MICROBIAL DYNAMICS IN ANAEROBIC SYSTEMS

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Abstract

Energy demand, the depletion of fossil fuels and concerns about sustainability increase the interest in the production of renewable energy sources. Biogas; it is a clean, environmentally friendly and highly efficient renewable energy source obtained by the digestion of organic waste. Biogas production is carried out under anaerobic conditions via complex microbial reactions to decompose organic matter into final products such as CH_4, CO_2, H_2S, and NH_3. The biogas content of the anaerobic decomposition (AD) process contains about 50-70% of methane and this methane is used for heat or electricity generation. The use of conductive materials in the AD process is a practical solution to the disadvantages such as the long lag phase, slow methane production and the lack of resistance to adverse conditions (low pH, ammonia effect, etc.). In recent years, conductive materials have been used to increase the amount of biogas and/or biomethane and to find solutions for operational problems. In addition to conductive materials promoting interspecies electron transfer between bacteria and methanogens, these materials can also provide an ideal support material for the attachment of microorganisms. This review focuses on the effects of conductive materials such as activated carbon, biochar, carbon nanotubes, magnetite, graphene, graphite on the microbial community and pathways in the AD.

Keywords: Anaerobic Digestion, Conductive Materials, New Generation Sequencing, Scanning Electron Microscopy (SEM), Microbial Community

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THE USE OF NANOMATERIALS FROM AGRICULTURAL WASTES AS CEMENT ADDITIVES

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Abstract

Nowadays, the approach of sustainable waste management has been remarked to protect the natural resources and reduce the solid wastes. Due to the depletion of natural resources, the recycling applications of a potential source for raw materials have particularly emerged in the construction industry. The production of cement, a main component of concrete, contributes about 5-8 % of the global CO_2 mainly associated with the production of clinker. In this context, extensive researches have been undertaken over the years for enhancing the sustainability of concrete industries, as well as neutralize their carbon footprint. Nanomaterials (being smaller in size and higher in surface area) are used in several fields, including catalysis, polymers, electronics, biomedical and environmental applications. Recently, various nanomaterials have been researched as concrete additives to increase their mechanical strength, refine their microstructure and improve their durability. This review focuses on the performance of nanomaterials manufactured from agricultural waste such as rice husk, bagasse ash, coconut shell, and corn cab as sustainable cement additives.

Keywords: Agricultural Waste, Cement, CO_2 Emission, Concrete, Nanoparticles

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DETERMINING OF CARBON STORAGE USING REMOTE SENSING

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Abstract

Following EU regulation 2018/841 carbon reporting from the LULUCF is required by all EU member states. Within this scope the establishment of a carbon baseline in forests is a prerequisite. Two different approaches are used for determining the amount of carbon stored in forests. In both cases, control points including field sampling necessary to determine the parameters of the different stand. However, these studies are time consuming and costly. The current research addresses this need and focuses on quantifying carbon storage with remote sensing in natural pure and mixed stands in the Trabzon region. The study area is in Araklı Forest Management Chiefdom which is sub department of Sürmene Forest District in Trabzon Regional Directorate of Forestry. Terrestrial ecosystem based carbon storage is determined with the help of the field sampling data. Relationship between the brightness values obtained from the various bands in LANDSAT-8 OLI satellite image and various vegetation indices are examined. Thus, amount of carbon storage of the study area was estimated with remote sensing.

Keywords: Carbon Storage, Forest, LANDSAT-8 OLİ, Remote Sensing

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BIODIVERSITY OF ÖRÜMCEK FORESTS

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Abstract

Biodiversity, the variety of life, emerges as a combination of all living things on earth and is recognized as one of the key components of environmental sustainability. Biodiversity is the basis of the ecological balance in the whole ecosystem. Human actions, however, often lead to irreversible losses in terms of diversity of life on earth. These losses affect the functioning of the whole environment and difficult to realize the natural cycle. It is important to establish and protect life as an indicator of biodiversity for the continuation of natural balance. Forest areas are ecosystems that contain a significant portion of biological diversity. So, biodiversity in forest areas needs to be demonstrated. Importance of measurement of biological diversity is increasing and need for biodiversity assessment methods to enable biodiversity to be measured is outlined. Various methods were used to determine biological diversity. The biodiversity indices are statistical method which is planned to evaluate the variety of a data group consisting of different types of components.

Eastern Black Sea Region of Turkey is rich in biodiversity compared to other regions and endemism is high. Eastern Black Sea forest is dominated by *Picea orientalis*, *Abies* spp., *Pinus sylvestris*, *Fagus orientalis*, *Quercus* ssp., *Castanea sativa*, *Alnus glutinosa*, *Carpinus betulus*, *Acer* spp., Ulmus spp., Taxcus baccata, Populus spp., Tilia spp., Juglans regia, Salix spp., and *Fraxinus angustifolia*. Data were collected 32 temporary sample plots from Örümcek Forests in Eastern Black Sea Region. In this study, aim to compare biodiversity using biodiversity indices such as Shannon-Weaner Index, Simpson Index, MacArthur Index, Pielou Regularity Index. The calculations are based on species composition as well as basal area distribution.

Keywords: Biodiversity, Forest, Index, Species Composition

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FIBRE REINFORCED GEOPOLYMER COMPOSITES - A REVIEW

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Abstract

The current technology of Portland cement, developed in the 20th century, has many disadvantages. First of all, the durability of this material is questioned in many scientific studies. At the same time, its production has an adverse environmental impact, which includes both the emission of a very high amount of CO_2 and highly toxic nitrogen oxides as well as the overwhelming consumption of energy and natural resources. Significant energy consumption is associated with high temperature (between 1400 and 1500 °C) necessary to carry out the clinker burning process. This process hardly belongs to the technologies that support the sustainable development economy.

The most promising alternative solutions are technologies based on alkali materials and geopolymers. Such technologies have a significantly lower carbon footprint than traditional construction materials. The synthesis of geopolymers requires 2-3 times less energy, not to mention the fact that 4-8 times less CO_2 is generated. In addition, the above process has another environmental benefit i.e. the possibility of using anthropogenic raw materials (minerals) such as slags and fly ashes for the production.

One of the limitations for the wide use of such materials is their relatively low brittle fracture behaviour. Nowadays, one of the most important research areas is the improvement of their mechanical properties. To improve these mechanical properties, it is possible to reinforce the matrix by fibres addition.

The main objective of the article is to analyse the possibilities of using new composite for practical applications, especially in building industry. It also presents some prototype solutions made in the framework of the project: “Development of eco-friendly composite materials based on geopolymer matrix and reinforced with waste fibers” financed by the National Centre for Research and Development, Poland, under ERANet-LAC 2nd Joint Call (http: //www.eranet-lac.eu).

Keywords: Composite, Geopolymer, Fiber

Acknowledgment: This work was supported by the ERANet-LAC 2nd Joint Call (http: //www.eranet-lac.eu) and funded by National Centre for Research and Development, Poland, under the grant: “Development of eco-friendly composite materials based on geopolymer matrix and reinforced with waste fibers”.

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CHARACTERIZATION OF GEOPOLYMERS BASED ON POLISH COAL GANGUES

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Abstract

Poland is one of Europe's biggest coal mining areas and continues to rely heavily on coal for electricity and heat. It has very strong mining sector and environmental problems with industrial wastes in this area, including coal gauge that is usually deposited on landfills. It is estimated that mining waste generated as a result of exploration and mining of minerals constitutes about 60% of industrial waste generated in Poland. Generally, in the European countries, the mining industry generates 28.2% of the total amount of waste (EUROSTAT, 2017). At the same time their total amount is closely related to the economic structure of the country. Waste from mining and extraction activities is the highest percentage of waste in countries such as Poland (EUROSTAT, 2017).

The article shows the results of research on the mechanical properties for the geopolymers obtained from calcined coal gauges. The research was conducted on three different types of materials from Polish mines: Piast, Rydułtowy, and Chwałowice. Geopolymers were prepared according to the procedure described in the patent application: P.418861 'Method for preparing and application of geopolymers for the production of construction elements, in particular high temperature resistant construction elements, and the method of their manufacturing' ('„Sposób otrzymywania geopolimeru, zastosowanie geopolimeru do wytwarzania elementów konstrukcyjnych, zwłaszczaelementów konstrukcyjnych odpornych na działanie wysokich temperatur, oraz sposób wytwarzania elementów konstrukcyjnych'). Obtained results show that the coal gangues can be high quality raw materials for the production of geopolymers with high compressive strength values above 40 MPa was found. Additionally, the article presents some prototype products that have been manufactured from this kind of material.

Keywords: Coal Gangue, Geopolymer, Composite

Acknowledgments: 1. This work has been supported by Intelligent Development Operational Program 2014-2020, 1.1.1: Industrial research and development works carried out by enterprises, funded by the National Centre for Research and Development in Poland, within the framework of the grant: 'Development of coal gangue recovery technology for the simultaneous production of metakaolin and road-building aggregates with additional energy recovery' ('Opracowanie technologii odzysku łupków przywęglowych do jednoczesnej produkcji metakaolinu i kruszyw drogowo-budowlanych z dodatkowym odzyskiem energii'), grant no. POIR 01.01.01-00-0009/17-00.
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THE POSSIBILITIES OF USE COAL GANGUES AS AN ADDITIVE TO GEOPOLYMER CONCRETES

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Abstract

The main components of waste gangue associated with coal mining are illite, quartz and kaolinite, which contain a large amount of silicon oxide and aluminum oxide. Their chemical composition makes it potentially a good raw material in the process of alkaline activation [2, 3]. However, to ensure adequate reactivity in the alkaline activation process, this raw material requires initial preparation in a mechanical and thermal process [2]. It is possible to use only one of these processes to activate the material, however, optimal properties are obtained by means of mechanical activation - grinding (fine particles show higher reactivity) and thermal activation in the calcination process [2]. It should also be noted that the best material properties are obtained on the basis of gangue, which contains a high content of amorphous aluminosilicate [3]. The content of reactive components, in particular active silicon and aluminum, is important very important in geopolymer synthesis [1].

The main aim of the article is presented the research conducted by the university in industry to development of knowledge about materials and their properties, especially to design new, eco-friendly composites – based on coal gangue as a raw material for the geopolymers synthesis. The new material will be dedicated for industrial application, including construction industry. Article is focused on research of physicochemical properties and treatment of coal gangue. The research methods used are: XRD research of raw materials before and after calcination process, thermal analysis, SEM/EDS investigations. Obtained results show that the coal gangue can be alternative raw material in geopolymer synthesis to traditional one based on metakaolin, slages or fly-ashes as well as the raw material for zeolites synthesis.

Keywords: Coal Gangue, Calcination, Metakaolin, Gopolymer, Composite

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metakaolinu i kruszyw drogowo-budowlanych z dodatkowym odzyskiem energii'), grant no. POIR 01.01.01-00-0009/17-00.

2. This work has been supported by the ERANet-LAC 2nd Joint Call (http: //www.eranet-lac.eu) funded by the National Centre for Research and Development in Poland, within the framework of the grant: 'Development of eco-friendly composite materials based on geopolymer matrix and reinforced with waste fibers'.

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ALUMINUM IN DOMESTIC POISONING AND RESEARCH METHODS

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Abstract

Widely applying aluminum and its corresponding organic and inorganic compounds in various areas of the national economy, as well as in everyday life and in chemical laboratories, the potential for poisoning arises. Fruit dishes prepared in canning and stored especially in aluminum containers (jam, juice, compote, etc.) are life-threatening and cause poisoning. Therefore, due to the appropriate environmental safety measures, the positive solution, the environment improvement, and also the production of high quality food products are solved and paid special attention at the state level.

Fruits and berries, for example, strawberries, peaches, pears, and raspberries, contain acidic components, but only slightly, while cherries, cornels, and others have a fairly significant amount of acidic components.

Our experiments have shown that preservatives made from acidic components contain a large amount of aluminum ions, unlike other non-acidic ones, and therefore are objects of chemical-toxicological research.

To develop a method of isolating the target substance from the objects of study, it is important to consider that aluminum is an active complexing agent. So, being components of organs, tissues and biological fluids of the body and possessing various functional, analytical and analytically active groups, proteins, peptides, amino acids, and other molecules easily combine with aluminum to form stable intracomplex compounds.

Extraction of aluminum from such objects by the method of conventional extraction is impossible. First you need to release the aluminum from the composition of the complex in the form of an ion, then conduct a chemical-toxicological study. Therefore, in the practice of chemical-toxicological analysis, the method of mineralization, more important for metal poisons, decomposition (oxidation) of the biological material containing the aluminum complex was used. Conducted scientific studies suggest that dry mineralization is superior to wet.

In order to detect aluminum, besides classical analytical reactions, drip and color reactions that are more important for chemical-toxicological analysis were proposed. These reactions were carried out using organic reagents containing carboxyl and hydroxyl groups: alizarin, aluminon, morin.

For the quantitative determination of aluminum, a spectrophotometric method was developed based on the formation of an intracomplex aluminum compound using a new reagent - saponin, the results of which are presented in the form of a patent.

Keywords: Aluminium, Extraction, Dry Mineralization, Fruit, Saponin

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PHOTOCATALYTIC IMPLEMENTATIONS OF PORPHYRIN/PHTHALOCYANINE-BASED NANOSTRUCTURES

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Abstract

With growing industrialization, the wastewater originated from several industries has permanent and non-biodegradable organic chemicals, surfactants, chlorinated aromatic hydrocarbons and heavy metals. Because of complex aromatic structure of these resistant organic compounds, conventional chemical treatment processes are not sufficient to protect the natural environment. Therefore, advanced oxidation processes (AOPs) producing hydroxyl radicals (OH▪) have received comprehensive research attention and have been utilized for the removal of resistant organic compounds from industrial effluents. Among AOPs, photocatalytic oxidation process has the most scientific attention in aqueous media and the commercial heterogeneous catalysts (TiO_2, ZnO) are commonly used for this process. The TiO_2/UV photocatalytic oxidation process mainly involves separating of electron (e^-) and gap (h^+) pairs on the TiO_2 surface with solar energy (*hv*) to produce hydroxyl radicals (OH▪) which lead to degradation of molecules through oxidation–reduction reactions. However, TiO_2 has a wide bandgap (of about 3.2 eV) and can only absorb UV wavelengths <387 nm (only 4% of sunlight). This process cannot be used on a large scale due to high energy cost and TiO_2 has also some disadvantages as fast recombination rate of photogenerated electron–hole pair. Therefore, TiO_2 can be modified to extend the light adsorption capacity to the visible region. Some reports confirm that the visible photocatalytic activity of TiO_2 can be effectively improved by choosing an appropriate sensitizer, such as porphyrin or phthalocyanine. The metaloporphyrin and metalophthalocyanine compounds are also produced by binding of metal ions such as Fe, Mg, Co, Zn, Ni, Cu. Porphyrin and phthalocyanine absorb strongly light in the visible region and contain light-sensitive dyes which increase their photocatalytic effects. Thus, working effectively of these catalysts under daylight contribute to the widespread using of the photocatalytic oxidation process for degradation of resistant organic compounds.

Keywords: Organic Compounds, Photocatalytic Oxidation, Phthalocyanine, Porphyrin

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THE USE OF LCA IN ENVIRONMENTAL ENGINEERING

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Abstract

In consequence of developments in technology and life levels with rising environmental sensitivity, in the process of development and implementation of all kinds of projects; in addition to the traditional parameters such as cost and performance to society, the environmental dimension of the project has become an increasingly important phenomenon in decision-making processes. Point at issue as environmental dimension evaluated on the basis of natural resource consumption and global environmental problems such as climate change, stratospheric ozone layer thinning, eutrophication, acidification, toxic emissions. This assessment is made through the Life Cycle Assessment (LCA) which is an effective analysis process developed as a support mechanism for decision making systems. LCA offers a holistic and scientific evaluation based on the production of raw materials used in the production of a product or service, all related production and shipment, using by the consumer and disposal as waste after use. It also provides a comparative assessment of the environmental impacts that will be caused by possible modifications to the product or process and reflects it to the relevant decision-making processes.

LCA offers a more sustainable approach with assessment of the environmental performance of production or service processes through applications serving different areas, expression with internationally accepted performance indications and developing improvement strategies. This situation provides to increase adaptation on national and/or international legislation, improve environmental performance, take control and reduce pollution from the source.

In this study, general information will be given about the basic application methodology and application areas of LCA. Besides, while LCA is being made, the extent of the data sources and their contributions to the accuracy of the studies will be investigated.

Keywords: Global Environmental Problems, Life Cycle Assessment, Sustainability

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LAUNDRY WATER AND RECOVERY TECHNOLOGIES FOR WATER SUSTAINABILITY

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Abstract

Due to the increasing population and industrialization in the world, there are serious reductions in water resources, as well as climate change increases the pressure on water resources. For these reasons, recycling technologies should be given importance in order to ensure the sustainability of water.

Source separation is a concept that needs to be evaluated for water management. 70-75% of the domestic wastewater is grey water and it is easier to control because it contains less pathogenic organisms and organic matter than toilet and kitchen waters. Grey water consists of different fractions and laundry water is one of the main components of them. Laundry wastewater passing through a particular treatment can be used directly as irrigation or flushing water without additional processing; besides it can be used as washing machine water with additional treatment. In this way, recycled water for a household laundry can be a new option and this situation can cause significant freshwater savings.

Various technologies such as coagulation, adsorption, flotation, oxidation, and membrane filtration are applied for laundry water treatment and reuse. In addition, the laundry water treatment can also be performed by a combination of different technologies. For example, microfiltration and activated carbon adsorption have been investigated for re-use of laundry water, and when these two systems are used in combination, it has been shown that recycled water can be preferable for washing machines.

The aim of this study is to examine the studies on recycling and reuse of laundry water and to explain the effective management technologies according to the purpose of water reuse.

Keywords: Grey Water, Laundry Water, Recovery, Sustainability, Water Management

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THE IMPORTANCE OF VARIABLES IN FORMATION OF ANODIC ALUMINUM OXIDE NANO MOLDS

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Abstract

Porous anodic aluminum oxide (AAO) is used in a wide range of applications including catalysis, energy production and storage, electronics, photonics, sensors, biosensors and template synthesis. The formation of AAO is an electrochemical process that does not require any lithography. By changing the anodization parameters (temperature, voltage, electrolyte concentration and type), the size of the nano-pores can be controlled by distinct pore geometries. They are also the most remarkable mold materials for the synthesis of nanowires and nanotubes with high size/ratio.

In this study, a two-stage anodization process was performed in order to produce perfect anodic aluminum oxide (AAO) nano molds whose pores were placed in a hexagonal order. The aluminum foils were first cleaned in the solvent mixture HF: HNO_3: HCl: H_2O. The samples were then annealed at 500°C for 3 hours under nitrogen gas. An electrolyte consisting of a mixture of perchloric acid and ethanol (1: 15) was used in the electrochemical polishing of aluminum foils. The first anodization process was performed. After the anodization process, the AAO pores were expanded in 5% H_3PO4 solution at different temperatures and minutes. The first and second anodization steps were carried out under the same conditions. During anodization, aqueous solutions of sulfuric acid, oxalic acid and phosphoric acid as electrolyte were used at different concentration, pH and voltage (5-120 V) values in order to change the pore diameters of AAO molds between 20-300 nm. The depth of the pores was controlled by changing the time of the anodization. Surface analyzes of the nano molds produced by SEM were performed. The results of the analysis showed that the nano molds were obtained as straight linear hexagons. Pore amplification (increase in nanotube volume) of prepared AAO nanostructures provides an advantage for producing nanowires with larger diameters.

Keywords: Anodization, Nanotube, Nano Mold, Anodic Aluminum Oxide

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FROM CARTESIAN 3D PRINTERS TO MULTI-AXIS ROBOTIC (JOINTED) 3D PRINTER DESIGNS

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Abstract

With the development of technology and especially with the effect of industry 4.0, 3D printer technology has become very popular and popular. This technology has a basic concept from technology for installation and bonding. Today, 3D printer technology is used in many fields from jewelery to education, medicine to furniture, aircraft technology to the automobile sector. For example, these printers can design various design robots, toys and artistic designs.

It is seen that the method used in 3D printers is very different from the processing or shaping techniques. The 3D printer method uses the material addition technique instead of the traditional chip removal technique. In traditional production methods, there is a need for computer aided drawing, supported production materials, various manufacturing machines and raw materials. It is known that the raw material requirement and the amount of waste are very low compared to other classical methods.

The use of Cartesian 3D printers is increasing day by day. However, with the increase in usage, new needs also arise and new problems are encountered. Multi-Axis Robotic (jointed) 3D Printer Designs can help overcome these problems. This type of robots is widely used in industries such as gas welding, arc welding, spraying machines. The freedom of movement of the robot increases in proportion to the number of joints.

As with any developing technology, there are some problems in 3D printer technology. As the 3D printer technology uses the articulated manufacturing method, all layers are progressively inserted and support for some geometry in the form of parts is required. The 3D printer proceeds with this support, but once the process is finished, an additional process is required to clear these supports, which requires extra time and overtime.

Multi-Axis Robotic (jointed) 3D Printer design ideas to the product to determine the chances of success in the conversion of the evaluation are required. In this study, evaluation of Multi-Axis Robotic (jointed) 3D Printers; production, financing, marketing.

As a result, it will be possible to add a different dimension to the rapidly spreading 3D printer technology by integrating the robot arms. In order to solve the problems encountered in Cartesian 3D printers, different platforms can be developed. In addition, 3D printers in the rapidly developing industry 4.0 environment, the integration of automation systems has been made easy. This means that the multi-axis robotic articulated 3D printer can be easily integrated into the production lines and adopts 3D printer technology.

Keywords: 3D Printer, Design, Industrial, Multi Axis, Robot

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ENVIRONMENTAL APPROACH IN TRANSPORTATION: TRIZ-SUPPORTED POWER STORED PUBLIC BICYCLE DESIGNED

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Abstract

Today's technology has reached many different dimensions and continues to progress. If so, we live in the age of ultron, even if we are not alive, it is clear that we are not far from that age. In such an era, almost everything such as mobile phones, televisions, computers, wristwatches, cars (electric cars), heating systems we use during the day need energy, even electrical energy. This need makes electrical energy very valuable. Therefore, humanity is working on various projects to convert any type of energy into electricity. This study will be based on the transformation of a wasted energy into a form that we can use in our lives. This design will be realized by TRIZ method.

The public bike design, which stores energy using the triz method, was carried out in 5 steps. The first point to be considered in terms of our design; A rotational movement of the front wheel occurs due to the movement of the bicycle and a kinetic energy is generated. This kinetic energy is wasted and cannot be used efficiently and it is a problem to use such energy when we need such energy.

Second, the type of contradiction has been determined and the identified problem is an example of technical contradiction. For the solution, first of all 39 contradiction matrix will be looked at and solution will be reached from the solution principle with the intersecting passwords in the matrix.

Thirdly, when the 40 basic principle tables are examined, the solutions that are appropriate for our problem are; pioneering action, mechanical system appears to be the replacement.

Fourthly, the proposed solutions are implemented and suggest that we need to use a leading device to prevent wasted kinetic energy when leading action is applied to our problem. The kinetic energy wasted by this device will be transformed into another energy and a pioneering action will be taken. The replacement of the mechanical system will also indicate the device to convert the rotational movement of the device to be used into an energy type to be stored.

Fifth, the solution is placed on the hub of the front wheel of a dynamo bike using the proposed solutions and the dynamo converts the rotational motion to electrical energy. A battery is needed to store this transformed energy. This battery is also located in the chamber where the dynamo is placed.

As a result, a bicycle design was made using the TRIZ method, which stores energy and transfers it to the city network. In this design, the solution of wasted kinetic energy problem in rotational motion has been found by providing the possibility of storing electrical energy. While this solution was found, the contradictions method, which is one of the mainstays of the TRIZ method, was used. Then the contradictions were classified and technical contradiction methods were applied.

The design created with this solution is able to offer us an alternative in order to meet the energy needs of our age.

Keywords: Alternative, Bicycle, Electrical, Energy, Public

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TECHNOLOGICAL SOLUTIONS OF INACHUS PROJECT TO PREDICT COLLAPSE BEHAVIORS OF BUILDINGS

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Abstract

A review of recent research developed by INACHUS project to estimate collapse behaviors of buildings is presented. Simulation tools for predicting structural failures The Bullet Constraints Builder (BCB) and Extreme Loading® for Structures Software or ELS are developed. BCB is a free 3D software suite. The first aim of the BCB is to connect separate rigid bodies with sophisticated constraint arrangements that allow complex collapse simulations. This tool enables little experienced users to use it, but it offers also advanced options for experts. The BCB prepares the building model for simulation and after the collapse scenario (e.g. loading of an earthquake record or pillar removal) is defined by the user it transfers the model to the connected physics engine that solves the simulation. As the other simulation tool ELS is an advanced non-linear structural analysis software tool designed specifically for structural engineers. ELS enable structural engineers to study the 3D behavior of structures during the stages of loading. Unlike many structural analysis software tools which are based on the Finite Element Method (FEM), ELS utilizes a non-linear solver based on the Applied Element Method (AEM). This allows ELS is to automatically analyze structural behavior during elastic and inelastic modes including the automatic yielding of reinforcement, detection, and generation of plastic hinges, buckling & post-buckling, crack propagation, membrane action & P-Delta effect, and separation of elements. So ELS can provide an accurate simulation and analysis of proposed demolition scenarios by way of wrecking ball, explosives, pushing or pulling force, or manual deconstruction.)

Keywords: Demolition, INACHUS, Prediction, Simulation

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THE EFFECT OF NA-ALGINATE CONCENTRATION ON IMMOBILIZATION AND BIOSORPTION CHARACTERISTICS OF *BACILLUS* SPECIES

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Abstract

Dyestuff is widely used in industry such as cosmetic, textile, food and paper and their increased contaminants have posed risks to the ecosystem. In particular, the mixtures consisting the wastes of these industries are highly colored and the disposal into receiving waters may significantly affect the photosynthetic activity in aquatic life. The water resources become detrimental to environmental health including humans.

Nonspecific adsorption of cells on chemically treated surfaces or physical entrapment of cells in gels or micro holes called as immobilization. The immobilization technique has many advantages for industrial usage like high cell density, high stability, and absence of cell washout and extended reaction times.

Here we report the immobilization of four different *Bacillus* species (*Bacillus cereus, Bacillus megaterium, Bacillus subtilis* and *Bacillus thuringiensis*) with different Na-alginate (1%, 2.5%, 5%, 10%) concentrations. The immobilized cells used for biosorption of maxilon red (textile dye) at 100-ppm concentration at different pH (5, 6, 7, 8) values.

Bacillus species grown for 48 hours at 35°C in Nutrient Agar (Merck) for sporulation. The bacterial cells collected with a spatula and washed with 0.85% NaCl solution. The collected cells suspended in Na-Alginate solutions and dropped into $CaCl_2.2H_2O$ solution. The immobilized cells (beads) taken to different $CaCl_2.2H_2O$ solution after 15 minutes and kept in this solution for 12 hours for hardening of the beads. The beads transferred and stored in 0.85% NaCl solution at 4°C until further use. The biosorption kinetics of beads determined with 100-ppm initial dye concentration at different pH values. The immobilized cells were broken at pH 8 and lower pH values found to be more effective.

Keywords: *Bacillus* Species, Biosorption, Immobilization, Na-Alginate, Maxilon Red

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THE MICROBIAL GROWTH PARAMETERS IN A MICROBIAL FUEL CELL

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Abstract

The global population and industrialization increased in steady and consistent values that resulted in drastically rising of fossil fuel usage also, pollution. The recognition of renewable energy caused by increased public requirements and unbalanced usage of energy. The main issue in today's world is the replacement of fossil fuels with the new energy sources. In Microbial Fuel Cells (MFCs), microorganisms convert the chemical energy, which found in the organic matter in wastewater, to the direct electricity. Thereby, high-organic wastewater treatment and simultaneous electricity generation could make by MFC technologies that are the rapid and effective method. Different wastewaters could be as substrates (chemical compounds, domestic wastewater, food processing wastewater, swine wastewater, urban wastewater) for electricity generation in MFCs.

In this work, the main aim is determining the growth parameters of microorganisms in a two-chambered MFC. The microorganisms in a MFC are the most effective issue on producing electricity, and growth of microorganisms must be follow carefully.

Dual chambered MFC used for experiments. Total volume was 0.7 L and connection between anode and cathode compartments provide by salt bridge. The carbon rods used as electrodes and voltage generation followed with a multimeter. The anode chamber fed with molasses media at 48 hours period for support to bacterial growth in incubation period and the experiments conducted at 35°C in a temperature-controlled shaker. The inoculum taken from Akkaya Lake, which was the main drainage dam for domestic wastewater in Niğde. The OD values were determined with spectrophotometer at 600 nm, wet weigh and dried weigh also determined as a function of incubation period.

Keywords: Bioelectricity, Microbial Fuel Cells (MFCs), Microbial Growth, Renewable Energies

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REVISITING RACHEL CARSON: ENVIRONMENTAL APOCALYPTICISM IN *SILENT SPRING*

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Abstract

Rachel Carson was an American marine biologist and conservationist whose monumental book Silent Spring and other writings are honored of advancing the global environmental movement. Beginning her career as an aquatic biologist, Carson turned her attention to environmental problems that she believed were caused by synthetic pesticides. The result was Silent Spring (1962), which brought environmental concerns to an unprecedented share of the American people. Although it was met with fierce opposition by chemical companies, the book spurred a reversal in national pesticide policy, which led to a nationwide ban on DDT and other pesticides, and it inspired a grassroots environmental movement that led to the creation of the U.S. Environmental Protection Agency. With the help of large amount of scientific researches and accurate data, the book depicts a bleak world without any vigor and vitality, discloses the great harm done by the abuse of insecticide to the environment and human health, attacks the living style, developing mode and values which intend to enslave and dominate nature through the means of scientific technology. In this regard, the book can be labelled as an environmental apocalyptic work that creates images of future disasters and to inform people of the danger to enlighten them to escape from such terrible fate. Within this context, this study will discuss the connotation of environmental apocalypticism in Silent Spring.

Keywords: Rachel Carson, Pesticide, DDT, Ecological Crisis, Environmental Apocalypticism

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FLOOD EVENTS ASSESSMENT IN AZATLI (NİĞDE), TURKEY BASED ON BASIN MORPHOMETRY USING GIS TECHNIQUE

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Abstract

Flood events were occurred in several times a year in the valley including town of Azatlı district of Niğde Province. The valley corresponds the upper catchment of the Melendiz River. In this study, morphometric analysis using Geographic Information System (GIS) technique has been carried out to examine the flood potential of the valley. The study area is a small basin surrounded by mountains. Morphometric parameters of the valley were evaluated to determine flooding potential in the river basin. These parameters are bifurcation ratio (Rb), drainage density (Dd), stream frequency (Fs), circularity ratio (Rc), elongation ratio (Re), form factor (Rf), relief ratio (Rh), length of overland flow (Lg), time of concentration (Tc) and basin relief (Bh). The drainage network was extracted from a 10-m resolution Digital Elevation Model (DEM) derived from 1: 25000 scaled topographic maps including the sheets for Kayseri (L32-33). In addition, lithologies and slope values were evaluated due to the key roles and impact of the basin on the dynamic hydrologic behavior of the main valley in terms of flooding. The values of Rb (6.8), Rc (0, 38), Re (0.47), Rf (0.17) indicate that the basin is strongly elongated shape indicating low runoff. However, high slope values and impermeable lithology have been triggered by flood formation. As a matter of fact, this is reflected in other index values. Tc and Lg are respectively 31 minutes and 0.14 km, indicating a rapid surface runoff after heavy rainfall in the basin. The high value of Dd (3, 49) and Fs (6, 49) is indicative of high relief, rapid surface flow, low infiltration and consequently high flood potentials of the basin. The basin has a high Rh (85, 8) and Bh (1459 m) indicating high relief and steep slope. The results indicate that the basin with short stream length of 17 km is likely to be exposed to flood events after heavy rainfall of short duration.

Keywords: Azatlı, Drainage Morphometry, Flood, Geographic Information System, Melendiz River

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DETERMINATION OF CARBON FOOTPRINT ORIGINATED FROM HIGHWAY TRANSPORTATION IN SIVAS

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Abstract

Global warming emissions, known as greenhouse gases, are increasing day by day and the impact is felt. Reducing the amount of these gas emissions and taking preventive measures through scientific studies is a very important and necessary. Especially, determination of precautions to be taken globally and the reduction of emissions have been provided by Kyoto Protocol. With the Kyoto Protocol, countries have also reduced their carbon emissions and their calculations, as well as the release limits for emission amounts for the partner countries. It is extremely important that these limits are calculated and accounted for by their own carbon footprints in order not to exceed these countries. This calculation methodology was developed by the International Climate Change Panel (IPCC) and determinate using Tier 1, 2 and 3 methodology. In this study, Tier 1 approach methodology was used to calculate fuel consumption data of Sivas and carbon footprint for CO_2, CH_4 and N_2O gases between 2016 and 2018 years. In this calculation, it was seen that the carbon footprint increased in 2016, 2017 and 2018 and increased by 683.17 Gg, 739.26 Gg and 783.35Gg CO_2 respectively.

Keywords: Carbon Footprint, Greenhouse Gases, IPCC Methodology, Air Pollution, Climate Change

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IN VITRO EVALUATION OF ANTIBACTERIAL ACTIVITY OF TWO NOVEL BODIPY DYES AGAINST *STAPHYLOCOCCUS AUREUS* AND *ESCHERICHIA COLI*

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Abstract

The use of antimicrobial agents has gained more attention as one of the alternative way to solve problems for hygiene standards of health impacts in environment, construction, army, medicine, solar cells and biochemistry in recent years. Alternative antimicrobial technologies which have not be able to develop resistance against bacteria have been exploring by researchers day by day. In our study, we aimed to synthesize two new boradiazaindacenes monomers (BODIPYs) as functional compounds with antimicrobial properties for its potential use in bioengineering applications. In this regard, firstly two new series of BODIPYs (BODIPY-TB and BODIPY-OHB) were synthesized by condensation reaction from an aldehyde and pyrrole. After that, the synthesized BODIPYs were characterized chemically by Gass Chromatography Mass Spectrometry (GSMS), ^{1}H and ^{13}C Nuclear Magnetic Resonance (^{1}H-NMR and ^{1}3C-NMR) and Fourier Transform Infrared (FTIR) spectroscopy methods. Finally, the antimicrobial properties of the obtained BODIPYs within different concentrations (2.5, 1, 0.5, 0.25 mg/mL) were then assessed against two common human pathogen microorganisms: Gram positive (*Staphylococcus aureus*) and Gram negative (*Escherichia coli*) by disc diffusion assay. In this work, the chemical characterization results demonstrated that pyrrole and aldehyde carbonyl group interactions for synthesized BODIPYs. The antibacterial assay of two BODIPYs within increased concentration displayed increased inhibition zones ranged average values from 26.12 to 14.18 mm for BODIPY-TB and from 16.34 to10.22 mm for BODIPY-OHB against *E. coli*, from 22.44 to 15.24 mm for BODIPY-TB and from 15.28 to 10.37 mm for BODIPY-OHB against *S. aureus*. The discovery of novel and facile synthesized functional agents within antimicrobial properties could lead to be complementary treatments for bioengineering applications.

Keywords: Antibacterial Agent, Bioengineering Applications, BODIPY, *Escherichia coli, Staphylococcus aureus*

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PRECISION AGRICULTURE TECHNOLOGIES AND ENVIRONMENTAL RELATIONS

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Abstract

Precision agriculture technologies are advanced technologies that aim to increase production by using the variability in agricultural areas, effective use of soil and water resources and the protection of the environment. Increasing production by achieving higher yield with less cost is one of the main objectives of precision agricultural production. However, if wrong practices are made in production, the cost increases and on the other hand, the environment can be harmed. These wrong applications are eliminated by the advanced technologies used in precision agricultural technologies and the cost of production is reduced and the protection of the environment is aimed. The use of increased chemical input causes soil and water sources to be polluted. However, due to precision agricultural, the reduction of and chemical inputs or no use is an approach that can prevent environmental pollution. In order to ensure sustainability, protection of the environment and natural resources in agricultural production is very important. In order to ensure sustainability, protection of the environment and natural resources in agricultural production is very important. Both economic and environmental benefits are achieved by using less chemical fertilizers and pesticides in the fields with sustainable agriculture and precision agriculture. The aim of this study is to examine the effects of the sensitive agricultural practices on the environment and natural resources.

Keywords: Chemical Input, Environment, Precision Farming, Sustainability

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MODELING OF DRYING KINETICS OF WASTEWATER TREATMENT SLUDGE

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Abstract

Wastewater treatment plants produce sewage sludge when disposing of dissolved and suspended solids in wastewater. The amount of sludge is proportional to the inlet flow rate. One of the treatment process of sewage sludge may be dewatering process that solids content increased approximately from 1% to 16-25%. Dewatering process can be done by many methods such as solar drying, thermal drying, lime drying, burning alone or by composting and incineration in cement plants. The values of dryness after dewatering of sludge limit the use of these methods as an alternative to each other. As a result of the decrease in the amount of moisture content of the sludge; sludge volume decreases, the transfer cost to the final evacuation area is reduced, transport is easier, combustion is easier, odor problem can be eliminated and contamination of groundwater can be prevented.

The objectives of the present study were to determine experimentally the thin-layer drying characteristics of sludge basis of the change of sludge moisture with the temperature, sample shape (form) and drying time and to fit the experimental data to mathematical models available from the literature. Drying kinetics of the sludge was modeled by measuring of the total weight and determining of humidity changes depending on time. The model parameters were determined by SQP (Sequential Quadratic Programming) which is an effective optimization method used for predicting the optimum model parameters. It is aimed to obtain optimum system design in order to reach desired degree of dryness in different drying conditions with the aid of modeling. Thus, drying process parameters (i.e. the required energy, holding time, sludge form) required for achieving the targeted dryness level of the sludge obtained from the daily sludge at the exit of a wastewater treatment plant can be provided.

Keywords: Drying Kinetics, Sludge, SQP, Wastewater Treatment Plant

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EFFECT OF THE REPEATING DISTRIBUTION PIPES ON LEAKAGES IN DISTRICT METERED AREA

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Abstract

The network pipes in water distribution systems are renewed due to the increasing the water demand, the insufficient capacity of the existing pipes and increasing the failure rate. However, especially, in old districts where the new pipes were constructed, the old lines, which are not repealed in many cases, continue to provide services without the knowledge of the utility due to the absence of operation plans. In this study, the effect of double lines providing service in street on water losses in water distribution systems was investigated. For this purpose, Malatya water distribution system was selected as application area. In the pilot isolated zone, the minimum night flow rate was measured as 38 l / s in the first measurements, while the average flow rate was 47 l / s in the region and the flow rate was found to be 57 l / s during the peak water demand periods. As a result of the analysis and field works conducted after the monitoring of the flow rate, it is determined that there is another inlet and pipeline not measured in the region. In addition, the flowmeter was placed on the 200 mm diameter pipe and the total input flow rate of the area was determined as 82 l/s. After the old water supply has been interrupted in the region, changes in system input flow rate and volume have been analyzed. The daily average inlet volume in the isolated area was reduced from the level of 6000 m3 to the level of 2000 m3 per day and a total of 4000 m3 less water per day was given to the system. Considering that the total network length in the study area is 6233 m, as a result of these works, it is obtained that the water, 0.642 m^3/day/meter, was saved to the system per unit line length.

Keywords: Water distribution system, non-revenue water, repeating pipes, leakage.

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REMOVAL OF HEAVY METALS USING SILICA FUME

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Abstract

Heavy metals and other toxic materials from industrial wastewaters accumulate in soil and water depending on weather conditions and climate. As a result of accelerating industrialization with technological developments, toxic heavy metals in air, water, and soil has become a global problem and reduction of these pollutants has become a priority. In general, the problem of heavy metals in the environment is recognized as a great danger for human and environmental health because of their high toxicity, nonbiodegradability, and accumulation in living organisms.

Although several methods like chemical coagulation-precipitation, evaporation, and oxidation-reduction are used, adsorption is the most commonly used method for the removal of heavy metals from industrial wastewaters because of its simplicity as well as low costs of operation and maintenance. Activated carbon is the most commonly used adsorbent whereas natural, industrial and agricultural wastes have gained attention because of their low cost and availability. In recent years, silica fume, generated as the byproduct in silicon and ferrosilicon alloys, has emerged as a promising adsorbent for adsorption processes.

Removal of copper and nickel, by adsorption onto silica fume, from synthetic wastewater containing 1000 mg/L Cu ($CuCl_2.2H_2O$) and Ni ($NiCl_2.5H_2O$) was studied. Experiments were conducted with three different adsorbent concentrations at room temperature, at a pH of 5, and at a mixing intensity of 500 rpm. Heavy metal analyses were conducted using atomic absorption spectrophotometer as triplicates. Removal efficiencies for both Cu and Ni were above 70% at various adsorbent concentrations. Also, the suitability of several adsorption isotherms were evaluated. Results showed that silica fume can be confidently used as a cheap and easily available adsorbent for the removal of heavy metals from industrial wastewaters. Use of silica fume as an adsorbent reduces cost of operation in industrial wastewater treatment systems, and it also contributes to waste management efforts.

Keywords: Adsorption, Heavy Metal, Silica Fume

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EFFECTS OF INLET AND OUTLET HEIGHTS ON CLEAN PRESSURE DROP IN A CYCLONE

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Abstract

Particulate matter (PM) is the most spread pollutants in the air and it is one of the six criteria air pollutants. So it is very important to remove them from exhaust gases before prior to emission. Cyclone separators are mostly used as an alternative method to remove PM from the exhaust gases. They can be the main treatment system or appropriate to use as preliminary equipment as needed. There is a most important parameter for a cyclone, named as pressure drop. This parameter directly effects PM collection efficiency and maintenance costs. So, this study focused on pressure drop parameter.

The geometry of cyclone separator is one the most important parameter that has effect on pressure drop. Especially, the inlet and outlet parts are the areas where the pressure drops occurs most. In present study, the effects of inlet height and outlet pipe length on pressure drop were investigated. The increasing particle concentration in the waste gas has a decreasing effect on the pressure drop. Therefore, the studies were carried out with clean pressure drop. The research was performed in Yıldız Technical University, Environmental Engineering Laboratory. Experiments were conducted in five flowrates to see effects of different flowrates.

As a result of the experiments, it was determined that, independently of geometry, pressure drop increased with increasing gas flowrate. The rising trend is similar for all geometries. The inlet height is a factor that determines the gas inlet velocity. Therefore, it has a clear effect on the pressure drop in the cyclone. The effect of the outlet pipe length was found to be quite weak compared to the inlet height.

Keywords: Air Pollution Control, Cyclone Separator, Inlet Height, Outlet Pipe Length, Pressure Drop

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GASIFICATION OF SUGAR BEET PULP IN A CIRCULATING FIXED BED GASIFIER

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Abstract

The aim of this study is to obtain synthetic gas (syngas) with high calorific value from sugar beet pulp by gasification process in the concept of waste-to-energy. The experimental study was carried out in a lab-scale, up-draft circulating fixed bed reactor with cyclone separator. Internal temperature of the reactor during gasification was 750 ^{O}C and weight of the samples were 30 g. Dried air was used as an oxidizing agent with the varying flow rates of 0.05, 0.1 and 0.2 L min^{-1} in order to determine optimum flow rate. The highest syngas calorific values was calculated around 2100, 2400 and 1600 kcal m^{-3} for flow rates of 0.05, 0.1 and 0.2 L\min., respectively. Solid residues and liquid products were weighed after each experiment. Results of the study showed that about 67 wt% of sugar beet pulp was converted into syngas that is rich in CH_4 and H_2 with high calorific value. It can be concluded that energy recovery from waste is a part of the waste management hierarchy and gasification is a promising Zero-Waste technology for waste management.

Keywords: Gasification, Sugar Beet Pulp, Syngas, Zero-Waste, Waste-to-Energy.

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EVALUATION OF DIFFERENT COLOR MEASUREMENT METHODS IN COLORFUL WATERS PREPARED BY USING TEXTILE DYEING

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Abstract

The textile industry is one of the industries with the longest and most heterogeneous processes in the manufacturing industry. For this reason, many dyestuffs are used in the processes and processes involved in manufacturing in the textile industry. Wastewater resulting from industrial processes are not treated sufficiently and disrupt the quality of the receiving environment when discharged into the environment. Especially in wastewater discharged from dyestuff plants, the color parameter has gained importance in recent years. Many countries around the world apply the color discharge parameter to the receiving environment. However, in many developing countries, there is a lot of confusion about color discharge. Studies on the color value and unit of the water to be discharged are also limited. The countries that put color discharge criteria apply color measurement methods such as Pt-Co (Platinum-Cobalt), ADMI (Institute of American Paint Manufacturers), RES (Color Count), Area, Lovibond, Hazen. In this study, samples that represent the three main colors (yellow, red, blue) and dye wastewater samples were prepared. In each sample, Pt-Co color unit, ADMI color unit and RES color unit were analyzed by three different color measurement methods. The color units were evaluated with the data obtained by these methods. In this context, the relationship between the color measurement methods was investigated by correlation analysis. In addition, color measurement methods were examined in detail and their advantages and disadvantages were determined. When the color measurement methods are evaluated; The Pt-Co method is not suitable for industrial wastewater because it is suitable for single-wavelength measurements and suitable for surface waters. ADMI method is a suitable method of measurement in a wide spectrum, but the difficulty of calculation makes this method disadvantageous. The RES color measurement method has been found to be very advantageous at 3 different wavelengths (436 nm, 525 nm and 620 nm) and these wavelengths represent three main colors (yellow, red, blue).

Keywords: Textile Industry, Dyestuff, Color Measurement Methods

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THYME OILS ON COLIFORMS IN DRINKING WATER

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Abstract

In this study were determined different concentration thyme oil on coliforms bacteria about affect. Coliforms bacteria is very dangerous for people. In addition, hygienic rules for not sutiable. Essantial oils have antibacterial affect. Especially, use in food for long shelf life. In water disinfection use ozon, clor, uv method. The aim of this study is to investigate the use of essential oils in water disinfection.

Four experimental groups were formed. Group A (control 0% essential oil), Group B in 0.5% thyme oil, Group C 1% thyme oil and Group D in 1.5% thyme oil. The experimental samples were analyzed microbiologycal and physical (color, fragrance, clarity) in 0., 3., 6., 12. and 24. hours were determined *E. coli* numbers. 10^5 cfu log / mL innitialy inoculation E. coli and thyme oil.

The result of, thyme oil in 1-1.5% concentration very important on the E coli ($p<0.05$). Espesially 12 and 24. hours not detection. But phsical analyzed result fragrance adversely.

Keywords: Drinking Water, Microbiological, Thyme Oil

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MICROBIOLOGICAL QUALITY OF PACKAGED WATER SOLD IN SiVAS

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Abstract

Consumers perceive packaged drinking water, usually distributed as bottled or in plastics packages. The aim of this study was to determine the microbiological quality of different types of packaged drinking water available in Sivas. Fifty samples of plastics packages water and fifty of bottled water were randomly purchased from various locations and time in Sivas. Microbiological analyses of the samples were done according to standard procedures (total mezophile aerob bacteria (TMAB), total coliform bacteria (TCB) and parasitological).
The result of microbiological analyzed ten out of the fifty samples of plastics packaged water had TMAB levels within the recommended limits (1×10^2 cfu/mL). For the bottled water samples, nine out of the fifty were within the recommended limit for TMAB. The samples not detected parasite. The coliform bacteria fifty samples of plastics packaged water had two samples.

Keywords: Microbiological, Packaged Water

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SALT REMOWAL METHODS AND OBTAINED DRINKING WATER OF SEA WATER

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Abstract

Water, an indispensable source for all living things; due to various reasons such as increasing population, urbanization and industrialization, it is becoming increasingly scarce. In this case, the use of alternative water sources such as sea water is treated and used as drinking water.

The most important stage of sea water treatment is the desalination stage. And there are three groups of desalination technology. The first one is thermally activated systems including multi-stage flash distillation (MSF), multi-effect distillation (MED), vapor compression distillation (MVC), solar distillation, dehumidification and freezing. Second, pressure applying systems, including such as reverse osmosis (RO), forward osmosis (FO), electrodialis (ED) and nanofiltration (NF) technologies. The third is the chemically activated salt separation methods, including ion exchange, liquid-liquid separation, gas hydrate and other precipitation methods.

In this study, thermally activated, pressurizing and chemically activated desalination methods will be evaluated one by one and their advantages will be evaluated.

Keywords: Desalination, Sea Water, Treatment

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DETERMINATION OF THE DIRECT ENERGY CONSUMPTION DURING THE PRODUCTION OF ORGANIC GRAPES IN KAYSERI

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Abstract

Agriculture sector has many processes that consumes energy including, tillage, irrigation, spraying, fertilization, and harvesting. As the mechanization increases, the energy consumption increases. Making agriculture more sustainable requires decreasing pollution in air, water and soil, as well as decreasing fossil fuel consumption and making the agricultural systems energy efficient.

In this study, we aimed to calculate the direct energy inputs used in the production of organic chardonnay grapes grown in the province of Kayseri. We collected the usage information of agricultural machinery in the 2018 production season in a boutique vineyard in the village of Boğazköprü in the Kocasinan district of the Kayseri province. We collected the data from all the machinery used in tillage, irrigation, organic spraying, transportation, harvesting, and using this information we calculated the daily and hourly usage of the machines and their fossil fuel consumption. In vineyard, two different tractors were used for daily work. According to the results, total energy input for 2018 was determined as 14, 884.53 MJ/h. The direct energy input per kilogram of grape was 72.04 MJ/kg. When we compared the processes we found that most fuel consumption was during irrigation with 77% of the energy usage.

In this study, total energy consumption, its difference to other farms and similar types of grapes, and how energy consumption may be decreased will be discussed.

Keywords: Agriculture, Direct Energy Consumption, Organic Farming, Vineyard

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THERMODYNAMIC STUDIES FOR ADSORPTION OF PHARMACEUTICALS COMPOUNDS ONTO SOIL

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Abstract

Soil pollution can be expressed as the destruction of the soil properties of harmful waste materials deposited on and into the soil. The pharmaceutical compounds used in chemistry and pharmacy have been among the substances causing soil pollution in recent years. The pharmaceutical compounds undergo sorption and (bio) degradation in the receiving environment. Photo degradation and hydrolysis can also take place in the disintegration processes of pharmaceuticals. Temperature is a parameter by which important information about sorption mechanisms can be determined. The aim of this work is to evaluate the adsorption thermodynamics of two drugs (tetracycline and diclofenac), which represent different ionic species in varying environmental conditions represented by different temperatures.

The tetracycline (antibiotic) and diclofenac sodium (inflammatory, analgesic and antipyretic) used in the study. The soil used in the experiments is agricultural land taken from the center of Sivas province.

Thermodynamic studies were performed in an agitated incubator for intermittent system operation at 25, 35 and 45 °C. Thermodynamic calculations have been made for tetracycline and diclofenac. In this study, K_d values obtained, showed that different chemical forms of the pharmaceutical compounds exhibit different sorption capacities at different temperatures due to different ionic forms of the compounds.

The adsorption capacity of both compounds decreases as the temperature increases. The adsorption capacities and their retention in the soil depend on the ionic forms of the pharmaceutical compounds. Containment of contaminants on the soil surface is spontaneous and requires an exothermic process for tetracycline, and an endothermic process for diclofenac. In this case; these thermodynamic data obtained can support estimates of the spread of pharmaceutical compounds in the environment.

Keywords: Diclofenac, Sorption, Soil Pollution, Tetracycline, Thermodynamics

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SIVAS CITY AIR QUALITY ASSESSMENT

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Abstract

Air pollution is a major problem affecting human health and disrupting the ecosystem in our country as it is in many countries of the world. Human beings are the main reason for this pollution. Human activities form the main source of pollutants (e.g. traffic, industry, heating systems). Natural environment factors also have an influence on pollution, either positively or negatively. Air pollution is one of the top ten risk factors against health throughout the world, which makes it an important problem.

This study aimed at analyzing the air pollution situation in Sivas city center. The air pollution measurement data obtained by Sivas Provincial Directorate of Environment for 2016, 2017 and 2018 years were used in this study. In this study; NOx, PM_{10}, $PM_{2.5}$, CO and SO_2 measurement data were used.

According to the Air Quality Assessment and Management Regulation, the main reason for the air pollution in the Sivas city is that the PM_{10} concentration is high especially in the winter months.

Keywords: Air Pollution, Sivas, Air Pollution Sources

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SYNTHESIS OF A NEW ADSORBENT USING WASTE ASH AND TETRACYCLINE REMOVAL

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Abstract

The main pollutants causing water pollution are organic substances, heavy metals, aromatic and aliphatic hydrocarbons, detergents, dyestuffs in textile and other dyeing industries, and antibiotic compounds. Different treatment methods are used to remove antibiotics from wastewater, such as coagulation, adsorption, biosorption, reverse osmosis, advanced oxidation, and biological treatment. In recent years, studies on the use of zero-value iron (nZVI) ions as an alternative to activated carbon have been carried out in the adsorption process, which is one of the recommended methods for the removal of tetracycline from waste water. The role of nZVI particles in antibiotic removal; strong reduction and catalysis, micro electrolysis, adsorption and flocculation. New adsorbent (Ash + nZVI) was synthesized by applying waste oak fireplace ash, as an alternative to traditional adsorbent nZVI and adsorbent synthesis. In tetracycline (TC) removal with synthesized material (Ash+ nZVI), important parameters affecting the adsorption process were determined by batch system studies. In this study, pH, temperature, adsorbent concentration and initial TC concentration are 5, 25 ^{O}C, 1 g/L, 50 mg/L, respectively. Under these conditions, the removal efficiency was observed at a rate of % 93. The Freundlich, Langmuir and D-R Isotherm models were investigated. The Freundlich isotherm model (R^2 = 0, 9365) was observed to fit.

As a result, an alternative material to the tetracycline antibiotic removal was produced by using natural source magnetic biosorbents produced from the materials left as waste to the nature. Produced natural source magnetic biosorbents have the advantage that they can be used as an alternative adsorbent with economical, and time-saving benefits.

Keywords: Adsorption, nZVI, Tetracycline, Waste Oak Fireplace Ash

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INVESTIGATION OF REMOVAL OF SAFRANINE USING HAZELNUT SHELL

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Abstract

Chemicals; known as detergents, medicines and dyes etc. Anionic, cationic and non-ionic dye are handled in three ways. Dyestuffs are common in various industrial establishments, especially in the textile sector. Even the use of low amounts of water creates a serious waste of color. Because most of the organic structures contain aromatic rings in the wastewater and dye groups, the carcinogenic substances that it contains cause serious damage by affecting the environment and ecosystem. Safranine is a type of cationic dye that we encounter in the pollution of waste water. Conventional methods used in color removal from waste waters; It is known as oxidation, ion exchange, activated carbon adsorption, membrane technology, coagulation and flocculation. One of the most effective processes for color removal is adsorption. In the adsorption process which is one of the most effective processes for color removal, activated carbon is generally used as the adsorbent. However, the high cost of activated carbon accelerated the production and development of adsorbents from different materials. In addition, alternative natural adsorbent in waste materials such as hazelnut shell is encountered in many studies.

In this study, the removal of safranine by adsorption process by using waste hazelnut shell was investigated. The pH value of the solution affecting the removal of the safranine from the hazelnut shell and the aqueous solution was studied in the adsorption parameters such as the amount of adsorbent, contact time, temperature and initial dye concentration. In the adsorption of safranine, it was determined that it was more suitable for D-R isotherm model and pseudo second order kinetics. Maximum adsorption removal efficiencies were obtained with 0, 5 g / L adsorbent at pH 5 and %95, 87 at 120 min contact time. As a result, it has been concluded that the waste hazelnut shell can be used as a new economic adsorbent in removing cationic dyes such as safranine.

Keywords: Adsorption, Dye Removal, Nut Shell, Safranine Dye.

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THE USE OF SUPERCRITICAL WATER OXIDATION TREATMENT PROCESSES IN ENVIRONMENTAL ENGINEERING

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Abstract

Supercritical water oxidation (SCWO) is an innovative and powerful treatment process specially for the high concentration organic waste. When water was reached to specific high temperature and pressure (above 374°C and 221 bar), supercritical water can occur and the unique property of this supercritical water with addition of oxidant can easily be destroyed organic compounds in wastes in a very short time. In supercritical water, organic materials are rapidly destroyed to produce carbon dioxide and water. Heteroatoms such as chlorine, fluorine, and sulphur, are transformed to inorganic acids or to salts if enough number of cations such as sodium or potassium are present. If there are metals such as iron and nickel present, they will produce the metal oxides. In this study, general information on SCWO processes will be discussed along with their comprehensive solutions. The effected process parameters such as temperature, pressure, reaction time, waste and oxidant concentration on waste treatment are investigated in detail. Also, some operational problems such as corrosion, salt deposition, plugging, carbonization, high energy consumption and operating costs are critically examined then the most recent solutions and applications such as reactor material modification, advanced reactor design, energy/product recovery and catalysis for SCWO problems will be discussed according to literature studies. Literature studies showed that SCWO is a promising alternative treatment method for high strength wastewater removal process.

Keywords: Supercritical Water Oxidation, SCWO Treatment Processes, High Strength Wastewater

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URBAN TRANSFORMATION APPLICATIONS IN EUROPEAN CITIES

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Abstract

Urbanization; it occurs as a result of changes in the technological, economic and social structure of societies. Increasing and diversifying of business areas together with industrialization are among the most important reasons for urbanization. Cities; it needs renovation, transformation and improvement works. Due to reasons such as economic reasons, inadequacies in social development, overpopulation, improper site selection and natural disasters, cities need renovation, transformation and improvement works. Meeting the basic needs of humanity from the past to the present, increasing the level of welfare, preserving the environmental values as well as providing urban, social and cultural development can only be achieved through sustainable development. Urban transformation practices support sustainable development in order to protect urban values and to include interventions to ensure socio-economic and socio-cultural development.

Urban transformation with a general expression is renovation, transformation and improvement works in urban areas in order to solve the problems brought about by urbanization. The concept of urban regeneration has first emerged with the revitalization and socialization of the industrial zones that have developed into social and economic collapse in the developed Western countries. In our country, the concept of urban transformation emerged after 2000s. The common feature of the urban constructions that should be considered in urban transformation is to consider and address the problems of the city not only physically but also with their social problems. However, it is seen that the transformation is transformed into physical transformation especially in urban development applications in underdeveloped countries.

In this study; examples of urban transformation practices in different parts of the world are presented. In line with the examples of urban transformation; A general evaluation was made on the effects of urban transformation on sustainable development, urban, social and cultural development.

Keywords: Urbanization, Urban Transformation, Sustainable Development

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SOIL TREATMENT WITH SOIL WASHING

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Abstract

The treatment of contaminated soils is extremely difficult for environmental en-gineering. Depending on the structural properties of the soil, pollutants cause differences in their behavior. Depending on these characteristics, it increases the cost of remediation processes and limits the use of conventional waste disposal technologies. The washing process that uses chelating agents to remove polution from the soil is known as an important way of treatment. These chelating agents can be divided into two groups as natu-ral and synthetic. Mostly known natural chelating agents are compounds such as humic acid, and fulvic acid. Synthetic chelating agents used for the removal of polutions are compounds such as ethylene-diaminetetraacetic acid (EDTA), diethylenetriaminepentaacetic acid (DTPA). An ideal chelating agent must have high effect of extraction, high selectivity for trace contam-inants, high-resolution, and thermodynamic stability for forming metal complexes The methodology presents several advantages: (i) the volume of soil to be further treated or disposed of is considerably reduced (ii) the treatment systems are easily modular, and some fullscale mobile units are available for on-site remediation (iii) the technologies are well estab-lished in the mineral-processing industry (iv) the operational costs are usually low compared to those of thermal treatment. In addition, soil washing, is one of the few permanent treatment alternatives to separate the polution from soils

Keywords: Soil, Soil Treatment, Soil Washing

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LANDFILL SITE SELECTION AND GEOGRAPHIC INFORMATION SYSTEM APPLICATIONS

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Abstract

Global urbanization, rise in population, economy and life style change in recent years have resulted in increased amounts of solid waste generation and ultimately towards the problem of solid waste management has become a global environmental issue. A sanitary landfill is one of the most popular refuse disposals means in an urban environment. As a short-term waste disposal strategy, many under developed, yet urbanizing counties use the same landfill facilities that their adjoining large urban center uses. As the landfills of large urban cities approach the end of their disposal capacity, it is likely that these facilities will begin to limit the admittance of waste from other regions. In most of the countries much emphasis is being laid on solid waste management and many new technologies have been developed for improving solid waste management systems. GIS is one of the new emerging technologies which have contributed much to the waste management society in a very short time. Using GIS technology is quickly becoming an established method for planning large-scale engineering projects such as sewage system, drinking water, and energy management.

This paper presents an integrated approach for the identification of potential candidate landfill sites with GIS.

Keywords: Geographical Information Systems, Landfill, Site Selection

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CHARACTERIZATION OF *PAENIBACILLUS sp.* ISOLATED FROM NIGDE AKKAYA DAM

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Abstract

Microbial contamination is one of the biggest environmental problems since exposure to microorganisms, such as bacteria and their biological by-products, are often associated with disease and allergic reactions. *Paenibacillus* subspecies are defined as aerobic or facultative anaerobic bacteria that form rod-shaped Gram-positive or Gram-variable endospores. *Paenibacillus* species can be isolated from a variety of sources, including soil, fresh and salt water, sewage, sediments, caves, compost, plant, insect larvae, and clinical specimens. Due to the resistance of their spores against heat, cold and general disinfectants, they can survive on several environmental surfaces for a long time. In this study, we isolated and characterized a bacterial strain from Niğde Akkaya Dam, which is a wastewater disposal area and therefore presents a great source of contamination.

The bacterial isolate was incubated at 35-37 ˚C for 24-48 hours; colony morphology and Gram-reactions were observed. Pure cultures of Gram-positive and rod-shaped bacteria were obtained and used in further analysis. DNA isolation followed by polymerase chain reaction (PCR) using 16S rDNA universal primers and sequencing analysis were performed. Sequencing results were analyzed using 4peaks software and compared with known bacterial strains using BLAST (Basic Local Alignment Search Tool). BLAST analysis indicated significant sequence similarity to *Paenibacillus lautus*. Due to their pathogenicity in terms of human and animal health, development of tools that will be useful in decontamination efforts is important. For this reason, we tested antibiotic resistance of the isolate using 16 different antibiotics according to International Clinical and Laboratory Standards Institute (CLSI) standards. The inhibition zones were examined by disk diffusion method.

This study provides the first data regarding the isolation and characterization of *Paenibacillus lautus* strain from a local source in Turkey, which will account as preliminary data and guide our future efforts to fight against microbial contaminations.

Keywords: Antibiotic Resistance, Bacterial Contamination, Environmental Isolates, *Paenibacillus Lautus*

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PHOTOCATALYTIC REDUCTION OF Cr(VI) IN AQUEOUS SOLUTIONS

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Abstract

Advanced oxidation processes have become prominent among the methods used treatment of industrial wastewater in recent years, since they have less operational problems and provide superior treatment efficiency than other advanced treatment methods for recalcitrant chemicals. In particular, the removal of hexavalent chromium (Cr(VI)) and other toxic substances by using semiconductors has been the issue for many studies.

Cr (VI) which is one of the toxic metal compounds in industrial wastewater, causes environmental problems due to its high toxicity, water mobility and carcinogenic properties. Industrial processes such as mining, leather tanning, paint production, metallic coating, electrolytic coating, steel production are among the potential sources of this pollutant.

In this study, the removal of Cr (VI) from aqueous solutions was investigated by using photocatalytic oxidation process. In the current work, photocatalytic reduction of (Cr (VI)) was carried out by using laboratory-scale UV photoreactor. The effects of catalyst type (ZnO, TiO_2), catalyst loading, initial concentration of Cr (VI), initial pH of the solution (neutral, pH 4 and pH 9) and purging of different gases into the solution (air, nitrogen and without gas) on removal efficiency of Cr (VI) was investigated by using photocatalytic oxidation process.

Keywords: Hexavalent Chromium, Photocatalysis, TiO_2, ZnO

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REMOVAL OF RED 241 TEXTILE DYE FROM AQUEUS SOLUTIONS BY ELECTROCOAGULATION PROCESS USING TAGUCHI METHOD

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Abstract

In this study, the removal of red 241 dyestuffs from aqueous solutions by electrocoagulation process was investigated and optimum test conditions were determined by using Taguchi experimental method. For this purpose, four important parameters such as initial pH, current density, electrolysis time and electrical conductivity, affects the removal of dye by electrocoagulation process were optimized. These experimental four factors were studied at three levels and the experimental conditions were optimized by the L9 (4^3) experiment with the orthogonal sequence by the Taguchi method. Result of the experiments, the optimum operation conditions were determined as initial pH 7 (level 3), current density 100 A/m^2 (level 3), electrolysis time 10 min. (level 3) and electrical conductivity 1000 µs/cm (level 2). In these conditions, the experimental and predicted dye removal efficiencies were 99.6% and 99.8%, respectively. The closeness between the removal of experimental and estimated values indicated the available use of Taguchi method for electrocoagulation process.

Keywords: Red 241, Electrocoagulation, Taguchi, Removal of Textile Dye

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MONITORING DROUGHT WITH STANDARDIZED SOIL MOISTURE INDEX (SSI) IN DATA-SCARCE ÇARŞAMBA BASIN

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Abstract

With the increase in global warming, significant changes have occurred in the climate throughout the world. Extreme changes in the climate show the effect of decreasing water resources and increasing drought, heatwave sand floods. The drought is indicated as hydrological, agricultural and socio-economic drought, primarily meteorological drought. Agricultural drought leads to a decrease in productivity in agriculture. Drought is one of the most important impact parameters in the planning of agricultural strategies. Agricultural drought brings along food shortages and socio-economic problems. For these reasons, it is necessary to estimate and monitor agricultural drought.

The study was carried out in the headwater of Çarşamba River located in Konya Closed Basin where agricultural activities were effective. The Soil and Water Assessment Tool (SWAT) was used to obtain daily soil moisture data for the period of 2006-2015. SWAT-CUP was used to determine the optimum parameters of the SWAT model. Standardized Soil Moisture Index (SSI) was calculated by using soil moisture values obtained by using hydrological model developed by using SWAT model. SSI is frequently used because it can be easily interpreted to evaluate the effects of agricultural drought.

Within the scope of the study, it was aimed to perform agricultural drought analysis for the period of 2006-2015 in the headwater of Çarşamba River by SWAT-SSI assessment. As a result of the study, the years 2006-2007-2012 were determined as dry years, and the years 2008-2011-2015 were determined as non-dry years in terms of soil moisture. It was determined that there was no extreme event for other years.

Keywords: Drought, Konya Closed Basin, Standardized Soil Moisture Index, Semi-Distributed, SWAT

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THE DETERMINATION OF ÇARŞAMBA RIVER WATER BUDGET WITH SWAT IN KONYA CLOSED BASIN, TURKEY

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Abstract

Hydrological models are frequently used in the development of strategies for water resources management. The Soil and Water Assessment Tool (SWAT), which is a physically based and semi-dispersed model, provides very successful results in the examination of hydrological events, development of sediment and water quality models. The creation of the water budget in water potential determination studies provides important comments about the study area.
The Çarşamba River, located in the Konya Closed Basin, was designated as the study area. The establishment of the hydrological model of the Çarşamba Çayı, which contributes to meet the agricultural irrigation needs, is necessary to determine the water potential of the study area. In this study, the water budget was evaluated for the headwater of Çarşamba River during the period of 2006-2015. The hydrological model of the study area was constructed by using the SWAT model. At the stage of development of the hydrological model, hydrological and meteorological data were obtained from Seydişehir and Hadim meteorological observation stations and D16A115 flow observation station. The evapotranspiration required for water budget calculations was determined using the Penman Monteith method. In the evaluation of the success of the SWAT model, the coefficient of determination (R^2), Nash-Sutcliffe Efficiency Coefficient (NSE) and percentage of bias (P_{BIAS}) performance criteria were used. SWAT-CUP was used for the calibration and validation of the SWAT model. According to the results of the study, a negative change was observed in storage at the end of 2008 and 2013.However, there have been positive changes in storage of the study area in other years. In annual total precipitation, the highest value was obtained in 2009 and the lowest value was obtained in 2013.When the evapotranspiration parameter was examined, the highest values were observed in the years 2011 and 2012.

Keywords: Çarşamba River, Konya Closed Basin, Penman-Monteith, SWAT, Water Budget

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DEVELOPMENT OF A SOLID OXIDE FUEL CELL STACK WITH HIGH ENERGY DENSITY

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Abstract

Solid oxide fuel cells (SOFC) are electrochemical devices that convert the chemical energy of fuel directly into electricity and heat energy with high efficiency at high temperatures. A typical SOFC consists of a membrane electrode group (MEG), which is composed of porous anode and cathode layers coated on the dense electrolyte layer and placed between the lower and upper current collectors with a sealing element. In addition, multi cell SOFC, also known as stack, are equipped with metal or ceramic based interconnector plates to allow the cells to be electrically connected to each other. Conventional interconnector plates are produced via traditional machining technique. This technique requires long production time and has high production cost. In addition, thick material (~ 5mm) needs to be used for a successful machining without any failure. Therefore, in addition to the high manufacturing cost, the specific power density (W/kg) and the volumetric power density (W/m^3) of the stack are limited. In this study, instead of machining, it is recommended to produce thin interconnector plates from thin sheet metal by press shop method. For this reason, three-dimensional models of different interconnectors are designed. The producibility of the prepared models is analyzed with Dynaform program. The parameters analyzed are the interconnector thickness (0.2-1 mm), channel edge rib angles (90^o-120^o), MEG contact width (0.5-4 mm) and channel depth (0.5-2 mm). As a result of the analyzes, a sheet thickness of 0.2 mm is selected for light-weight and small size, in other words, for a stack having high specific and volumetric density. For the selected thickness, damages are detected during production at channel edge rib angles below 120° and channel depths above 0.54 mm. Improvements in manufacturability can be achieved as the MEG contact width increases. However, it is found in literature that MEG contact width and channel depth are almost equal. As a result of the results of the analysis and literature researches, the optimum thickness of the sheet, the optimum rib angle, the channel depth and the MEG contact width are found as 0.2 mm, 120°, 0.54 mm and 0.5 mm, respectively.

Keywords: Solid Oxide Fuel Cell (SOFC), Interconnector, Stack, Press.

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INVESTIGATION OF THE MEASUREMENTS OF THE THERAPY GARDEN PLANNING AND DESIGN MEASURES IN THE EXAMPLE OF MENTAL AND NERVE DISEASES HOSPITALS

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Abstract

Constantly growing population brought intense structuring, distorted urbanization and unplanned settlement with the development process of the cities. Together with the deterioration of natural areas the needs of people whose living areas are constantly narrowing are increasing. From the past to the present, the relaxing and healing effect of being with nature is known. In many studies, it is clear that green areas increase the quality of human life and provide a positive development on it. The therapy gardens have started with the Darüşşifa in the old Turkish gardens and the monastery gardens in the middle ages. Attract attention by recognizing the importance of it today and by bringing together the nature with natural elements. Healing gardens aim to help increase the health situation of mentally handicapped children and adults, and hospitalized patients. While offering people the possibility of rest and loneliness, it also provides the responsibility of taking care of plants and strengthening their muscle skills. This study was prepared to draw attention to the lack of application and the implementations of this type of gardens due to the fact that there are less studies on this topic in Turkey. Within the scope of the research, the effects of the therapy gardens on human life, the psychological, mental - physical health and social life of the users were examined. The information about planning and design approaches in the garden were collected from Hospital for Mental and Nervous Diseases in Turkey called Bolu İzzet Baysal, Manisa and Samsun Mental Health - Diseases Hospital. Design criteria, functions, structural material selection and plant selection considerations were explained. The advices were developed in accordance with the comparisons of hospitals each other.

Keywords: Therapy Gardens, Healing Gardens, Landscape Design

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A REVIEW ON THE PROPERTIES OF CONCRETE/MORTAR INCOPORATING GLASS POWDER

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Abstract

The highest priority for the decreasing usage of ordinary Portland cement as utilizing the industrial by-products having cementitious properties in construction materials is seriously under-taken by many researchers. The use of waste materials instead of cement is compulsory to reduce the energy combustion during the cement production and deplete of natural resources for sustainable development. For this purpose, many industrial by-products possessed of pozzolanic characteristics such as silica fume, fly ash, blast furnace slag, metakaolin have been used in the production of different concrete/mortar types. In this study, it has been planned to evaluate the effects of glass powder (GP) (a pozzolanic material) on the properties of concrete/mortar in terms of strength, durability and microstructural characteristics. Therefore, various types of concretes and mortars prepared by using GP have been examined with the aim of literature studies. Test results indicate that GP generally has increased the workability of concrete/mortar. In addition, mechanical and durability properties of concrete/mortar were improved with respect to microstructural analysis methods by the usage of GP at later test ages.

Keywords: Glass Powder, Durability, Strength, Microstructural Analysis Methods

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THE EFFECTS OF HIGH ASPECT RATIO SYNTHETIC WOLLASTONITES ON STANDARD MORTARS BASED ON POZZOLANIC ACTIVITY TEST

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Abstract

Cement production involved the mining of raw materials at 1450 °C such as limestone and clay needs large amounts of natural sources and higher energy. Many fuels are used such as fuel oil, natural gas, mineral coal, petroleum coke and diesel to provide high temperature. High emissions of carbon dioxide (CO_2) consisted of the burned of fossil fuels, alongside the decarbonation of limestone in the cement production adversely affect the sustainable development as well as the extensive resource consumption. In previous studies, the pozzolanic and inert materials have been used as Portland cement replacement materials in concrete/mortar to reduce the high cost and environmental damage caused by cement production. In this study, two different synthetic wollastonites (SWs) having high aspect ratio were used in the production of standard mortars (SMs) with/without super-plasticizer (SP). Wollastonite, an inert mineral which is used as Portland cement replacement material, was manufactured via a special method. Therefore, the usage of SWs in the concrete/mortar was determined indirectly based on pozzolanic activity test of SMs. In laboratory studies, in the first group, pozzolanic activity test were performed on 7 and 28 days for both SWs. In the second group, SMs incorporating SWs were produced with SP instead of water increment as in pozzollanic activity test and were tested at 7 and 28 days. The test results indicated that SWs reduced significantly the workability of SM. Thus, it was proposed that SWs should be incorporated by using SP in production of mortar. The compressive strength of SMs containing SWs produced with SP was higher than that of SMs produced without SP. In addition, SWs decreased the workability of the mortar depending on the increased aspect ratio.

Keywords: Synthetic Wollastonites, Inert Material, Pozzolanic Activity, Compressive Strength, Workability

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A STUDY ON THE ESTIMATION OF THE CARBON FOOTPRINT OF DAIRY SHEEP FARM

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Abstract

By 2050, the World population is expected to be more than 9 billion. The need for a secure food and water supply will force agriculture to increase production. The need for food and water supply is forcing agricultural production to increase. The major greenhouse gases from the livestock sector are carbon dioxide (CO_2), methane (CH_4) and nitrous oxide (N_2O) throughout the production process. They have contributing to an increasing earth surface temperature. Global warming occurs as a result of gases emitted by humans into the atmosphere, creating greenhouse effect. The livestock sector contributes between 25 and 40% of anthropogenic methane emissions. Human-derived animal production effects to global warming by providing 9% of CO_2 emissions, 35-40% of CH_4 emissions and 65% of N_2O emissions. Carbon footprint is defined that a measure of the damage that human activities cause to the environment in terms of the amount of greenhouse gas produced as a unit of carbon dioxide. The most common method used in carbon footprint calculations is the Tier 1-2-3 approach developed by the Intergovernmental Panel on Climate Change (IPCC). In this study, it was investigated that the carbon footprint of a dairy sheep farm in Niğde province using Tier 1 method and its potential effect on global warming.

Keywords: Dairy Sheep, Greenhouse Gas, Carbon Footprint, Sustainability

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URBANIZATION AND SUSTAINABLE TRANSPORTATION: CANAKKALE CITY CENTER

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Abstract

Economic, social and technological developments in the world increase day by day. Industrial revolution and the problem of wrong land use and unplanned urbanization have emerged especially with the immigrations occuring in time of industrial revolution. Unplanned urbanization brought along the problem of transportation. Cities should be able to manage resources correctly and move human-oriented without harming the environment. Thus livable and sustainable cities should provide accessible facilities for all individuals living there. Transportation systems are one of the most important elements of urban landscape with all spaces. Transportation systems should be planned together with all land uses. Unplanned transportation systems cause many environmental problems such as air quality, climate change and noise pollution. Sustainable transport should be provided instead of more roads for urban development. Sustainable transport should be addressed in all aspects of economic, social and environmental aspects. Although transportation systems are generally considered economically, their social and environmental aspects should not be ignored. The concept of sustainable transportation is a necessity nowadays. This need enhances the quality of life and includes an approach providing environmentally friendly and energy efficiency. In all urban transport systems, systems using smart technologies and renewable energy sources should be included. In this study, the transportation systems of the city of Canakkale are examined in terms of sustainable transportation criteria. The aim of the study is to investigate and evaluate the transportation systems in Canakkale city center in economic, social and environmental dimensions. For the study, domestic and foreign studies are examined and conceptual values are given. After the research stage, required information and documents were obtained by going to the relevant institutions. The data were evaluated according to the criteria of sustainable transportation and solutions were proposed.

Keywords: Canakkale, Environment, Sustainable Transportation, Urbanization, Urban Landscape

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THE ROLE OF LANDSCAPE ARCHITECTS IN CLIMATE CHANGE; CANAKKALE URBAN AREA ANALYSIS

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Abstract

Climate change is defined as changes in weather events due to the change in the average temperature values in the world. While temperature and precipitation regimes cause climate changes in the first stage, socio-economic developments have increased in time. The global development of the industrial revolution has led to a rapid increase in environmental problems. Greenhouse gas has increased and significant changes have taken place in the climate with human activities such as deforestation, burning of fossil fuels and increasing of urbanization. These unconscious changes have caused many destruction in the natural and built environment. These destructions in rural and urban areas have revealed the problem of climate change. People have sought sustainable solutions to prevent environmental degradation and climate change. Throughout history, landscapes have been formed by people's interactions with nature. As a result of socio-economic changes instead of the flamboyant landscaped landscapes, which were designed and designed before the industrial revolution, sustainable landscaping works were started. Nowadays, ecological-based studies are conducted in landscape architecture studies. All natural and built environment changes with the phenomenon of urbanization. Landscape architects conduct studies to prevent microclimatic changes on urban areas along with other professional disciplines. The aim of this study is to analyze the role of landscape architects in climate change and to conduct field analysis in Canakkale. In the first phase of the study, a literature review has been done and relevant reports have been obtained. After that, natural and cultural landscaping elements in Canakkale urban area were examined and their negative effects on climate change were revealed. In the final stage of the study, it is proposed to make planning and design studies compatible with the environment by evaluating the data obtained.

Keywords: Canakkale, Climate Change, Ecology, Landscape Architect, Urban Area

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COMPUTER BASED DEMOLITION SIMULATION FOR DISPOSAL PLAN

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Abstract

Damaged and old buildings (because of earthquakes or other various reasons) which are prone to fall down completely or partially must be demolished before any fatal accident. When the important structural components like pillars and beams become absolutely insufficient for service then there is no option other than demolishing the building. In this study, The Bullet Constraints Builder (BCB), a dynamic collapse simulation program, was used for the controlled destruction of a sample reinforced concrete building in the city considering the safety of neighboring area. According to the scenario prepared for demolition, structural demolition was performed systematically from top of building to bottom, using a Track Excavator to removal of pillars. Aim of the demolition plan was ensuring the correct selection of the columns to be demolished and ensuring the safety of other buildings, demolition team and equipment. The targeted control plan was prepared through the removal of columns with the ideal sorting from the building collapse behaviors obtained with the help of simulations. In the light of this research we have seen that The Bullet Constraints Builder is a free 3D software suite enables users to demonstrate buildings collapse scenarios to gain better deconstruction projects for safety, saving time and money.

Keywords: Bullet Constraints Builder, Demolition, Reinforced Concrete Building, Simulation

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POSSIBLE CONTRIBUTION OF THE PLASTIC POCHETTE PRICING TO THE ENVIRONMENTAL RESPONSIBILITY AWARENESS: KAFKAS UNIVERSITY SAMPLE

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Abstract

The interest of humanity to the environment and environmental issues, has increased with 1970. Humanity, who has always preferred development to the environment, ignored the environmental problems created by development efforts. Until environmental problems create economic problems. The transformation of environmental problems from ecological problems to economic problems is one of the main reasons for the increase in interest.

Evaluating the environmental problems in the form of economic problems has also connected the economic approach of humanity to the environment. Thus, the environment and environmental issues are evaluated by an economic perspective. Environment and environmental issues were described with economic concepts like environmental goods, externalities etc. Economic definitions, has brought with it economic solutions. The reflections of this transformation are also manifested in development policies. Eco-development, sustainable development, green development ideas replaced by development idea. Although the name of the idea changes, the main emphasis is on development.

Within the framework of the idea of sustainable development, a policy of development that does not exclude the environment has been adopted. A development policy that does not exclude the environment is sought for solutions to environmental problems through economic approaches. Environmental protection and environmental development policies are guided by market approaches and economic instruments belonging to the market mechanism. It is partly correct to say that economic instruments produce solutions. Because economic tools that producing solution have some practical difficulties. Sustainable development also focuses on the adoption of individual attitudes and behavior patterns within the framework of ethical boundaries in the name of the environmental protection and environmental development. It has an individual perspective on environmental awareness and environmental responsibility. However, it is difficult to get results unless environmental responsibility is carried to the social dimension.

Plastic pochette pricing that implemented in Turkey with 2019 will be examined in this study as an example of marketable solutions originating from sustainable development. Possible contributions to environmental responsibility awareness of practice except for its main objectives such as reducing environmental problems and contributing to zero waste project will be evaluated with a questionnaire to be applied to the students of Kafkas University.

Keywords: Environment, Environmental Responsibility, Plastic Pochette Pricing, Sustainable Development, Zero Waste

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THE EFFECT OF LOW VELOCITY IMPACT WITH GRAFEN 6.6 NANOFIBERS REINFORCED EPOXY ADHESIVELY BONDED JOINTS

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Absract

In this study, the effects of low velocity impact on the load applied were investigated in single lap joints of Nylon 6.6 (N-6.6) nanofibers unreinforced /reinforced Graphene Nanoparticle (GNP) at ratios 1, 3 and 5 % by weight epoxy adhesives. The aluminum (Al 2024-T3 alloy) plate and 8 layers at 0/90° plain weave fabric of carbon fiber reinforced epoxy composite plates used in aircraft and spacecraft were cut according to ASTM D1002-10 and ASTM D5868-01 standards, respectively. Surface preparation methods of these materials were used according to ASTM D3933-98 phosphoric acid anodization and ASTM D2093-03 standards respectively. Nylon 6.6 (N-6.6) nanofibers unreinforced /reinforced Graphene Nanoparticle (GNP) at ratios 1, 3 and 5 % by weight modified epoxy adhesives joints low velocity impact energy of 3 J was applied. These samples applied low velocity impact were subjected to tensile test under static load. This test result by analyzing the loads applied to the samples in the reference sample and nanofibers GNP reinforced /unreinforced N6.6 nanofibers joints of the maximum load are compared. When the loads applied after the impact are compared, the epoxy adhesive and 1 wt. % GNP reinforced N6.6 nanofibers modified epoxy adhesive are 2230.3 N and 3206.4 N, respectively, which shows an increase of 43.7%.

Keywords: Electro Spinning, Graphene Nanoparticle, Nanofibers, Single Lap Joints, Adhesive

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MECHANICAL AND THERMAL PROPERTIES OF MWCNT REINFORCED POLYSULFONE NANOFIBERS BY ELECTROSPINNING

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Abstract

In this study, the production of polysulfone (PS) nanofibers unreinforced / reinforced carbon nanotubes (MWCNT) at ratios 1, 2 and 3 % weight by using electro-spinning method was performed. Reinforced/unreinforced nanofibers produced, tensile strengths, elasticity modules, toughness and strains changes were investigated by tensile tests in accordance with ASTM D 882-02 standard under static loading. The mechanical properties of the MWCNT reinforced PS nanofibers produced in different ratios were compared with PS nanofibers. Thermogravimetric Analysis and Differential Thermal Analysis (TGA/DTA) were performed for the chemical changes occurring in the system formed by the combination of nanofibers produced with PS and MWCNT. In addition, scanning electron microscopy (SEM) images were examined in order to determine the physical properties of the MWCNT reinforced/non-reinforced PS nanofibers.

Keywords: Electro Spinning, MWCNT, Polysulfone Nanofibers, SEM, Tensile Strength

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COLOR REMOVAL FROM AQUEOUS SOLUTIONS OF DIRECT YELLOW 86 TEXTILE DYESTUFF BY ELECTRO-FENTON METHOD

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Abstract

In this study, color removal from aqueous solutions containing direct Yellow 86 commercial textile dyestuff by electro-Fenton method was investigated. The effects of electrolyte, (NaCl: 1000-3000 mg/L), H_2O_2 (250-2500 mg/L) and initial dye concentration (50-500 mg/L) on color removal efficiencies by electro-Fenton process were investigated.

It was determined that high color removal efficiencies were strongly dependent on the H_2O_2 and initial dyestuff concentration. The removal efficiencies increased as the H_2O_2 concentration were increased. On the other hand, the removal efficiencies decreased as the dye concentrations were increased. Maximum color removal efficiency of 99, 5% was achieved at optimum experimental conditions (NaCl: 1500 mg/L, H_2O_2: 1500 mg/L, dye concentration: 50 mg/L). The obtained results showed that the Electro-Fenton method can be applied effectively for the removal of yellow 86 from its aqueous solutions.

Keywords: Color Removal, Direct Yellow 86, Electro-Fenton

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COD REMOVAL FROM LEACHATE BY ELECTRO-FENTON METHOD

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Abstract

In this study, the effects of different cathode electrodes (steel, graphite, carbon-containing fabric) and current densities (50, 100, 150, 200, 250, 300 A/m^2) on COD removal from leachate containing its various initial concentrations ranging from 7000 to 9000 mg/L by electro-Fenton method were studied. Maximum COD removal efficiency of 82, 5% was achieved under optimum experimental conditions (anode: iron, cathode: steel, pH = 3, H_2O_2= 2000 mg/L, mixing speed= 250 rpm, current density = 100 A/m^2). The high performance of Electro-Fenton showed that this method can be applied efficiently in the treatment of leachates.

Keywords: COD Removal, Electro-Fenton, Leachate

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DETERMINATION OF SENSITIVE ZONES FOR SOIL PROTECTION AND WATER FUNCTION IN KASTAMONU KARAÇOMAK BASIN

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Abstract

The soil, which is one of the important elements in the maintenance of the natural and cultural processes in the landscape; is a parameter that should be considered carefully in determining the water and soil function of landscaping. Important processes affecting natural landscape character include erosion, groundwater recharging and rainwater surface run-off potential. However, due to the landscape architecture studies in which ecological based landscape planning approaches are not adopted, the structure and function of the components constituting the landscape change negatively. Therefore, damages in ecological equilibrium, coating of groundwater recharging areas with impermeable surfaces and climate change result in a negative impact of rainfall regime, cause erosion and urban areas are exposed to flood hazard.

Within the scope of this research, Kastamonu Karaçomak Basin has been investigated in terms of soil protection and water function which is one of the functions of landscape, and sensitive zones have been identified. In order to determine the soil conservation and water functions of the research area, Corine (2012) land cover, soil, slope and geology parameters were evaluated using a geographical information systems software called ArcGIS 10.5. The findings show that the new developments have threats over sensitive natural areas. This evaluation was made by comparing the urban development plan and the analyses. As a result, landscape protection and rehabilitation proposals have been developed for the sensitive zones with regard to water and soil protection functions of the landscape. Key landscape functions construct the base knowledge and address the spatial pattern for urban and green areas developments.

Keywords: Erosion Risk Analysis, Groundwater Recharging, Surface Flow Potential, Kastamonu, Landscape Function

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DETERMINATION OF TEMPORAL CHANGE IN WETLANDS BY GEOGRAPHICAL INFORMATION SYSTEM AND REMOTE SENSING METHODS: SULTAN SAZLIĞI NATIONAL PARK CASE

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Abstract

Wetlands, which make up the richest and most productive ecosystems of the world, are natural systems with different functions at the national scale as well as local and regional scale. These systems have functions and values that are not comparable to any other ecosystem on earth. Due to climate change and other environmental problems threatening the world, pressures on rural areas and intact natural resources are increasing day by day. While these pressures on natural resources continue, various studies are carried out in the field of landscape planning and design for the protection of these resources and various projects related to the sustainability of resources are produced. These works can be directed not only for conservation but also for the mental and physical relaxation of the urban people.

Wetlands are also in danger of extinction as climate change impacts on people and wildlife; this problem is frequently encountered in landscape architecture studies. The Sultan Sazlığı National Park is a rare ecosystem where sweet and saltwater ecosystems coexist, but it is an important Ramsar area that contains many endangered flora and fauna. Within the scope of the research, ArcGIS 10.5 was used from the geographic information systems software which aimed to determine the temporal change in the amount of wetlands of Sultan Sazlığı. NDVI (The Normalized Difference Vegetation Index), NDMI (The Normalized Difference Moisture Index) and Wetness Index methods were used to determine changes in wetlands and reeds, and to develop the natural landscape character of the site and to provide the natural water cycle of water.

Keywords: Geographical Information Systems, Remote Sensing, Sultan Sazlığı National Park, Wetland

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DETERMINATION OF EMISSION FACTOR FOR ASPHALT PAVING

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Abstract

Emission factor is a representative value used for the estimation of the quantity of a pollutant released to the atmosphere by an activity. These factors are usually calculated using per unit weigh, volume, distance, or duration of the activity. Emission factors facilitate emission estimation from the sources of air pollution while it gives a rough value compared to direct measurement, but direct measurement is an expensive and time consuming method. Although emission factors give approximate emission value they are used so often; therefore, new emission factors are being determined for different sources.

In this study, emission factor has been determined for the asphalt paved road by using evaporation of asphalt in a controlled evaporation cell at 333 K. The asphalt mixture has been prepared at ratios of bitumen: gravel: slag as 1: 6: 10, and the release of total hazardous air pollutants (HAPs) from the soft and pressed asphalt mixtures has been determined in time. Results showed that there are fifteen dominant HAPs in the emission and their release continue few days when soft asphalt was used while the release took weeks when pressed asphalt was used. It can be concluded that the release of HAPs from the asphalt paved road continue days, and the released HAPs do not enter into the atmosphere, they also enter into the water bodies. Therefore, the emission factor determined in this study will be very helpful for the estimation of HAPs released from the asphalt paved road which is not a point source.

Keywords: Emission Factor, Asphalt, Road, Hazardous Air Pollutants

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ACTIVITY-BASED COSTING METHOD AS ONE OF THE CONTEMPORARY COST METHODS: A SAMPLE APPLICATION IN FURNITURE PRODUCTION OPERATION

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Abstract

Changes in the economic conditions in the globalized world day by day and rapid developments in the field of technology has made the importance of satisfactory use of resources and particularly the reduction of costs in terms of enterprises. Through using the activity-based costing method, which is one of the contemporary cost methods, unlike traditional cost management techniques, for enterprises to produce their products in better quality and more suitable market conditions, shall create a reliable and efficient management information system. This will provide an advantage to the company's products, thus, the company will be able to increase its competitiveness in the market.

In accordance with this purpose, due to exceeding production value of $ 2 billion and contributing to country employment at a non-negligible level, a furniture production enterprise was selected among the furniture manufacturing sector.

The aim of this study is to focus on the methods which are considered to be superior to the market conditions and which are compatible with technological innovations and express the market management of the costs, rather than the traditional cost management approach applied in furniture enterprises.

In this study, face to face interview method has been selected among the field research methods. With this method, it is aimed to perform one-to-one observation in the application part and to evaluate the obtained results onsite and it has been tried to reach the results that will contribute to the literature of the discipline and guide the people of the respective sector.

Keywords: Activity-Based Costing, Cost Accounting, Furniture

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ARSENIC REMOVAL FROM AQUOUS SOLITIONS WITH ALKALI TREATED NATURAL ZEOLITES

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Abstract

Natural zeolites can absorb metal ions from contaminated/polluted water. However, there are some restrictions that small pores and cavites of natural zeolites leads to significant diffusion limitations of reactant molecules and they show low adsorption capacities compared to metal oxides. In order to eliminate the diffusion limitations, the desilication with alkali treatment is a selective silicon extraction from the zeolite via insignificant changes in the acidity and crystal structure of the material. Therefore, in this study, the treatment with 1.0 M of NaOH was applied to the natural zeolites with different compositions originated from various region of Turkey (Manisa-Gördes and Bigadic). Chemical and physical properties of natural and modified zeolites were characterized by XRD, SEM, nitrogen adsorption, FTIR, zeta potential and NH_3-TPD. The adsorption capacities of these samples were evaluated by the adsorption of arsenic from aqueous solution.

Despite synthetic zeolites, the treatment of natural zeolites with NaOH leads to a selective silicon extraction from the zeolite via significant changes in the acidity and crystal structure of the zeolites depending on their compositions. Irrespective of composition of natural zeolites, the treatment with NaOH caused to a decrease in the surface area and microporosity of all natural zeolites as well as partly damage of the zeolite structure depending on zeolite composition. In addition, the amount of weak, medium and strong acid sites in the zeolites was changed significantly by NaOH treatment depending on zeolite composition.

The highest As (V) adsorption capacity was found (4.5 mg g^{-1}) on the natural zeolite obtained from Manisa-Gördes region of Turkey because of higher surface area (44.8 m^2 /g) of the natural zeolite. Depending on their compositions, the treatment of natural zeolites with NaOH improved their arsenic removal capacity due to modification of porosity in the zeolites and formation of hydroxysodalite.

Keywords: Adsorption, Alkali Treatment Arsenic, Natural Zeolite

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EFFECT OF ALUMINIUM CONTENT OF ZEOLITES ON ARSENIC REMOVAL FROM AQUOUS SOLITIONS

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Abstract

Natural zeolites are mainly called alumina silicates because they are mainly formed from $[SiO_4]^{4-}$ and $[AlO_4]^{5-}$ along with alkali or alkaline earth metal cations present within a zeolite structure in order to balance the negative charges in the framework of the zeolites. Among them, aluminum content of the zeolites can be altered their chemical and thermal stability, distribution of Bronsted/ Lewis acid sites and adsorption capacity in addition to characteristics (channels and cage) of surface. Therefore, in this study, the aluminum was introduced into natural zeolites originated from Bigadic, and Manisa-Gördes regions of Turkey in order to improve characteristics and adsorption capacity of the zeolites. Aluminum loading was performed by formation of hydrated aluminum oxide (HAIO) onto the zeolite structure after NaOH treatment of the natural zeolites. Chemical and physical properties of natural and modified zeolites were characterized by XRD, N_2 adsorption- desorption, FTIR, NH_3-TPD, zeta potential and SEM-EDS. Adsorption capacity of natural and aluminum introduced zeolites was performed for removal of As(V) from aqueous solutions.

The aluminum introduction into zeolites was performed using a solution of sodium chloride, aluminum sulfate($Al_2(SO_4)_3$) and water with 1: 5.4: 10 mass ratios. The natural zeolites treated with 2.5 M NaOH was treated with this solution at 90 °C for 2 h with a mixing rate of 500 rpm. The product was filtered, washed and dried at 80 °C.

After the loading of aluminum, the aluminum oxide phase is detected on zeolites, particularly for significantly desilicated zeolites with NaOH treatment and the distribution of acid sites in the zeolites is dramatically altered. Increasing aluminum content increased the number of weak and medium acid sites based on the NH_3-TPD results.

Enhanced aluminum content of zeolites improved their arsenic adsorption capacity depending on their composition. Increasing adsorption capacity with aluminum content might be related with increasing exchangeable cation capacity of zeolites.

Keywords: Adsorption, Aluminum Loading, Arsenic, Natural Zeolite

Acknowledgment: The study was supported by the research fund of Sivas Cumhuriyet University (M-492) and The Scientific and Technological Research Council of Turkey (TUBITAK) (113M813).

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PRODUCTION OF OLEATE COATED MICRONIZED CALCITE BY BALL MILLING FROM MARBLE PROCESSING TAILINGS

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Abstract

Marble production accounts for half of the world's natural stone production. Associated with the reasonably low production efficiency, marble mining and processing cause significant environmental problems, especially related with the rejection of huge amount of marble dust from slab cutting processes. Marble dust increases the alkalinity of soil and ground/underground water, decrease the permeability of surface soil, and affects adversely the flora and fauna. Owing to its ultrafine size, marble dust exhibits great potential for evaluation as micronized calcite especially for polymer industry as a functional filler. Functional calcite powder is prepared by surface modification to reduce its surface tension (also known as hydrophobization) approaching down to that of polymers to satisfy perfect distribution of micro/nano sized calcite particles in polymer matrix mud. This study was conducted to investigate the effect of mechano-chemical activation by ball milling process on the modification of marble dust using Na-oleate (Na-Ol) as coating agent. The assessment of calcite modification was performed by contact angle measurement, activation ratio (AR) and whiteness index tests. Na-Ol concentration, mill solid ratio, rotational speed of ball mill and grinding time were tested to clarify their effects on the efficiency of coating. Coating tests revealed that optimum Na-Ol dosage was necessary for coating. Lower Na-Ol concentrations were observed to be suitable for hydrophobization, but not enough for acceptably high AR value. On the other hand, hydrophobicity decreased by excess usage of Na-Ol due to multi-layer formation. Discriminating effect was also observed by manipulating mill rotational speed. Mechano-chemical activation reached its maximum as the mill speed approached up to the critical speed showing the positive effect of high pressure grinding during cascading action. Experimental results demonstrated that 45 min of grinding time, 40% mill solid ratio, 10 kg/t Na-Ol concentration and a rotational speed of mill equal or higher than critical speed were the operating variables for the production of coated micronized calcite from marble dust. According to the test results, one could be concluded that the marble dust, undesirable product of slab cutting process, could be evaluated as an added-value product as functional filler material suitable for various polymer applications.

Keywords: Marble Dust, Sodium Oleate, Surface Modification, Micronized Calcite, Contact Angle Measurement, Activation Ratio

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BIODEGRADATION STUDIES OF THE REACTIVE RED AZO DYE BY ELECTROSORAY /MASS SPECTROMETRY

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Abstract

Biodegradation studies of the Reactive Red 195 azo dye by a photosynthetic, anaerobic bacterium *Rhodopseudomonas*sp.51 ATA strain was followed by ESI/MS. The degradation efficiency of this strain, in the presence and absence of a co-substrate was investigated. However The ESI/MS analysis has provided an insight to the way this dye has been degraded and the fragmentation showed complete mineralization of the toxic aromatic ring system of the dye.

Keywords: Biodegradation, Dye Removal, Reactive Red 195, Rhodopseudomonas, ESI/MS

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ISOTHERMS, KINETICS AND THERMODYNAMICS OF PHENOL ADSORPTION ONTO POWDERED ACTIVATED CARBON

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Abstract

Phenol is ranked 11th in the most toxic 126 chemicals. It can accumulate in the food chain and cause cancer. The permissible concentration in water for phenols by the World Health Organization (WHO) is 0.001 mg/L and the maximum allowable concentration is 0.002 mg/L. Phenols are used extensively in various industries (resin, rubber processing, insulation material, coal distillation, paper-pulp, pesticide, insecticide, paint, solvent, pharmaceuticals, etc.), and phenol-phenol derivatives are frequently encountered in the wastewaters. The receiving environment discharge standards for the various industrial wastewaters of the phenol should be less than 0.5-2 mg/L in the Water Quality Control Regulation. Adsorption is an effective method for phenol removal. Adsorption is economical in terms of cost and is also environmentally friendly.

In this study, powdered activated carbon was used for phenol removal. At constant mixing rate (150 rpm) and sample volume (100 mL); adsorbant dose (0.01-1 g), contact time (1-20 min), initial phenol concentration (50-400 mg/L) was optimized and various isotherms (Freundlich, Langmuir, Temkin, Elovich, Dubinin-Radushkevich and Redlich-Peterson) were applied to the obtained results. In addition, adsorption studies were carried out at 25, 35 and 45 ^{o}C temperatures for kinetic calculations (Pseudo 1st order, Pseudo 2nd Order and Intra Particle Diffusion) and thermodynamics. In this study, optimum adsorbent dose and contact time of powdered activated carbon with very active surfaces were determined as 0.3 g and 10 min, respectively. We can say that it provides discharge standards for a wastewater containing 100 mg/L phenol. It was observed that the adsorption capacity decreased with increasing temperature and it was more suitable for Langmuir isotherm. It has been concluded that the adsorption of phenol with powdered activated carbon is an exothermic reaction. As a result of the kinetic study, it was found to be suitable for the Pseudo 2nd order (R^2 0.9999-1.0000). ΔS, ΔH and ΔG were calculated as -0.02 J/mol*K, 14.15 kJ/mol and between -8, 16 and -7.76 kJ/mol.

Keywords: Adsorption, Isotherms, Kinetics, Phenol, Powder Activated Carbon

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LAND USE/COVER CHANGES IN SOMALIA FROM 2003 TO 2016

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Abstract

In Somalia, major alterations in land use/cover occurred in the past decades due to human activities and climate change. Somalia has very sensitive environment and the people of Somalia are directly dependent on nature. In this study, we analyzed the land use/land cover changes in Somalia from 2003 to 2016 using satellite imagery techniques. We also examined the relationships between land use/cover changes and climatic conditions. Moderate resolution imaging spectroradiometer (MODIS) 16-day composite normalized difference vegetation index (NDVI) data with 250 m spatial resolutions were acquired from US. Geological Survey for the 2003-2016 period. We obtained annual precipitation and annual average air temperature data for Somalia from WorldBank Climate Change Knowledge Portal. Lineer regression was applied to identify the trends in NDVI, precipitation and air temperature time series. The correlations among these parameters were also calculated. The results showed vegetation in Somalia showed a dynamic pattern from 2003 to 2016. NDVI responded quickly to changes in climatic conditions. Average NDVI was generally lower under drought conditions. The trends in NDVI and precipitation data were similar. NDVI provided is suitable tool for detecting land use/cover changes.

Keywords: Land Use/Cover Change, Somalia, Satellite Imagery, MODIS

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THE EFFECTS OF DIFFERENT MULCH MATERIAL APPLICATIONS ON TOTAL ORGANIC CARBON, PHOSPHATE AND TOTAL NITROGEN FLUXES THROUGH RUNOFF FROM SOILS

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Abstract

Soil erosion is shown as one of the main causes of soil degradation all over the world. Surface runoff as a result of human activities such as inappropriate land use and soil tillage can lead to severe erosion and loss of nutrients, which can adversely affect soil productivity. In recent years, mulching is one of the most widely used soil protection measures to prevent erosion and surface runoff. The aim of this study is to determine the effects of different mulch materials and dose applications on total organic carbon, phosphate, total nitrogen transportation and the effects on pH and electrical conductivity of surface runoff water generated from experimental plots under simulated rainfall conditions in the laboratory. Three mulch rates (2, 4, 6 t/ha) and three mulch types (straw, dry weed and peanut hay) were studied and compared to un-mulched plots. Simulated rainfall was applied an hour on the experimental plots. The rainfall intensity was 97 mm/h. The surface runoff water formed during the application was collected and and analyzed for total organic carbon, phosphate, total nitrogen, pH and electrical conductivity. Study results showed that the most effective mulch and total dose of 4 tons / ha of peanut hay mulch was found in total nitrogen and total organic carbon transportation. Straw mulch and total dose of 6 tons/ha of this mulch was the most effective in phosphate transportation by surface runoff.

Keywords: Mulching, Surface Runoff, Erosion, Total Organic Carbon

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ANALYSIS OF RELATIONSHIP BETWEEN WASTE MANAGEMENT AND THE EUROPEAN UNION ENVIRONMENTAL LEGISLATION IN THE MINING SECTOR

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Abstract

Mining is one of the oldest industries and extracts solid materials and minerals necessary to produce many of the modern products in everyday life. The aim of mining is to provide the energy and natural raw materials needed for national development and socio-economic development to the industry. However, there are inevitably many problems such as vegetation and land degradation, water regimes, gas emissions, wastes, dust and noise during and after mining activities. Mining wastes are one of the types of wastes that must be carefully managed in terms of both quantities and different characteristics (e.g. hazardous, non-hazardous, inert). According to the data of the Turkish Statistical Institute (TURKSTAT) 2018, a total of 45 million tons of waste were generated by the manufacturing industry, thermal power plants, organized industrial zones, mining enterprises and health institutions, 5.7 million tons of which were dangerous. It was determined that 802 million tons of this waste were constituted pickling material/uneconomic rock waste from the mining sector.

It will be possible for our country to reach its sustainable development targets at a faster pace and to increase the international competitiveness of our industry sector with environmentally friendly technologies. This is due to the work in the area of integrated waste management to maximize the recovery rate of waste. The basis of integrated waste management; waste prevention, waste reduction, reuse, recycling, energy recovery, disposal hierarchy. In this study; after the mining activities, the environmental impacts and management of the wastes, as well as the recycling and reuse alternatives, as well as the analysis of the harmonization process with the European Union Environmental Legislation are put forward.

Keywords: Environmental Legislation, EU, Mining, Waste Management, Recycling

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BENEFICIAL ROLES OF FRESHWATER MUSSELS IN THE ECOSYSTEM

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Abstract

Freshwater mussels are an important part of the ecosystem and has several important roles in the ecosystem such as recycling and storage of food, substrate and food network modification, environmental monitoring feature (ecological indicator), water treatment (biofiltration), mussel crust industry, jewelery making and being a food source. The ecosystem services provided by mussels are directly proportional to the decrease in the mussel population. Much more information is needed about the economic, social, ecological value and magnitude of these ecological roles provided by freshwater mussels. They contribute to the food web ecology by affecting the bio-sedimentation and biodegredation of nutrients in the sediment directly or indirectly. In addition, the physical structure of mussel shells constitutes an habitat for other organisms. In this review, the beneficial roles of bivalve members, which constitute an important group of biodiversity at the point of biodiversity, have been examined in detail and it is tried to be emphasized that they are very important for aquatic ecosystem.

Keywords: Freshwater Bivalve, Ecology, Food Web, Biomonitoring, Ecosystem

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SURVIVAL RESISTANCE OF THE LAND SNAIL *(Helix aspersa)* AT BIODIVERSITY POINT

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Abstract

In this study, the summer and winter sleep processes of Helix aspersa were observed and the survival time without feeding was investigated. 90 snails collected in Iskenderun were placed in specially designed aquariums called pen in March 2017. The research lasted for 24 months depending on the survival conditions of the snails. The periods of aestivation and hibernation were determined. First aestivation was observed in July, August, September and second aestivationwas observed in June, July and August. Then, First hibernation was observed in November, December, January and February, while the second hibernation was observed in November, December, January, February and March. At the begining, middle and end each estivation and hibernation process, the snails were awakened by spraying method to observe the movements of the snails on the glass surface. Snails were fed only after the aestivation and hibernation process by lettuce in the morning (total of 8 times) during 24 hours. Survival rates of end of 1. Aestivation, 1. Hibernation 2. Aestivation and 2. Hibernation period were found as 94.3%, 73%, 26.6% and 1.1%, respectively. In this study, the determination of survival resistance of land snails was investigated and it will be useful in snail breeding while considering climatic variability, which is an important criterion of biodiversity.

Keywords: Aestivation, Hibernation, Survival Rate, Spraying Method

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RELATIONSHIP BETWEEN MUSSELS-HOST FISH IN THE LIFE CYCLE OF FRESHWATER MUSSEL

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Abstract

One of the most important differences between Unionid mussels and other freshwater bevalves is their unique life cycle. Unionid mussels are waiting for a host fish to complete the life cycle, while free-floating larvae of other bivalve family members can reach the adult stage without a host. Freshwater mussels incubate their eggs by internal fertilization in the marsupial section of their gills. When it comes to the glochidia larval stage, it must be connected to a suitable host fish in order to survive and pass the metamorphosis. The relationship between freshwater mussel and host fish is the sustainable balance of biodiversity in the aquatic ecosystem. For many years in Europe and the US, freshwater mussels, which have been subjected to species loss due to overfishing for the shell industry, are important mollusc individuals who need to be extensively studied in biodiversity due to their private life cycles. The host fish selectivity of freshwater mussels that contribute to the environment due to their biomonitor properties requires evaluation in privileged living group. In this review, it was emphasized that freshwater mussels, which are not yet threatened with extinction, are necessary for species diversity in Turkey.

Keywords: Freshwater Mussel, Unionoidae, Glochidia, Host Fish, Mussel Gill

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BIOMATERIAL RESOURCES AND USAGE AREAS

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Abstract

Biomaterials are natural or composite materials used to perform the functions of living tissues that have lost their function in the human body. For many years, biomaterial studies have been conducted on many sources such as fish waste, tooth enamel, human, cattle, sheep, turkey, crocodile and chicken bone due to their high calcination abilities. Also, for he production of hydroxyapatite, wide range of studies are carried out by using cattle bones, coral reefs, ivory, egg and mussel shell. Biomaterials are widely used not only as an implant in orthopedics and dental areas in the medical world, but also in various pharmaceutical products and biotechnological devices that are placed outside the body but interact with the body. In this study, the usage areas of biomaterial were given in detail, and the emphasis was placed on the biomaterial selection of biocompatibility. In addition, in this review, attention was drawn to the waste mussel shells, which is a new source of biomaterials, with reference to relevant publications detailing various aspects of the subject.

Keywords: Biomaterial, Biocompatibility, Hydroxyapatite, Mussel Shell, Graft

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LAND SNAILS HYPOMETABOLISM STRATEGY AND EPIPHRAGM

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Abstract

Hypometabolism in land snails is an adaptive mechanism that enables survival in negative environmental conditions. Thanks to the hypometabolism, the organism can syncronize with environmental conditions fully, and it can survive in habitats with high temperature and humidity changes. The snails protect themselves from the extreme cold and heat conditions by the epiphragm layer from the cold conditions, hiding themselves in various ways upon the approach of the adverse air. Epiphragm is a hard cover formed by limestone salts of mucus secreted by the snail. Before the snail is drawn into the shell, it closes the opening in the pulmonary region by releasing the calcified glands from the adjacent mantle. Epiphragm is an important structure that occurs at the beginning of the hypometabolism process. The land snails, which accumulate energy and water reserves (glycogen, lipids, proteins) before the period of estivation and hibernation, are gradually consuming these reserves with the hypometabolism ability. In the hypometabolic process, coordinated changes in the phosphorylation of many cellular enzymes and proteins are observed. In this adaptation process, a broad information survey was conducted to understand the habitat requirements and to predict the response to environmental changes. The main purpose of this study is to examine the importance of *Helix aspersa* hypometabolism mechanism based on the studies. In this review, a new perspective on snail breeding is presented with the knowledge of the mechanism of hypometabolism at the upper limits of ecological conditions.

Keywords: Land Snail, Helicidae, Hypometabolism, Epiphragm, Energy Reserves

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THE EFFECT OF BLACK COLOR ON THE WEIGHT LOSS OF THE LAND SNAIL (*Helix aspersa*) IN ESTIVATION PERIOD

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Abstract

In this study, the effect of dark shell color on weight loss was investigated in the period of estivation when temprature was increasing and moisture was decreasing. When the snails (*Helix aspersa*) enter the summer sleep, their shells are painted in black and white. In this study, three groups, one control with replicates, consisting of white colour, black colour and natural colour were formed. 20 snails were planned for each group and a total of 180 *H. aspersa* was used. Begining and end of estivation were determined as the end of June and mid-September, respectively. Weight measurement of each group member was done before and after estivation. The weight loss of the snails painted with black was higher than the others and the difference between the control group and the experimental group was found to be significant by ANCOVA analysis ($p<0.001$). In the process of estivation, it was determined that the light color was advantageous for land snail because of the higher heat absorption in the dark shell. Since weight gain in snail cultivation is an important issue, this study will shed light on the creation of new methods in the land snail culture.

Keywords: Helicidae, Snail Shell, Estivation, Weight Gain

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INVESTIGATION OF MONOCROTOPHOS REMOVAL BY PHOTO-FENTON PROCESS

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Abstract

Organophosphorus pesticides are widely used in both agricultural and residential settings. Monocrotophos (MCP) is a commonly used agricultural pesticide with an organophosphorus structure and has a high risk for reaching surface water sources and underground waters. MCP is an endocrine disrupter, is toxic in aquatic environments and is a human carcinogen. The degradation of MCP through advanced oxidation processes (AOPs), such as homogeneous and heterogeneous photocatalysis, ozonation, photolysis (UV) and UV/O_3, has been described in studies. The biodegradation and photocatalysis of MCP are not feasible for realistic treatment conditions due to their slow degradation rates. Therefore, AOPs based on chemical oxidation, including various Fenton-type processes for aqueous MCP degradation, are increasingly important. Photo-Fenton processes are combination of hydrogen peroxide and UV radiation with Fe^{+2} or Fe^{+3} which produce more hydroxyl radicals in comparison to the conventional Fenton processes or the photolysis.

In this study, the photo-Fenton process tests was used in the new design photo-reactor experimental setup in order to evaluate the effect of UV-A radiation on MCP removal. The effects of an independent variable as UV-A light intensity were investigated by applying conventional optimization. The concentration ranges used in this study were selected as 0.005-0.094 mM for MCP, 0.01-0.05 mM for Fe^{2+} , 0.05-0.25 mM for H_2O_2 and the reaction times changed between 5 and 65 min. In UV/H_2O_2 process 1 mM H_2O_2 was added at the reactor, all experiments were carried out for 30 min. The contents of the reactor were mixed after setting the speed of the magnetic stirrer, which was placed under the reactor. Since heat from the UV lamps can increase the reaction temperature, a cooling fan was mounted on the top cover of the reactor. Using this method, the temperature of the solution in the reactor was maintained at 22 ± 2 ^{0}C. The performance of this reactor was evaluated with the results obtained from the photo-Fenton experiments. The efficiencies of MCP and TOC removal were 76% and 77%, respectively. The results obtained in this study will contribute to the literature because few studies have investigated the effects of increasing UV-A light intensity on pesticide removal.

Keywords: Organophosphorus Pesticides, Pesticide Removal, Reactor Systems

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EVALUATION OF COURSES INCLUDING INNOVATIVE EDUCATIONAL TECHNOLOGIES IN ENVIRONMENTAL ENGINEERING

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Abstract

The aim of the environmental engineering program is to train engineers who can take part in the design, operation, control and construction of engineering structures and systems for reducing and preventing pollution in water, air and soil environments. The responsibilities of an environmental engineer include the reduction of emissions and waste generation, the use of renewable resources, the recycling of waste, the reduction of natural disasters and the provision of environmental technologies necessary for clean production.

Environmental Engineering Department (EED) was first established in 1973 at Middle East Technical University in Turkey, and founded in many other universities since then. As of 2019 in Turkey, Environmental Engineering Education (EEE) is given in 36 departments at 31 universities. In the first years, EEE programs included mainly water treatment, drinking water supply and sewerage for the purpose of public health protection. In the course of time, due to technological and industrial developments, it has been obligatory to adapt the courses that include innovative technology subjects to the EEE curriculum.

In this study, EEDs and current undergraduate education programs in departments of Turkey has been investigated in a comprehensive manner. The differences among the EEDs which are top ranked according to their base entrance scores in the last year were determined. In these departments, the quantity of courses including the subjects of the innovative technologies required by the age and the percentage distributions among the departments were determined. It was concluded that the courses in question corresponded to only 0.75% of all of the curriculums of the departments evaluated. This situation indicates the need to revise and renew the curriculums in all EEDs.

Keywords: Curriculum, Engineering Education, Environment, Innovative Educational Technologies

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BACTERIAL AND FUNGAL DISEASES OF AFFECTING COMMERCIAL CULTURED FROGS (*Pelophylax ridibundus*)

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Abstract

The high yield obtained from cultured animals depends on the diagnosis and treatment of the diseases seen in the animals. The success criterion of frog culture relies on the course, diagnosis and treatment of diseases in establishments. It is known that most of the common diseases in frog culture are bacterial infections and fungal diseases caused by injuries. In this study, the diseases in frog production facility in Aydıncık and some of the juvenile and adult frogs (*Pelophylax ridibundus*) were determined. During the breeding period, the adult frogs (average weight 66, 54±6, 75 g) and some juvenile frogs (average weight 4, 15±5, 32 g) which has bacterial infection such as red leg disease, fungal diseases and the hind limbs consumed as food edema were observed. Diagnosis of disease ponds was isolated and frequently water changed and the disease was prevented from spreading to other ponds. The diseased individuals were taken into a different pond and treated with salt baths and anti-fungal drugs. The course of the disease continued for about 15 days. Regardless of all affords made during this treatment, 17 frogs died. This study will facilitate the identification of diseases that are effective in the breeding of frogs, which is an important export product for our country and contribute to more efficient results from commercial farms.

Keywords: *Pelophylax ridibundus*, Disease, Leg Edema, Bacterial Infection, Fungal Disease

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DISEASES IN LAND SNAIL CULTURE

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Abstract

Snails are not consumed as food in our country, but they are among the most important alternative protein sources in many developed countries. In addition to consuming the snails as food, it is known to be a valuable product in the cosmetics industry. In recent years, for these reasons snail production has become an important sector in many countries. In our country, the production of snails is mostly made by hunting and this rewiew aimed to give information about the diseases that can be seen in the culture of snails in the aquaculture studies to be carried out in next periods. A number of bacterial, fungal and parasitic diseases was observed in different species of snails. Parasitic diseases occured with affect such as *Alluaudihella flavicornis*, *Angiostoma aspersae* (nematodes), *Phasmarhabditis hermaphrodita*, *Fasciola hepatica*, while fungal diseases (pink egg disease) caused by the fungus *Fusarium spp*. Bacterial disease, caused by *Pseudomonas spp.* and these species infect the intestines of the snails and cause significant loss in culture. This review will contribute to the minimization of the deaths seen as a result of diseases in commercial snail farms to be established in our country.

Keywords: Land Snail, Aquaculture, Disease, Parasite, Fungus

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ENERGY EFFICIENCY APPLICATIONS: METAL INDUSTRIES

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Abstract

Nowadays, increasing population and technology have increased the need for people for energy. This increase in energy demand increases the amount of energy usage and decreases energy reserves and causes them to disappear over time. The rapid increase in energy consumption threatens human life due to the thinning of the ozone layer and the increase in greenhouse gas emissions. For these reasons, energy is one of the most important problems of today. In line with the rising prices of energy demand in the foreign dependency countries such as Turkey in terms of energy, it causes great pressure on national economies. Energy efficiency is an indispensable issue due to the continuous increase in energy demand and consequently the decrease in energy resources.

Turkey, a large portion, such as 37% of the energy used in industry is used in the metal industry. In this direction, the applications of energy efficiency studies to metal industrial plants give results in a short time. In this study, it is aimed to provide energy efficiency by considering a metal industry.

The Energy Survey study was started by considering the production part and administrative part of the facility. It is proposed to renew the lighting, computers, sockets and insulation materials in the administrative section with more efficient and less environmentally friendly option. In all these studies, based on the useful lives of the currently used equipment and systems, investments that would not exceed 3 years have been proposed. At the same time, information was given about the engine maintenance which should be done in order to increase the life and efficiency of the currently used engines. Air leakage points found in compressed air systems were determined and annual losses caused by leakages were calculated. The studies that can be done to prevent these leaks are mentioned.

Keywords: Bursa, Energy, Energy Efficiency, Metal Industries

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DETERMINATION OF POLYCYCLIC AROMATIC HYDROBARBONS (PAHs) CONCENTRATION IN INDOOR AND OUTDOOR AIR

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Abstract

Studies on determination of persistent organic pollutants (POPs) such as polycyclic aromatic hydrocarbons (PAHs) in indoor and outdoor air are increasing day by day. This is mainly due to the studies on the negative impacts of POPs on the environment, especially on human health. The aim of this study was to determine the concentrations of PAHs in indoor (living room and kitchen) and outdoor air samples taken from five different houses in Bursa between July 2014-February 2015. In summer, the PAH concentrations measured in the living room, kitchen and outdoor air 24.96±21.27, 31.37±43.08 and 8.07±2.98 ng/m^3, respectively. Similarly, the PAH concentrations measured in the autumn and winter seasons were 22.27±21.79 and 26.55±16.75 ng/m^3 in the living rooms, 23.50±5.54 and 31.99±30.44 ng/m^3 in the kitchens, and 20.38±11.28 and 227.94±46.15 ng/m^3 in the outdoor air, respectively. In this study, indoor and outdoor air concentration (I/O) ratio was used to identify origins of PAHs. If this ratio is greater than 1, the source is usually from the indoor environment, if the source is less than 1, the source is usually caused by the outdoor environment. The I/O ratio was greater than 1 for almost all compounds in summer, some compounds were greater than 1, while others were less than 1 in the autumn, and finally almost all compounds in winter less than 1. The I/O ratio obtained in this study was determined to be the indoor air source of the PAH concentrations measured in the indoor environment in summer. Similarly, high PAH concentrations measured in winter were determined to be the outdoor air due to increased combustion activities.

Keywords: Air Pollution, Indoor, Outdoor, PAHs, Persistent Organic Compound

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WATER HYACINTH ROOTS AND NATURAL RICE HUSK AS AN ECONOMIC POTENTIAL BIOMASS FOR THE REMOVAL OF ORGANIC POLLUTANTS AND PHARMACEUTICAL INDUSTRIAL RESIDUES FROM WASTEWATER

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Abstract

Water scarcity in the world combined with a growing population presents a challenging dilemma that limits agricultural expansion to ensure food security. Thus, it is imperative to develop sustainable water resources to overcome this issue. In this study, an experimental investigation was conducted to examine the applicability of water hyacinth roots as well as rice straw and rice husk fibers in the removal and cleanup of some organic and drug residues, such as, phenolic pollutants, some nitrogenous organic pollutants and pharmaceutical industrial residues. The water hyacinth root is an important aquatic weed plant that abundantly exists in sub-tropical regions of the world. These naturally existing materials were utilized as bio-accumulators and ecofriendly bio-absorbents in an innovative and efficient technique for the removal and cleanup of water pollutants. Three of the most carcinogenicity causative contaminants, which are Ciprofloxacin, Sulfamethoxazole and Albendazole, have been efficiently cleaned up from pharmaceutical wastewater using a mixture of the previous biomass after minor modification. The cleanup efficiency was monitored using HPLC-UV, Agilent Zorbax C18. It was observed that over 98% of the pollutants were removed efficiently. The results of this study are compared with that obtained when a granular activated carbon (GAC) is used.

Keywords: Chemical Pollution, Drug Residues, Organic Pollutants, Rice Husk, Water Hyacinth Roots

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SITE SELECTION FOR INDUSTRIAL AREAS GEOGRAPHICAL INFORMATION SYSTEM BASED SIEVE ANALYSIS AND ANALYTICAL HIERARCHY PROCESS: SIVAS CITY EXAMPLE

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Abstract

Rapid population growth, especially with the industrial revolution and the rapidly developing technology and the choice of basic development as industrialization, increase the pressures on the natural environment and cause the natural environment to lose its power to renew itself. The most important factors in these problems are that the balance of protection and use cannot be established sufficiently and the natural potential characteristics of the area are not taken into consideration in the area utilization plans. The basis of natural and cultural resources conservation management should include planning, design and management that will enable the functionality and multi-faceted utilization of the physical environment.

In the face of developments in the global scale, the necessity to plan nature based on scientific principles as the main source of human needs in the whole world is reflected in the agenda of our country. Site selection studies aiming to maintain human-nature relations and at the same time establish a balance between environmental and economic developments have gained importance. Due to rapid urbanization, site selection studies for the developing industrialization sector have become one of the priority issues in our country as in the whole world. In order to determine the most suitable areas for the industrial sector, conformity mapping should be done by taking into account the biophysical, social, economic, cultural and other environmental variables of the current work areas. Geographic Information System (GIS) based sieve analysis and Analytic Hierarchy Process (AHP) methods are widely used in site selection studies.

In this study; with the help of GIS based sieve analysis and AHP methods, the most suitable areas for the industry were determined in the vicinity of the city center of Sivas. In this context; 1/25.000 scaled numerical maps were used to reveal the properties of the study area such as terrain ability classes, geology, slope, erosion, existing land use, distance to water resources and distance to main road. These data were analyzed by GIS based on sieve analysis developed on the basis of GIS and AHP methods. In terms of industrial areas; the most suitable areas determined according to both methods were determined in the northeast of Sivas city center.

The most suitable areas for industrial areas constituted 17.12% of the study area. It is suggested that the results obtained from this study should be taken into consideration by the decision makers in future planning studies for the industrial sector.

Keywords: Industrial Areas, Site Selection, Sieve Analysis, AHP

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FUZZY COGNITIVE MAPS FOR UNDERSTAND HUMAN-AQUIFER INTERACTIONS IN THE PALAS BASIN

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Abstract

The complexity human-aquifer interactions prevent the sustainable management of groundwater systems. This study examines the human-aquifer interactions in the Palas Basin (Kayseri, Turkey) to reveal how goals, perceptions and understandings of water users affect the groundwater system. Palas Basin is an agricultural basin where groundwater is almost the only source for irrigation. Groundwater also feeds a groundwater dependent lake ecosystem (Tuzla Lake). In recent years, significant declines in groundwater and lake water levels and deterioration of water quality were documented. In this study, we examined the relationships between human-aquifer systems using fuzzy cognitive approach. Cognitive maps are casual maps that reflect the perceptions and understandings of different people/groups. The cognitive maps were prepared with farmers and government officials. The maps were transformed into square adjacency matrices for further analyses. Graph theory indices (density, indegree, outdegree, complexity, centrality, hierarchy index) were calculated to reveal the characteristics of maps. Statistical methods were used to compare maps of farmers and government officials. Social cognitive maps were prepared by augmenting individual cognitive maps. This study showed that irrigation/irrigated agriculture is among the most important variables in the Palas Basin. The priority of people in the Palas Basin is increasing agricultural yield and profits by increasing cultivation of high water consuming crops and irrigation/fertilization. Both farmers and government officials think that groundwater levels decline in the basin due to extensive pumping and soil quality deteriorate due to use of chemical fertilizers. Still, farmers are more focused on short-term economic gains rather than the sustainability of the agricultural system. Water requirement of Tuzla Lake ecosystem is not mentioned frequently. Cognitive mapping provided an effective tool for revealing the understandings of water users and water managers about the groundwater system. This information could be used in the future for developing groundwater management strategies for in the Palas Basin.

Keywords: Cognitive Mapping, Groundwater Management, Human-Aquifer Interactions, Palas Basin

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MODELING OF WATER QUALITY INDEX OF DRINKING WATER TREATMENT PLANT EFFLUENT WITH ARTIFICIAL NEURAL NETWORKS

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Abstract

In this study, modeling of drinking water treatment plant was studied by using Artificial Neural Network tool of Matlab software v. 2018b with different architectures. All data were obtained from the drinking water treatment plant by taking the average of monthly data for 1 year. Treatment efficiency of the treatment plant was determined by taking into account of input values of total 19 physicochemical, chemical, and microbiological parameters with output value Water Quality Index which was developed by Steinhard, Schierow, and Sonzogni. The model performance was evaluated with the parameters of Mean Squared Error, and Correlation Coefficient. The suitable architecture of the neural network model was determined after several epochs and errors. According to the modeling study, ANN can estimate plant performance by more than 0.95 according to the consistency between the observed and predicted output variable.

Keywords: Drinking Water, Treatment Plant, Model, Water Quality Index, Artificial Neural Network

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DISPOSAL OF SIVAS WASTEWATER TREATMENT PLANT TREATMENT SLUDGES WITH VEGETABLE WASTE

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Abstract

Today, in the world and in our country, the disposal of treatment sludge from a large number of facilities is one of the most important environmental problems. Sivas wastewater treatment plant is designed for 345, 000 equivalent populations and 78, 500 m^3/day flow rate. The process is extended activated sludge system and carbon nitrogen and phosphorus removal is done. The facility is built on an area of approximately 11.6 ha. The sludge from the final sedimentation tanks to the sludge dewatering unit is conditioned and then sent to the centrifuge-decanters to dewater. The resulting sludge contains about 25% KM. 53 tonnes of sewage sludge is formed per day.

Wastewater treatment plant return sludge (RS) was used as the primary substrate and the suitability of vegetable waste (VW) use as an additional substrate was investigated. Batch experiments were performed under mesophilic conditions (37±1 °C) and inoculum 5 g of VS/l was added at a different VW/RS ratio with an ideal substrate / inoculum (S/I) ratio of 1.5 and methane production potentials were measured by standard BMP test. It was evaluated. Only sludge (0% vegetable waste) and only vegetable waste (100% vegetable waste) was used for control purposes. By increasing the amount of vegetable waste added to the treatment sludge, it was determined that COD removal efficiency, removal efficiency of VSS, and methane production increased.

As the vegetable waste increased (65% and over), COD removal and biogas production increased. By applying kinetic models to represent the anaerobic digestion process, vegetable waste can be suggested as an additional substrate

Keywords: Waste Sludge, Anaerobic, COD Removal, Biogas

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TOXICITY ASSESSMENT OF CARBAMAZEPINE ACTIVE INGREDIENT BY SOME TOXICITY TEST METHODS

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Abstract

The occurrence of pharmaceuticals in environment has led to growing concern in recent years, particularly with regard to their potential risks to the aquatic environment. Pharmaceuticals have been frequently detected in aquatic environment worldwide and suspected for potential ecological consequences. The main concern is related to the persistence of these micro pollutants in the environment due to a combination of characteristics, which includes toxicity in human and animal health. Additionally, many residual pharmaceuticals are resistant to conventional water and wastewater treatment.

In this study, most abundantly used anti-epileptic pharmaceutical group at carbamazepine active ingredient was examined for this acute toxicity by using *Lepidium sativum, Daphnia magna* and *Vibrio fischeri* toxicity test methods. According to these different toxicity test methods were used and compared sensibility with each other. When all three toxicity test results were analyzed, different sensitivities were determined for this pharmaceutical samples.

Toxicity test results were expressed in toxic units (TU). For all three experiments was evaluated, toxic unit values were explained respectively, *Daphnia magna>Vibrio fischeri>Lepidium sativum.* It was observed that the most sensitive values were obtained from *Daphnia magna* toxicity test method among others.

As a result, toxicity of carbamazepine was determined for plants and aquatic life and different toxicity test methods were compared with sensitivity. So these studies, in terms of feasibility toxicity test methods are very important on wastewaters. Also, looking from the viewpoint of next studies of toxicity will be lightning.

Keywords: Acute Toxicity, Ecotoxicology, Pharmaceuticals, Toxicity Tests, Toxic Unit

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THE EFFECT OF GRAPHITE ADDITION ON BIOGAS PRODUCTION FROM ANIMAL WASTE AND FOOD WASTE

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Abstract

In recent years, solid waste management has become one of the most attractive subjects in the field of environmental engineering. For many countries, sanitary landfill is no longer a sustainable waste management method due to the need for space and leachate. Instead of sanitary landfill, alternative methods (composting, anaerobic digestion, incineration, etc.) are used to convert waste into raw materials or energy sources. The anaerobic decomposition (AP) process is the decomposition of organic and inorganic substances in the absence of oxygen with the aid of microorganisms to the final products such as CH_4, CO_2, H_2S and NH_3. With the AP process, both waste disposals and biogas, a renewable energy source, are produced. Conductive material such as active carbon, carbon nanotubes, stainless steel and graphite supported with the AP technology this process the problem can be solved of negative operating conditions or the long lag phase. Graphite is a carbon allotrope with a large surface area, excellent heat and electrical conductivity. In this study, the effect of graphite on biogas production potential was investigated. For this purpose, in the batch reactors with an effective volume of 300 ml, different wastes (Food waste (FW), animal waste (AW) and mixtures) and different graphite concentration (0; 0, 5; 1; 2 g/L) were used. The reactors were operated as 3-parallel for 30 days in mesophilic (37 °C±1) conditions and shaking incubator at 150 rpm. Total biogas and CH_4 analyzes were performed to determine the effect of graphite on biogas production potential. Graphite addition positively has affected the biogas production on AW and mixture at 6% and 13% ratio, respectively. On the other hand, there is no significant increase in biogas production from FW.

Keywords: Carbon Based Conductive Materials, Graphite, Food Waste, Animal Waste, Biogas

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PRODUCTION OF BIOGAS FROM ORGANIC WASTES IN ECO-CAMPUS MODEL: EXAMPLE OF NİĞDE ÖMER HALİSDEMİR UNIVERSITY

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Abstract

Energy demand is constantly increasing due to population growth and technological advances in the world and in our country. Another important result of population growth is the increasing at amount of waste generated. In recent years, new legal regulations and social trends in our country bring up zero waste approach. In this context, laws and regulations are prepared in order to prevent waste generation, to minimize waste in case of prevention is not possible and to establish an efficient zero waste management system for the recycling / recovery of waste. How important and necessary the recovery/recycling activities carried out at the municipality scale, university campuses with a town population are also important. In this study, the sources of organic waste occurring in the Niğde Ömer Halisdemir University campus area were investigated and it was aimed to determine the biogas production potential obtained from these wastes. For this purpose, samples were taken from food and agricultural wastes and the biogas production potential of these wastes and mixtures were investigated. The batch reactors with 300 ml effective volume were operated for 30 days at mesophilic (37 °C±1) conditions, shaking at 100 rpm, and daily biogas production was measured. In the term of biogas production; food waste shows 58% and 20% higher biogas production from agricultural waste and waste mixture, respectively. In addition to experimental studies, the biogas potential of the campus wastes was calculated and compared with the experimental results.

Keywords: Eco-Campus, Zero-Waste, Food Wastes, Agricultural Wastes, Animal Wastes, Biogas

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CHALLENGES IN MULTI-SCALE NUMERICAL MODELLING OF COMPOSITE MATERIALS

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Abstract

Demand and requirements of composite materials is continuously growing. One of the techniques for design, analysis and optimization of composite materials is multi-scale numerical modelling. However, this advanced technique has many challenges to overcome. Some examples of multiscale analysis for fiber concrete and natural fiber based materials will be used to demonstrate main challenges.

Multiscale numerical modelling has gain its significance due to increase of computation power. However, there are still challenging to perform FE2 type of simulation for realistic industrial problems due to too large computation time. Therefore, one of challenge to overcome is reduction of computation time by doing fully or partially uncoupled numerical simulations. There are techniques such as design of precomputed database, model reduction techniques and others to do this, but they usually works fine for specific type of problems and still there are lack of general acceptable technique.

Another class of problems is related to material properties that should be defined on micro or even nano-scale. Mechanical properties, such as strength and stiffness on those scales are very challenging to obtain experimentally. Therefore, sometimes, it is reasonable to go on molecular scale and perform molecular dynamic simulation for getting effective mechanical properties of fibers or matrix.

Despite of many challenges in multi-scale numerical modelling, this technique is very promising and will be widely used for design of composite materials.

Keywords: Numerical Modelling, Multi-Scale Simulations, Composite Materials, Mechanics of Materials

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COMPARISONS OF BOWDEN VS DIRECT EXTRUDER DRIVE ON FDM PRINTERS

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Abstract

The FDM (Fused Deposition Material) printer is the printer technology that creates products with the fused deposition material method. In FDM printers, the filament is pushed into the heated nozzle using the extruder. FDM printers have two types of extruders that transmit the filament on the reel to the hot nozzle. The basic principle in both types is to transmit the filament to the heated zone. The first type is the direct extruder type. In direct extruder type nozzle and extruder are very close. Direct type is the most widely used type. The second type is Bowden extruder type. In Bowden extruder type, extruder is mounted away from the nozzle and rail car pairs in the x axis of the printer and the filament is carried out with teflon pipe. Both extruder types have positive and negative sides. In this study, it is investigated what type of extruder can be used according to the plastic and desired performance. Two extruder types are compared in terms of cost and performance. The effects of extruder types on slicer program were investigated.

Keywords: Bowden, Direct, Extruder, FDM, 3D Printer

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THE ROLE OF SOLAR ENERGY TECHNOLOGY SUPPLY IN THE UTILIZATION OF SOLAR ENERGY POTENTIAL: THE CASE OF TURKEY

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Abstract

The importance of energy which has a significant role in socio-economic development of countries is increasing day by day as a result of a fast growing population and industrialization. The fact that the fossil resources are insufficient to meet the demand if new reserves cannot be found in the near future and the threat to human and environmental health lead the countries to seek renewable clean energy resources. Turkey, which is dependent on foreign energy due to being poor in terms of fossil fuels as a country, although has high solar energy potential, it cannot utilize this potential fully. The point where countries such as Germany, Italy and France have reached in electricity generation from solar energy although they do not have higher solar energy potential compared to Turkey is noteworthy. It is known that one of the reason for this difference between Turkey and these countries is the supply and cost of technologies in solar energy, as seen in the literature. In this paper, the importance and potential of solar energy in country and global scales, the technology used in the utilization of this potential, the problems encountered in solar power technology supply and their impacts have been studied. This study will highlight problems encountered in solar energy technology supply and the role of supply in utilization of solar energy potential to present a backdrop for solar energy potential in Turkey from a viewpoint of technology supply.

Keywords: Energy Consumption, Renewable Energy, Solar Energy, Technology Supply

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A STUDY ON THE DEVELOPMENT OF DIFFERENT COMMERCIAL CULTURE YEASTS USED FOR THE EVALUATION OF APPLE IN ETHYL ALCOHOL FERMENTATION

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Abstract

Our country is among the countries that produce a significant amount of fruits in the world. On the other hand, due to the lack of planning in fruit production, each year different products cannot be evaluated due to production surplus, lack of exports and non-standard production, and product prices decrease. As a result, the manufacturer leaves the product in the field. In addition to damaging the country's economy and the producer financially, remained product is a suitable environment for some diseases and pests. In order to evaluate these products and to prevent losses and to make them more efficient, alternative products should be produced. One of them is the production of fruit wine.

Fruit winemaking is not very developed in our country. Our country is rich in fruit growing and potential. On the other hand, fruit winemaking is very small. Apples among fruits grown in Turkey are situated in the front row. Most of them are evaluated as table apples or processed into fruit juice. However, in excess of production, production surplus and/or non-standard apples are allowed to rot and this potential cannot be evaluated. Therefore, in order to evaluate these apples and prevent apple loss, it is necessary to produce products such as cider in order to provide a more effective/efficient use.

In this study, the effect of the addition of three different commercial *Saccharomyces cerevisiae* wine yeasts (*Actiflore PM*, *Lalvin* and *Zymaflore VL1*) on the growth of yeast was investigated in apple must obtained from Golden and Starking Delicious varieties.

Keywords: *Actiflore PM*, Apple, Cider, *Lalvin*, *Saccharomyces cerevisiae*, commercial yeast, *Zymaflore VL1*

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A RESEARCH ON CHANGES OCCURING IN CHEMICAL CHARACTERISTICS WITH THE SPOILAGE OF SHALGAM JUICE (ŞALGAM)

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Abstract

Shalgam juice (Şalgam) is a refreshing drink which is obtained by fermentation of lactic acid and is very popular especially in the southern provinces of our country. Black carrots are mainly used as raw materials for production purposes. In addition, lesser amounts of bulgur flour (setik), yeast/sour dough, rock salt and drinking water are also used. On the other hand, if available, turnip radish is also used.

Nowadays shalgam juice is especially consumed by the local people because it complies with the food of the region where it is consumed and completes them in terms of taste. However, the most important problem with shalgam juice for manufacturers and consumers is the shelf life. Shalgam juice is a quickly perishable drink. However, a study on spoiled shalgam juice was not determined. In this study, different shalgam juices were taken from the market. Some chemical analyses (total acidity, pH, dry matter, ash, anthocyanin, colour analysis) were made in these shalgam juices. Decrease in total acidity values and increase in pH values were determined with spoilage in all shalgam samples.

Key words: Spoiled Shalgam Juice, Chemical Properties, Total Acidity

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INVESTIGATION OF THE EFFECT OF ULTRASOUND APPLICATION ON PHENOLIC COMPOUND OF LUPIN (*Lupinus albus* L.) AND OPTIMIZATION BY RESPONSE SURFACE METHOD

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Abstract

The usage of the lupin produced in Konya and its vicinity has not found an effective place in the food industry due to its bitterness. Alkaloid, a source of bitterness, is soluble in water and traditional methods are preferred to remove bitterness. Traditional method is carried out by keeping the kernels in water for 4-7 days in special pools after boiling. It is known that it passes into water in other water-soluble substances during this long process. In this study, the total phenolic content of lupin was compared with the traditional method. As a traditional method for removing bitterness of lupin, 100g of sample was kept in hot water at 100°C for 90 minutes and then stored in tap water at room temperature for 4-5 days. As an alternative to the traditional method, ultrasonic treatment was used by ultasonic bath. 100g of lupin was placed in the ultrasonic bath and ultrasound power was selected as 60-80-100%. Ultrasound application time was selected as 60-120-180 minutes and temperatures were applied as 20, 40 and 60°C and the next holding time was determined as 2, 3 and 4 days. Ultrasonic debittering process was compared traditional method in terms of total phenolic content of lupin. The temperature of ultrasound process and waiting time after ultrasound treatment were found to be statistically important on the total phenolic compund of lupin ($p \leq 0, 05$). On the other hand, ultrasound power and application time were not statistically significant on total phenolic substance ($p > 0.05$). Equations and graphs of total phenolic content of lupin were obtained by the response surface method in detail. Total phenolic content were determined as 527.9602±40.74 mg/kg (GAE, db) at the end of the process. On the other hand, the highest value of 3247, 3630±243, 99 mg/kg (GAE, dry basis) total phenolic substance of lupin was recorded.

Keywords: Extraction, Lupin, Total Phenolic Content, Ultrasound

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COMPARISON OF SOME PHYSIOLOGICAL AND BIOCHEMICAL PARAMETERS OF *SALVIA TOMENTOSA* DISTRIBUTED IN ROADSIDE AND INNER PARTS

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Abstract

The population of Fındıkpınarı plateau (Mersin) reaches thirty times in summer due to plateau tourism. Roadside plants are significantly affected by the density of vehicle traffic on the plateau road. The aim of the study is to examine the degree of sage which has a natural distribution in the Fındıkpınarı plateau, has a pharmaceutical value and is important for the biodiversity of our country, affected by roadside stress factors. The sage (*Salvia tomentosa* Miller) plants collected from the fındıkpınarı plateau roadside and inner parts were transported from the land to the laboratory by applying the cold chain. Photosynthetic pigment (chlorophyll a, chlorophyll b, total chlorophyll and carotenoid), total protein, proline and antioxidant enzyme activity (superoxide dismutase-SOD, catalase-CAT) analyzes were performed and evaluated statistically. The total chlorophyll (69.37%), carotenoid (12.22%) and total protein (583.52%) amounts of inner part samples were higher than those of roadside samples. The amount of proline (50.32%) and CAT activity (24.61%) were lower in the inner part samples. In addition, SOD activity results are parallel to CAT activity results. The obtained data show that the sage samples collected from the roadside are exposed to more stress than the inner parts. The stress experienced affects the vital activities of sage plants negatively. Roadside stress factors will be determined by additional studies and measures can be taken to protect natural resources and biodiversity.

Keywords: Antioxidant Enzyme, Environment, Photosynthetic Pigment, Proline, Sage

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INVESTIGATION OF THE EFFECT OF DRYING METHODS ON THE COLOR VALUES OF PRODUCTION OF ENCAPSULATED COLORANT MATTER FROM RED CABBAGE (*Brassica oleracea* L.)

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Abstract

Red cabbage will be used for production of colorant matter in this study. Today, colorants in the modern food industry has become indispensable additivies. The anthocyanin content in fresh red cabbage is reported to be 69-94 mg/100g. Anthocyanins are known in nature as well as being one of the most widely used color substances. Heat treatment is one of the methods commonly used in food production and generally used to extend the shelf life of food or to produce a new product. However, during the heat treatment, it is stated that the nutritional value of food is significantly reduced due to the destruction of some bioactive components such as heat sensitive phenolic compounds. Maltodextrin is one of the most widely used encapsulation agents. The encapsulation method will be applied to increase the stability of the color matter produced. Encapsulation method will be done by spray drier and freze drying technique tried alternatively. Spraying solution was dried with spray dryer at a temperature of 140-160ºC. In the freeze-drying process, the feed solution was allowed to freeze at -80°C before freezing and then allowed to stand until the moisture was completely removed from the material. Color values of powder food dyes produced were compared and investigated in this study. According to the results of the powdered products, the highest L* and a* values were obtained with spray-dried maltodextrin in the samples 56.78±0.05 and 27.71±0.01 were obtained. Usage of maltodextrin and drying method were found to be statistically effective on L* and a* values ($p<0.05$). The highest ΔE value was obtained as 65.13±0.05 by spray drying method with maltodextrin coated. When the change in mE value was examined, it was seen that drying methods and use of coating material were statistically significant ($p<0.05$).

Keywords: Drying, Maltodextrin, Red Cabbage

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EFFECT OF INFLOW DISTRIBUTION RATIO ON NITROGEN REMOVAL PERFORMANCE IN STEP-FEED ANOXIC-AEROBIC SEQUENCING BATCH REACTOR

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Abstract

In this study, the effect of the inflow distribution ratio to nitrogen removal performance in the step-feed anoxic-aerobic sequencing batch reactor was investigated. The experimental study was conducted in three different reactors (R1, R2 and R3). The inflow distribution ratio was chosen as 50: 33: 17 in R1, 34: 33: 33 in R2 and 17: 33: 50 in R3. COD removal efficiency was found to be 91% in all three reactors. The NH_4^+-N removal efficiencies in R1, R2 and R3 are 98%, 97% and 90%, respectively. Total inorganic nitrogen (TIN) removal efficiency was found to be 89%, 88% and 77% in R1, R2 and R3, respectively. Similar results were obtained in the input distribution rates of 34: 33: 33 and 50: 33: 17 in terms of nitrogen removal efficiency, but there was a decrease in nitrogen removal at the input distribution rate of 17: 33: 50. It has been found that the inflow dispersion rate is an important factor in the nitrogen removal performance of an anoxic-aerobic sequencing batch reactor.

Keywords: Sequencing Batch Reactor, Nitrogen Removal, Step-Feed, Inflow Distribution Ratio

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EFFECT OF ANOXIC/AEROBIC PHASE RATIO ON NITROGEN REMOVAL PERFORMANCE IN STEP-FEED ANOXIC-AEROBIC SEQUENCING BATCH REACTOR

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Abstract

In this study, the effect of anoxic/aerobic phase ratio to nitrogen removal performance in the step-feed anoxic-aerobic sequencing batch reactor was investigated. The experimental study was conducted in three different reactors (R1, R2 and R3). Anoxic/aerobic phase ratio is 1/1 in R1, 1/2 in R2 and 1/3 in R3. COD removal efficiency was found to be 90%, 91% and 91% in R1, R2 and R3, respectively. The NH_4^+-N removal efficiencies in R1, R2 and R3 are 91%, 97% and 98%, respectively. Total inorganic nitrogen (TIN) removal efficiency was found to be 82%, 88% and 80% in R1, R2 and R3, respectively. In reactors, similar results were obtained in terms of the removal of organic matter, while in R2, higher removal efficiencies were obtained in terms of nitrogen removal efficiency. As a result, the anoxic/aerobic phase ratio 1/2 is more suitable for the nitrogen removal performance of the anoxic-aerobic sequencing batch reactor.

Keywords: Sequencing Batch Reactor, Nitrogen Removal, Step-Feed, Anoxic/Aerobic Phase Ratio

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DETERMINATION OF SURFACE WATER QUALITY OF KARASU STREAM (HATAY) ACCORDING TO THE PHYSICOCHEMICAL PARAMETERS

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Abstract

Karasu Stream, the most important tributary of Orontes River in Turkey receives its source from Turkey, forms the Turkey-Syria border for 28.1 km and connects with Orontes River in the south of Amik Plain. The Karasu Stream used irrigation purposes has a great importance for Hatay region. In this study, surface water quality of the Karasu Stream was seasonally determined with physico-chemical parameters between the period of February 2017 and October 2017. Water samples were collected from station where before connecting the Orontes River and temperature, pH, dissolved oxygen, total hardness, ammonium nitrogen (NH_4-N), nitrite nitrogen (NO_2-N), nitrate nitrogen (NO_3-N) and phosphate phosphorus (PO_4-P) parameters were investigated in this study. The observed data were evaluated with national and international water quality criteria. Consequently, it can be said that Karasu stream has Class II- less polluted water apart from PO_4-P parameter according to criteria of Turkish Water Pollution Control Regulation.

Keywords: Karasu Stream, Physico-Chemical Parameters, Water Quality

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ASSESSMENT OF WATER QUALITY OF THE ORONTES RIVER BASIN, TURKEY

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Abstract

The Orontes River is the principal river draining to the Levant coastline of the Mediterranean Sea. Orontes river south-western Asia forming part of the border between Lebanon and Syria and between Syria and Turkey. The Orontes River has actual importance for the health of ecosystems for Hatay region. The main reasons underlying the pollution of the Orontes River are farming and industrial activities, domestic wastes, and lack of treatment facilities. In this study, surface water quality of the Orontes River was seasonally determined with physico-chemical parameters. Seasonal water samples were collected from Demirkopru, Samandag regions of Orontes River between the period of February 2017 and October 2017 and temperature, pH, dissolved oxygen, total hardness, ammonium nitrogen (NH_4-N), nitrite nitrogen (NO_2-N), nitrate nitrogen (NO_3-N) and phosphate phosphorus (PO_4-P) parameters were investigated in this study. The observed data were evaluated with national and international water quality criteria. As a result, it can be said that Demirkopru and Samandag stations of Orontes river have Class III- polluted water according to criteria of Turkish Water Pollution Control Regulation.

Keywords: Orontes River, Physico-Chemical Parameters, Water Quality

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INVESTIGATION OF TREATABILITY OF FISH NET CLEANING WATER BY FENTON PROCESS

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Abstract

Advanced oxidation processes (AOPs) are currently accepted as one of the most effective methods for industrial wastewater treatment. Among chemical-driven AOPs, Fenton process has numerous promising applications in treatment of toxic and biologically refractory organic contaminants. Turkey has significant capture fishery and aquaculture potential and fisheries industry is one of the four sub-sectors of the agricultural sector. The fisheries sector is made up of marine fishing, aquaculture (fish farming) and processing. The number of fish farms is increasing constantly in Turkey. In fish-farming, the fish nets need to be cleaned at regular intervals. The aim of study is to investigate of treatability of fish net cleaning water by Fenton process. Fish net cleaning water contains dissolved and suspended organic materials and has high salinity. The objective of this study was to investigate chemical oxygen demand (COD) and color reduction from highly polluted fish net cleaning water by Fenton process. The process was carried out at various doses of H_2O_2 and Fe(II), using different reaction times and initial pH. Tested operating conditions were as 1: 1, 1: 2, 5, 1: 5 Fe^{2+}/H_2O_2 concentration ratio, 2, 3 and 4 as pH and 60, 120 and 180 minutes as reaction time to investigate effectiveness of Fenton process The results showed that Fenton process was found to be effective in removing COD and color from fish net cleaning water.

Keywords: Advanced Oxidation Process, Fenton Process, Fish Net, COD, Color

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THE FORMATION POTENTIAL OF TOTAL ORGANIC HALOGENS IN LOW SUVA SURFACE WATERS

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Abstract

In the disinfection process, disinfectants react unintentionally with compounds such as natural organic matter (NOM), bromide and iodide in water to form mutagenic and carcinogenic disinfection by-products (DBPs). Nowadays, 800 DBPs were identified in laboratory studies. It is difficult to quantify all halogenated organic DBPs in individual class species. They can be quantified as total organic halogen (TOX). TOX is an indication of the total amount of organic bound halogen in water as a group parameter. Carbonaceous DBP account for about 50% and less than 20% of the TOX in chlorination and chloramination of natural water treatment, respectively. Specific ultra violet absorbance (SUVA) values have been widely used as surrogates of concentration and reactivity of NOM in formation of DBPs. The aim of the study is to determine TOX formation potential (TOXFP) in drinking water sources. FP tests will ve conducted under five oxidation strategies (chlorination, chloramination, ozonation, ozonation-chlorination, and ozonation-chloramination). Surface water samples with low SUVA were collected from 2 different water sources (Eğirdir Lake and Darıderesi Pond). Adsorbable organic halogen (AOX) analyzer was used to determine TOXFP according to USEPA Method 9020B and TS EN ISO 9562 methods. In addition, total organic carbon (TOC), UV_{254} absorbance and total nitrogen (TN) measurements were conducted to determine water quality. The results for Eğirdir Lake samples showed that TOXFP was highest in chlorination and TOXFP was in order of chlorination > ozonation-chlorination > ozonation-chloramination > chloramination > ozonation. For TOXFP results of the Darıderesi Pond samples, the sequence is chlorination > ozonation-chlorination > ozonation-chloramination > ozonation > chloramination.

Keywords: Adsorbable Organic Halogen, Disinfection by Product, Drinking Water, SUVA

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SELECTION AND IMPORTANCE OF PLANT TYPE FOR ESTABLISMENT OF BUFFER ZONE IN NİĞDE AKKAYA DAM

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Abstract

As a result of various human activities and global warming, pressures on water resources are increasing day by day, and surface waters and groundwater are adversely affected by quality and quantity. There is a need for various regulatory ecological infrastructure services on the basin scale to reduce and control these adverse effects. As hedgegrows, vegetative fitler strips, ponds, constructed wetlands and riparian buffer zones buffer ecosystems can be used as a regional supporting mechanism in water management studies. Riparian buffer areas are valuable ecosystems that are naturally occurring or artificially established around surface water resources, enabling the transition between terrestrial and aquatic ecosystems. These areas have many functions such as erosion prevention, nutrient, aesthetic field formation, flood prevention, foul smell control. The Niğde Akkaya Dam is an important water resource that continually occupies the agenda of the city with various environmental problems. There are several recommendations for reducing the pollution problem of the dam and regulating the environment for the recreational use of the people. In this study, it is aimed to create aesthetic value in the coastal strip of Niğde Akkaya Dam, to control foul smell problem and to reduce the water pollution. In this context, it is aimed to determine the plant species recommended for use in a buffer zone created to contribute to other studies and to protect the ecology.

Keywords: Green Infrastructure, Niğde Akkaya Dam, Pollution, Tampon Zones

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ASSESSMENT OF PHYSICO-CHEMICAL PARAMETERS IN CEYHAN RIVER (TURKEY) WITHIN WATER FRAMEWORK DIRECTIVE

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Abstract

Ceyhan River is one of the major streams of the Mediterranean Region. Its length is 509 km. Born in the vicinity of Elbistan. It forms a large delta in Çukurova and flows into Iskenderun Bay. There are many hydroelectric power plants on the river. Ceyhan is also a great source for agricultural irrigation. Ammonia nitrogen, nitrite nitrogen, nitrate nitrogen, phosphate phosphorus, suspended solids, dissolved oxygen, temperature, electrical conductivity and pH parameters of the Ceyhan River were studied on a monthly basis from May 2014 to April 2015. The highest temperature in the Ceyhan River was 28.9 ± 1.36 ° C in August; the highest dissolved oxygen in February was 8.85 ± 0.10 mg / L; the highest pH was 8.10 ± 0.01 mg / L in September; the highest electrical conductivity was 678 ± 4.00 µS/cm in August; the highest amount of suspended solids was 7.196 ± 0.186 mg / L in September; the highest amount of NH_3-N was found to be 0.73 ± 0.02 mg / L in August; the highest amount of NO_2- N was found to be 0.36 ± 0.25 mg / L in July; the highest amount of NO_3- N was found to be 5.09±0.58 mg/L in July; the highest amount of PO_4_P was found to be 2.55±0.03 mg/L in August.

According to the water quality categories of Water Pollution Control Regulations, in terms of physicochemical parameters' findings, it is concluded that Ceyhan River has the category IV In conclusion, the Ceyhan river that is poured to İskenderun Gulf are contaminated by domestic and agricultural wastes, whereof this situation exhibits that both ecosystem and human health are affected negatively.

Keywords: Ceyhan River, Environment, Physicochemical Parameters, Pollution, Water,

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THE DETERMINATION OF PHYSICO-CHEMICAL PARAMETERS OF SOME FRESHWATER RESOURCES POURED INTO THE ISKENDERUN BAY AND THE EVALUATION OF WATER QUALITY

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Abstract

The rivers are primarily ecosystems affected by environmental pollution. Pollutants originating from domestic, industrial and agricultural activities are first introduced into rivers. During the period when the human population was low, the wastes involved in rivers could be diluted in a short distance and naturally disintegrated. However, due to the excessive population growth and industrialization coming along with development, domestic and industrial wastes have also increased and the rivers have not been able to clean themselves. In this study, the levels of suspended solids (AKM), dissolved mineral nutrients (nitrite nitrogen, nitrate nitrogen, ammonia nitrogen and phosphate phosphorus) which cause pollution of six different freshwater resources (Akçay River, Arsuz Stream, Deliçay Stream, Demirtaş Stream, Feyezan Canal, Payas Stream) poured into Iskenderun Bay (Northeast Mediterranean) are investigated. According to criteria of Turkish Water Pollution Control Regulation Akçay River, Demirtaş Stream and Feyezan Canal have the Class IV -very polluted water -; Arsuz Stream, Deliçay Stream, Payas Stream have the Class III-polluted water. As a result, considering all the parameters examined, it was concluded that the fresh water resources poured into the Gulf of Iskenderun have a potential risk for public health.

Keywords: River, Environment, Physicochemical Parameters, Pollution, Water, Iskenderun Bay

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INVESTIGATION OF THE EFFECT OF TiO_2 ON CHLORELLA ENZYME ACTIVITY

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Abstract

Due to the rapid developments in nanotechnology, the environmental problems of nanoparticles have been given importance. Considering the potentials of nanoparticles to release to the environment, concerns are raised due to the negative effects on water and terrestrial organisms. Today, in the water resources, the quantitative and qualitative evaluation of the nanoparticles is not sufficient and the studies on the effects on the environment and living beings are not enough and urgently need to be examined. In this study, water and environmental pollution in terms of the potential to become a major problem today ecotoxic effects on c.vulgaris microalgae TiO_2 nanoparticles (n.TiO_2) were investigated. *C. vulgaris* is chosen because it is a green algae with high fat content. It is a type of algae with high potential for bioenergy. The algal culture developed was exposed to n. TiO_2 at different concentrations, different durations and different light / dark ratios and changes in MDA enzyme activity were investigated. As a result of this study, it was observed that the highest increase in MDA enzyme activity was observed in 100 mg n.TiO_2/L dose compared to the control group. There was a significant decrease in MDA enzyme activity at the end of the 96 hour waiting period according to the control group. In the light exposure period study, it was observed that the highest increase in MDA enzyme activity was observed in the 6 hour light /18 hour dark conditions compared to the control group.

Keywords: Chlorella Vulgaris, Enzyme Activity, MDA, TiO_2 Nanoparticles

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TREATMENT OF TEXTILE WASTE WATER BY USING PHOTOCATALYTIC AND ADSORPTION METHODS WITH NANO-TiO_2

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Abstract

The textile industry waste water involves high concentrations of organic and inorganic chemicals. It has very strong COD, color, BOD, and suspended solids pollutant properties. Physical, chemical and biological methods are used in the treatment of textile wastewater and new methods are still being investigated. The purpose of this study is to investigate and compare of textile industry waste water by using Nano TiO_2 (n.TiO_2) in terms of COD and color removal by photocatalytic reactor and adsorption methods. The initial COD value of textile wastewater; 1025.44 g/L and initial pH 4.5. n.TiO_2 using photocatalytic treatment and adsorption methods were studied. For the removal of COD and color by photocatalytic treatment, pH, n.TiO_2 dose and reaction time were studied. The optimum conditions for COD and color removal were found at pH 2, 60 min and 1.5 g n.TiO_2/L. For the removal of COD and color by adsorption treatment, pH, n.TiO_2 dose, reaction time and temperature were studied. The optimum conditions for COD and color removal were found at pH 2, 30min, 2.5g n.TiO_2/L and 25^0C. COD removal was achieved with an optimum conditions of 50% in photocatalytic treatment, while 55% yield was achieved with optimum conditions in adsorption. Color removal efficiencies at optimum conditions with photocatalytic and adsorption treatment methods were found 95% and 93%, respectively.

Keywords: Photocatalytic, Adsorption, Textile Waste Water Treatment, Nano TiO_2

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GREEN ROOFS AND RAINWATER MANAGEMENT

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Abstract

One of the most important problems is in the world today is water scarcity. In addition, the need for water increases rapidly with the increase in the speed of urbanization. It is known that rapid and uncontrolled urbanization destroys green land areas that are effect also watersheds and so that water quality deteriorates. Furthermore, in the urban area, permeable land areas are losing by turning rapidly impermeable areas. These circumstances are very related to rainwater surface runoff increases and cause serious floods in the urban area. The protection and continuity of scarce water resources require rational water management. Rainwater management and rainwater collection is an important subject in sustainable urban water supply and flood prevention. In this context, green roofs are an important opportunity for water management in the scope of sustainable urban life.

Green roofs reduce the water load of infrastructure systems by delaying rainwater flow. In addition, it will be possible to prevent rainwater from reaching the points where it is not possible to use it like seas and infrastructure systems. With the rainwater harvest to be made, it will be effective in preventing the urban floods by keeping the flow in the water with its hold. By retaining these waters, positive contributions can be made to the clean water basins, which are facing disappearance. Rainwater passing from the green roof to the stream is a natural filtration process. Thus, this naturally purified water can be treated as domestic water without the need for additional treatment.

In this study, a scenario in which green roofs are applied will be discussed and the contribution of this system to rainwater harvest will be discussed and the literature will be evaluated.

Keywords: Green Roof, Rainwater Harvesting, Urbanization, Water Management, Sustainability

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COUNTER TOP DISHWASHER

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Abstract

Nowadays, with life style defined as solo living, in small flats, less populated families or individuals live one. Even sometimes office and home needs are met under the same roof. Living spaces are starting to become smaller and this leads us to the use of space saving products. When these situations are taken into consideration, it has been decided to work on a portable product designed for counter top use and reconsidering the dishwashing system. In the article, dishwashing unit design suitable for over the counter use is introduced. After the literature review about dishwashers, the user population was determined and a survey study was conducted to contribute to the study content. The conceptual design phase was initiated with the help of the mind mapping and product usage scenario. With the conceptual design, solution options have been created for the current problem and then the optimum design is decided by using evaluation methods (selection card, tree of purposes, value profile, etc.). This dishwashing unit will have a minimum volume and will be positioned on the counter to save us space. It is aimed to design a product that can be used easily by individuals who prefer to live alone, families with fewer populations, and people looking for solutions to dishwashing in areas such as camps and caravans.

Keywords: Conceptual Design, Dishwasher, Portable, Solo Living

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STATISTICAL EVALUATION OF SEASONAL RELATIONSHIP BETWEEN AIR POLLUTION LEVELS IN ADANA CITY CENTRE AND METEOROLOGICAL CONDITIONS

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Abstract

In this study, the relationship between an important air pollutant, SO_2 (sulphur dioxide), data collected at the air quality measurement station of Governship located at the city center of Adana and parameters such as temperature, pressure, and humidity were evaluated seasonally by statistical analyses using Minitab17™. The study covered 8 periods (seasons) between June 2012 and June 2014. In 7 out of 8 periods, the regression analyses of periodical data revealed that SO_2 in the air was related with at least one of the meteorological conditions. 6 out of 7 related periods, it was obviously seen that the pressure and humidity were influential.

Keywords: Sulphur Dioxide, Meteorological Parameters, Minitab17™, Regression Analysis.

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ANALYSIS AND OPTIMIZATION OF WASTE TRANSPORT SYSTEM: AN EXAMPLE OF A UNIVERSITY HOSPITAL

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Abstract

The majority of the hazardous wastes generated from hospital activities are infectious wastes in the category of medical waste and the parties have responsibilities under the relevant legislations in the process starting from the moment when these wastes are formed. Ensuring the management of these hazardous wastes in contradiction with the relevant legislation; it will bring some risks in terms of environmental and public health and employee safety, and will lead to administrative and fines.

Within the scope of this study, the process of transporting the wastes formed in the health facility from the container areas to the temporary waste depots was evaluated and the approximate distances between these points were determined by using satellite imagery and telephone applications.

As a result of this study, it is aimed to reduce the time spent in transportation of the wastes in the hospital model, to reduce the time spent in the waste transportation business, to reduce the time and to use the personnel effectively; it is concluded that the use of transport vehicles with a high capacity and a high capacity of a container can easily be accommodated in the existing waste transportation business.

Keywords: Waste Transport, Analysis and Optimization, Hospital Waste Disposal

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TREATMENT OF CONTAMINATED SOILS WITH PETROLEUM-DERIVED POLLUTANTS

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Abstract

Petroleum, a major energy source, contains high levels of metal and polycyclic aromatic hydrocarbons (PAHs). Petroleum does not dissociate easily and accumulate in the environment. Petroleum products stay in soil for minimum 30-40 years. Different fuels (fuel oil, kerosene, coal, wood, liquefied petroleum gas and electric) for heating purposes in Turkey is used. Fuel oil is commonly used for electricity and heat generation in industry. It is transported by sea and/or by road in different ways (ships, tankers, pipelines, etc.). Petroleum to Turkey is supplied from the Iraq-Turkey and the Baku-Tbilisi-Ceyhan transit pipelines. With the increase in population, the development of industry and technology; the extraction, processing, transportation and use of petroleum products are also increasing. Accidents, leaks, explosions and/or carelessness/unconsciousness during these activities cause pollution in soil and water environment. When the causes of petroleum pollution are investigated, it is seen that the accidents occurred during the production and transportation of petroleum. Petroleum hydrocarbons occur adverse effects such as soil pollution, inadequate ventilation, reduction in microbial activity, immobilization of soil nutrients and reduction in soil pH.

There are a variety of treatment methods (extraction of soil gas by vacuum, bioventilation, phytoremediation, solidification/stabilization, soil washing, thermal, biological and chemical treatments, metal extraction, etc.) that can be applied both in-situ and ex-situ for the soil to remove petroleum pollution. Biodegradation, incineration, landfill, solidification/stabilization, vacuum extraction and phytoremediation (clover, poplar, juniper) are commonly used in the removal of petroleum pollution. For example, cleaning materials containing hydrocarbon-fed bacteria are now being used in many areas where fuel oil is traded, in the case of fuel spills, leakage to the floor. Vacuum extraction is highly effective in compounds with high vapor pressure, such as fuel products, chlorinated solvents. In studies conducted in Turkey on petroleum removal, pump & treat technology usually associated with vacuum extraction method is selected. In the case of excess spills, the transition of petroleum to groundwater should be prevented by barrier walls. Contaminated soil should be burned in cement kilns or boilers.

Keywords: Petroleum, Pollution, Soil, Treatment

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HYDROGEN AND FUEL CELL R&D STUDIES AT DrV-CLEAN ENERGY RESEARCH CENTER

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Abstract

Nigde Omer Halisdemir University and Vestel Defense Industry, one of the leading industrial corporations in Turkey, have been carrying out intensive R&D studies on hydrogen and fuel cell technologies since 2004. Nigde Omer Halisdemir University Dr. T. Nejat Veziroğlu Clean Energy Research Center was founded in 2014 for R&D studies on new and renewable energy studies in the university side of the collaboration. The studies on hydrogen and fuel cell technologies are carried out with national and international projects as well as internal and institutional ones, aiming commercialization of fuel cell components and system. In this respect, many national/international projects have been completed successfully and some of them are still on going. Moreover, solid oxide fuel cell membrane electrode assemblies, anode and cathode contact pastes and stack have been already commercialized and added to the Vestel product catalog.

Keywords: Solid Oxide Fuel Cell (SOFC), DrV-TEAM, Vestel Defence Industry

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THE PROCESS OF CONCEPTUAL DESIGN OF EYE EXAMINATION UNIT WITH DESIGN-THINKING APPROACH FDM TECHNOLOGY

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Abstract

Eye diseases caused by environmental or genetic factors, which negatively affect the quality of life, decrease the quality of life of the patients by causing constriction in the visual field. With the development of technology, many solutions have been developed for the treatment of eye diseases, especially the use of mechanical devices. These devices have played a very important role in the treatment, but also have a big market in the medical sector and have taken their place in the economy.

These devices, which are generally small in size, are located in different places within the clinics that do not have sufficient size, thus complicating the treatment process for both the doctor and the patient. The fact that all these devices are located on a single unit as an alternative to the scattered state facilitates the treatment process and allows more patients to be treated within a day. In this respect, a design that collects the autoref, biomicroscope (slitlamp) and phoroptor devices for determining eye problems is needed in a single system. In this study, considering the current problems, the design thinking approach and the conceptual design of the eye examination unit, the most appropriate design among the 5 different design variants were decided both economically and researched.

Keywords: Eye Examination Unit, Conceptual Design, Design Thinking

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MEDICAL APPLICATIONS OF 3-DIMENSIONAL PRINTERS AND PROTOTYPE PRODUCTION OF FOOT WRIST ORTHOSIS WITH FDM TECHNOLOGY

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Abstract

With the advancement of technology and industry, the use of 3D printers, one of the additive manufacturing methods, has started to make its presence felt in many areas such as defense industry, aerospace, automotive, white goods, medicine and medical. The use of 3D printers is becoming more common in prototype production and in the production of end products. In this study, examples of medical products produced by additive manufacturing technology and other methods will be given. In addition, an ankle orthosis prototype will be produced as an example of using the application. For this production, the applicability of additive manufacturing methods in medical field by using FDM will be discussed.

Keywords: 3D Printer, Additive Manufacturing, FDM, Medical, Ankle Foot Orthosis

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TREATMENT OF ELECTROCOAGULATED BIODIESEL WASTEWATER BY USING CHLORELLA VULGARIS

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Abstract

Biodiesel is the one of the nontoxic clean fuel which is alternative to the petroleum diesel fuel. Through a transesterification method for producing biodiesel creates highly contaminated (COD, glycerol, oil and grease) waste water. Production produces. Electrocoagulation process is one of the effective method for industrial wastewater treatment however at biodiesel wastewater treatment process electrocoagulation is not enough to remove glycerol and methanol. Wastewater treatment with microalgae is a popular method because of efficient removal contaminants and biomass acquirement. The aim of this study is the treatment of electrocoagulated biodiesel wastewater by using microalgae (*Chlorella Vulgaris*) with different inoculum rates besides obtaining biomass. Total organic carbon (TOC), Chemical oxygen demand (COD), suspended solids (SS) and chlorophyll-A parameters were measured to monitor water treatment and biomass production. Microalgae inoculum ratios has been studied as 2%, 4%, 8%, 12% and 20%. The experiments were shown the most efficient inoculum obtained as 20% inoculum for 20 days. Optimum conditions for electrocoagulated biodiesel wastewater treatment COD and TOC removal efficiencies were obtained as 82% and 85% respectively for 20 days. Biomass production has been observed as 87% increase. After 20 days microalgae growth has been stopped because the deficiency of nutrition's.

Keywords: Biodiesel Wastewater, Microalgae, Wastewater Treatment, Biomass Production

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SUSTAINABLE PRODUCT DESIGN FOR CIRCULAR ECONOMY

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Abstract

The increasing population of the world, the rapid consumption of scarce resources in nature and the global warming problem that threatens humanity are leading to major environmental problems. These problems, especially due to globalization and industrialization, have shown that the "production-use-at" process in the linear economic model is not sustainable.

In recent years, the linear economy has been replaced by a cyclical economy model that embraces "sustainable production, sustainable consumption and recycling" processes. The concept of industrial design also has an important role for the model of cyclic economics.

The products used and consumed, wastes resulting therefrom are closely related to the design decisions by the designers. In order to reduce the impact of the products designed on the environment, designers must consider the entire life cycle of the product and take a proactive approach for sustainability. In this study, sustainable product design methods that can be used during the design phase of the products were investigated.

Keywords: Circular Economy, Industrial Design, Sustainable Design

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THE EFFECTS OF VARIOUS DRYING TECHNICS AND MALTODEXTRIN COATING ON QUALITY OF DIFFERENT APPLE CULTIVARS

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Abstract

As a new dehydration method, apple slices were dried after treating with 30 % (w/w) maltodextrin solution. For this purpose, 2 yellow (Granny Smith and Golden Delicious) and 2 red (Super Chief and Scarlet spur) apple varieties were selected. In this study, three different drying methods were chosen; natural drying under open atmosphere, drying in a laboratory oven and hot air drying in a tray drier. The dried samples were compared with samples, non-coated and dried under the same conditions, in terms of physicochemical properties such as color, total phenolic content (TPC) and antioxidant activity (DPPH). In order to determine the effect of drying methods and maltodextrin coating on color of apples, browning index (BI) values were also calculated. Maltodextrin-treated apple slices had better color than those of non-coated samples for all varieties and drying methods. Additionally, browning was less observed in maltodextrin coated apples. However, there is no positive effect of maltodextrin coating on phenolic compounds. Total phenolic content and antioxidant activity was found to be lower for maltodextrin coated apples due to the fact that maltodextrin coating reduced the sample quantity in the apple extracts. When the drying methods were compared, color, total phenolic and antioxidant activity values of the samples dried in the tray dryers were found to be the best. As a result, it is said that drying of apple slices using maltodextrin coating in tray drier is very good method for the apple drying.

Keywords: Apple Drying, BI Values, Color, DPPH, TPC

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USE OF FOURIER TRANSFORM INFRARED (FTIR) SPECTROSCOPY FOR THE DETERMINATION OF THE ENZYME INACTIVATION MECHANISM

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Abstract

There are different analytical tools to study protein conformation. One of the techniques which have recently become very popular for structural characterization of proteins is FTIR spectroscopy. It provides high-quality spectra with very small amount of protein and also the size of the protein is not important. It has a large application range from small soluble proteins to large membrane proteins. It has also short measuring time with relatively low costs. Each compound has a characteristic set of absorption bands in its infrared spectrum. Structural changes can be determined by analyzing the characteristic bands (Amide I and Amide II) found in the infrared spectrum of proteins and polypeptides and even the percent distribution of secondary structural members (α-helical, β-structures and random coil etc.) can be determined. However, it is not always easy to perform detailed numerical analysis of Amide I and Amide II bands due to overlapping of several bands in the secondary structure. Various spectral analysis methods have been proposed for the analysis of overlapping amide bands. The second derivative and Fourier self deconvulation (FSD) allows the determination of different protein structures and structural changes originating from denaturation by increasing the resolution of Amide band. Curve fitting, partial least squares analysis, factor analysis and neural networks (NN) methods are used in order to determine the relative amounts of different protein structures (α-helix, β-structure, etc.). Combining FTIR spectroscopy with secondary structure prediction methods such as Fourier self deconvulation and curve fitting has been successfully used to determine the enzyme inactivation mechanism many studies in the literature.

Keywords: Enzyme Inactivation, Conformational Change, Curve Fitting, FTIR Spectroscopy, NN

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A INTER-LABORATORY COMPARISON TEST FOR ELECTROCHEMICAL ANALYTICAL METHODS IN REAL WASTEWATER SAMPLE: Z-SCORE MODEL AND PARTICIPANTS EFFECT

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Abstract

The study was conducted to evaluate the z-scores of accredited and non accredited laboratories for the electrochemical analysis namely pH, conductivity and salinity through an inter-laboratory comparison test carried out on real wastewater samples. The participants were small scale 16 non-accredited and 9 accredited wastewater analysis laboratories in Turkey. The samples from a wastewater treatment plant were collected from influent, effluent point and these samples were mixed to obtain three different levels of these measurements namely high, low and medium, respectively. pH, conductivity or salinity are the measurements based on electrochemical analytical methods in which the influence of the other factors such as technical staff ability on the measurement is limited. However, the method used in z-score calculation could have a substantial effect on the z-score performance of the laboratory. Therefore, four different Z-score calculation approaches using SDPA and different assigned value were applied to the inter-laboratory comparison test results. The assigned value was determined through average, and median of accredited laboratories results and by robust analysis. The performances of the non-accredited ones compared with respect to accredited laboratories. The results indicated that the method used in z-score calculation does not substantially affect the scores of the laboratory. No population quality effect on the z-score exists. The laboratory with low performance will not pass the comparison test whatever the z-score calculation method.

Keywords: Z-Score, Inter-Laboratory Comparison Test, pH, Conductivity, Salinity, Wastewater.

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TREATMENT OF NITROGEN-PHOSPHORUS ADULTERATED BIODIESEL WASTEWATER WITH CHLORELLA VULGARIS

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Abstract

Biodiesel, produced from renewable materials such as sunflower oil, colza oil, waste cooking oil, is a type of diesel fuel with a sustainable energy potential. Microalgae are single-celled microscopic organisms, lived in marine and freshwater. Microalgae can be grown in the laboratory environment by using nutrients. Furthermore, they are effective in wastewater treatment. In this study, *Chlorella vulgaris* is preferred because of its high lipid content and rapid growth rate. Microalgae were raised by using nitrogen-phosphorus adulterated biodiesel wastewater as nutrient medium in laboratory environment. The treatment of wastewater with *Chlorella vulgaris* and biomass production were investigated. The experimental parameters were chosen as different inoculation rate, nitrogen-phosphorus ratio and duration time. Nitrogen, phosphorus and COD (Chemical Oxygen Demand) values were used to determine wastewater treatment efficiencies, while TSS (Total Suspended Solids) and chlorophyll analyses were performed to observe algae growth. 30% inoculation and 30: 1 nitrogen phosphorus ratio were chosen as optimum values. COD removal efficiency was obtained as 95% at the end of one week under optimum conditions.

Keywords: *Chlorella vulgaris*, Biodiesel Wastewater Treatment, Biomass Growth

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CLARKE AND WRIGHT SAVING ALGORITHM MODEL APPLICATION FOR SIMULTANEOUS COLLECT- DISTRIBUTE VEHICLE ROUTING PROBLEM

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Abstract

In this study, it was aimed to meet the demands of the branch in the best way by using the Clarke and Wright saving algorithm, by solving the routing problem arising from the weekly demand and by minimizing the distance of the vehicles. Businesses have to compete with other businesses in order to maintain their sustainability and increase their market share, at least to maintain their share. One of the prerequisites for competitiveness is to reduce unit costs. One of the factors affecting the unit cost is logistics activities. The biggest problem of logistics activities is vehicle routing problem. This problem causes an increase in distribution costs. This cost constitutes approximately 20% of the total cost. For this reason, it has become one of the biggest problems of our day to find the most suitable route to reduce distribution costs and to give the best time or distance to improve the quality of service provided to customers. Vehicle routing problem with one or several branches and a certain number is the problem of minimizing the travel distance of the company which has customers or cities. The study was carried out in a company with 83 market network that provides distribution through 25 vehicles, 5 of which are cargo vehicles. The entity realizes vehicle routing simultaneously. After the delivery of the requested product to the branch from the center to the moving vehicle, the product to be taken back from the branch is brought to the center simultaneously. Saving algorithm was used for routing 83 branches over one-week data. With this method, cost savings have been calculated between each branch and the cost savings have been calculated and the best route has been found by adding a branch between the two branches.

Keywords: Logistics, Saving Algorithm, Simultaneous Collecting-Distributing Vehicle Routing, Vehicle Routing Problem

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TURKEY WHITE MEAT PRODUCTION FORECAST 2023 WITH MULTIPLE REGRESSION MODEL

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Abstract

In this study, in order to decrease or eliminate the uncertainty of the future, the factors that affect this variable were determined by estimating the variables and estimation techniques based on the relationship with time series analysis and a model was expressed by expressing the relationship with a mathematical function. Countries want to provide sufficient nutrients in terms of quantity or quality according to their development status. It has a great place in white meat nutrition in meeting daily protein needs. In order to meet this demand, there is a need for production of chicken meat with sufficient unit cost. According to TURKSTAT data; 23, 09% of the total consumption and food, 19, 66% of it is divided into meat, fish and products. Chicken meat has a share of 3.79% in consumption expenditure. It is seen that instead of red meat, it is preferred especially for families with low income. Average of 17.8 kg of poultry meat consumption in Turkey, while the world average, this rate is 35-40 kg. In the study, firstly, the production forecast was tried to be determined and the production and production values were tried to be obtained by taking the production estimation into consideration. The prediction model is mainly based on regression and correlation analysis. Two regression equations were used to construct the model. In the estimation of factors affecting the target dependent variable, ie each variable, simple regression equation is the only independent variable, while estimating the target dependent variable by using the predictions of the independent variables, and multiple regression analysis, ie, the estimation of multiple independent variables is performed. In order to increase the level of chicken meat consumption to the level of developed countries, it has been tried to find out how much chicken meat production is and whether it will meet the needs. For this purpose, both production and consumption of the sector in order to realize the sustainable production planning of the sector as well as the production of meat at a more cost-effective way for the families meeting the chicken meat and to meet the needs of the increasing population have been calculated by using the multiple regression model in the 2019-2023 forecast range.

Keywords: Correlation, Meat Consumption, Multiple Regression, Sustainable Production, White Meat

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A SUSTAINABLE ARCHITECTURE EXAMPLE, GREEN BUILDING

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Abstract

Rapid population growth caused the increasing consumption of natural energy sources that caused the challenge of meeting energy requirement. Recycling and reuse of materials effectively have a great importance in human life. The modern day's architecture has a huge material consumption capacity. Green buildings are breathe new life into the construction sector, has created sustainable architecture in a sense. The projects can be considered as a green building; it must be designed and operated in accordance with the required standards.

In this study, the definition of green building, green building standards and the comparison of these standards and the criteria for obtaining a green building certificate are specified. In addition to this, there are green building examples and the green building that we designed.

Keywords: Green Building, Green Building Standards, Sustainable Architecture

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ALLELOPATHIC EFFECTS OF SUNFLOWER AND WHEAT ROOT EXUDATES ON *RUMEX ACETOSELLA* AND *RUMEX CRISPUS* SPECIES

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Abstract

Both extracts and exudates of sunflower and wheat having strong allelopathic effect are used in weed control as bioherbicide. The aim of this study is to determine some biochemical and physiological effects of sunflower and wheat root exudates on two species of *Rumex* genus which is culture (*Rumex acetosella* L.) and is wild (*R. crispus* L.) form. *R. acetosella* (sorrel) seeds, which were purchased from a commercial company and *R. crispus* (curly dock) which were collected from the campus area of Nigde Ömer Halisdemir University and diagnosed from various sources of flora were used. Sunflower and wheat root exudates were applied to the seeds in two different doses (20 seedlings.100 mL^{-1} distilled water and 40 seedlings. 100 mL^{-1} distilled water) and mixtures of both root exudates. Photosynthetic pigment amount (chlorophyll a, chlorophyll b, total chlorophyll), total amount of protein and amount of antioxidant substance (carotenoid) and antioxidant enzyme (catalase) activity were determined and evaluated statistically. To the control total chlorophyll content was decreased in all treatment groups in curly dock and in all groups except for sunflower 20 seedlings. 100 mL^{-1} distilled water and wheat 40 seedlings. 100mL^{-1} distilled water in sorrel. The highest reduction was ½ sunflower 40 seedlings. 100mL^{-1} distilled water+½ wheat 40 seedlings. 100 mL^{-1} distilled water treatment in the curly dock and was wheat 20 seedlings. 100 mL^{-1} distilled water treatments in the sorrel. Reductions in protein amounts were observed in all groups compared to control in both species. Maximum reduction was ½ sunflower 40 seedlings. 100mL^{-1} distilled water+½ wheat 40 seedlings. 100 mL^{-1} distile water treatment for both species. The amount of carotenoid increased in all of the application groups compared to the control in both species. In the highest increases were wheat 40 seedlings. 100mL^{-1} distile water treatment in the curly dock while ½ sunflower 20 seedlings.100 mL^{-1} distilled water+½ wheat 20 seedlings. 100 mL^{-1} distilled water treatment in sorrel. Increases and decreases were observed in the catalase activity compared to the control group. The highest increase was ½ sunflower 40 seedlings for both species.100 mL^{-1} distilled water+½ wheat 40 seedlings. 100mL^{-1} distilled water application. In the light of the data obtained, sunflower and wheat have allelopathic effect in curly dock and sorrel. It has been concluded that there is potential to use of bioherbicide in the curly dock, which is weed.

Keywords: Catalase, Curly Dock, Photosynthetic Pigment, Sorrel, Total Protein

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THE CHARACTERIZATION OF RISK AND PROBLEMS FOR RECREATIONAL FISHING ACTIVITIES WITH MADE TOUR TRIPS; A SAMPLE FROM ISKENDERUN BAY

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Abstract

With the increase in the number of people engaged in sportive line fishing in the Iskenderun Bay, there is a continuous increase in the diversity of this activity. Biodiversity, the suitability of climate and sea conditions in the region and the young demographic structure are considered as important issues in the increase of this activity. In this study, the socio-economic status and potential environmental effects of recreational fishing activities were determined. In addition, the risks posed by the activity on the security of life and property were tried to be put forward. For this purpose, face-to-face interviews were conducted between December 2018 and March 2019 in the fishing boats intended for angling in İskenderun and Dörtyol fishing ports. As a result of these interviews, it was determined that amateur fishing boats, some commercial fishing boats and large tour ships made fishing tours for per person fee. These tours are mostly made at night and at weekends, but there are also samples made during the day. In these activities, it was determined that the classic bottom angle was used as a fishing gear and it was determined that fresh bait such as shrimp and squid were generally used as bait in general. In the study, it was observed that a one-night fishing tour per person was about 50 TL although it changed depending on the comfort of the boat. It is thought that this amount increases as the number of people participating in these activities decreases. It is observed that the most basic risk of this activity is a tourism activity, although it is seen as a fishing. The most important problem observed is that a legal regulation to meet this activity does not take place in any ministry (control mechanism) in Turkey. Although the majority of the participants were experienced in the sea, the activity is open to the public carries out important life and property risks in maritime. Although it is considered to be the only responsible ship captain, the absence of any registration makes this responsibility legally invalid.

Keywords: Iskenderun, Recreational Fishery, Risk Assessment, Tour Trip

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THE ESTIMATION OF ECONOMIC CAPACITY AND ECOLOGICAL EFFECTS OF RECREATIONAL FISHING ACTIVITIES IN THE ISKENDERUN BAY

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Abstract

In this study, commercial fishing activities with amateur fishing license boat were analyzed in the fishing zone in İskenderun Bay, although it did not have commercial fishing license. Therefore, the study aimed at all fishermen in Iskenderun fishing port, who do not have commercial fishing license. In this context, the study was conducted by using face-to-face interviews. With face-to-face interviews with these people, catch per unit effort (CPUE) was calculated using by the number of fishing activity, the number of people on the vessel, the fishing gear (hook tackle, number of needles). Likewise, the catch amounts were analyzed basis of fish species. This CPUE and catch amount were evaluated comparatively according to vessel engine powers in İskenderun fishing port. This evaluation can play an important role for sustainable ecosystem because of unknown recreational fishery data. In this evaluation, economic value analysis was made according to the regional fish market prices, even though the individuals stated that they did not sell the fish they had caught in general. According to this assessment, it was observed that per capita income with this fishing activity was below the minimum income but it was at a good level as a side income. When this income was compared with commercial fishing income, the ratio was observed to be 1/3. In this respect, amateur fishing activities in the region should be considered as an artisanal fishery that generate additional income rather than recreational fishery.

Keywords: Catch Amount, CPUE, Iskenderun, Recreational Fishery, Sustainable Ecosystem

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DETERMINATION OF PHOSPHORUS CAPACITES OF AQUACULTURE MADE DAMS AND LAKES OF TURKEY IN TERMS OF SUSTAINABLE FISHERIES

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Abstract

It is of great importance to determine the phosphorus capacity of water resources to carry farms for the sustainability of fish farms which produce approximately 250 thousand tons of aquaculture annually in Turkey's lakes and dams. The transformation of the trophic state of water bodies from mesotrophic to eutrophic is an indication that the dam has completed its life in terms of aquaculture production. One of the most important values that determine the trophic status of the lakes is phosphorus. Calculating the maximum amount of phosphorus that each water body can carry and determining the total total phosphorus release of aquaculture farms in its body can determine the duration of the trophic status change of dams or lakes. The calculation of this time period is very important in terms of sustainable fishery for all dam and lakes.

Keywords: Fish Farming, Lake, Phosphorus Release, Sustainability, Trophic

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THE EFFECT OF CERTIFICATION PROCEDURES ON THE DEVELOPMENT OF FISHERIES SECTOR

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Abstract

In our country, aquaculture production has been increasing steadily since 2000. In this rapid development of the industry, catching a standard line and introducing healthy fish of the same quality to the market is, of course, thanks to some standards. These standards which are an indicator of the impact of nature, flora and fauna on the surrounding comunity of the farm and the social rights of its employees, play an important role in increasing the quality of the sector. Global G.A.P. and ITU documents cover fish health and welfare, and ASC certification covers fish health and welfare as well as social responsibility of the enterprise. Thanks to this technical certification, it is possible to follow the fishes exported abroad, from the last market to the larvae and the eggs, and in this process, it can be determined what kind of applications are carried out on fishes. In this review, the ranking criteria of certification procedures, how they are made, their contribution to the sector and the inability to meet the standardization of farms that export fish will be explained in detail and explained with EU norms. The certification systems, which have become an integral part of the aquaculture sector, are now expected to continue to grow on the basis of the diversity of aquaculture products exported in the years ahead.

Keywords: ASC, Certificate, Fish Farming, Global G.A.P

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THE TREATABILITY OF VEHICLE WASHING WASTEWATERS USING FENTON PROCESS

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Abstract

As the one of high water consuming activities, vehicle washing facilities and their wastewaters should be investigated intended for reuse. Vehicles may be washed manually or automatically and together with it changes according to vehicle size, average 200 L water is consumed for per vehicle. Vehicle washing wastewaters include pollutants such as sand, sludge, surfactants, oil and grease, but especially in the facilities located out of city centers, wastewaters sourced from vehicle washing are generally discharged into receiving bodies without any treatment. While the solids and free oil can be removed by basic physical processes, the methods easy to apply are needed for treatment of soluble organics for reuse purposes. In this study, the chemical oxygen demand (COD) removal from vehicle washing wastewater using the conventional Fenton process method was investigated. The Fenton process was carried out by applying 6 different dosages between 50 – 200 mg/L for Fe^{2+} and between 75 – 250 mg/L for H_2O_2 at a constant pH 3. The optimum dosages giving 98% COD removal efficiency were determined as $[Fe^{2+}]$ = 75 mg / L, $[H_2O_2]$ = 100 mg/L. In addition, the COD removal kinetics were studied applying these optimum dosages and taking COD samples at specified time intervals from the beginning of the Fenton reaction till its 45th min. According the results, COD removal with Fenton process fits 2nd order reaction kinetics.

Keywords: Chemical Treatment, Fenton Process, Vehicle Washing Wastewater

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REMOVAL OF DYESTUFF BY USING OLIVE STONE ADSORPTION

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Abstract

Dyestuff removal processes gaining more and more importance because wastewater pollution via dyestuffs increases day by day because of the developing technology and the need of the industrial dyestuff necessity increases and toxicity of dyestuffs are effects environment and human health. Removal of dyestuff using adsorption is considered very effective compared to the other methods, if proper adsorbent material is found it can give promising results.

In this study, removal of methylene blue using olive stone adsorption researched. The olive stones collected, cleaned, dried and grinded to proper powder size. Effect of pH, the adsorbent dosage, contact time and initial concentration on the adsorption was studied. PH is optimum at 7, with contact time of 45 min and adsorption dosage 0, 15 mg/L. According to this results, adsorption equilibrium isotherms and compliance with the kinetic model calculated.

Keywords: Adsorption, Methylene Blue, Olive Stone

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ARTIFICIAL REPRODUCTION OF SIAMESE FIGHTING FISH, (*BETTA SPLENDENS*) CULTURED UNDER LABORATORY CONDITIONS

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Abstract

Betta splendens is a popular aquarium fish species. Aquarist uses them to create new morphs with variable colors. The males of this species are more attractive than the females and have the economic value. There is a huge market demand for Betta splendens. Therefore, it is extremely important to produce under standard laboratory conditions and to describe the embryonic developmental stages. Mainly seven developmental stages of embryogenesis were described; the zygote, cleavage, blastula, gastrula, segmentation, pharyngula and hatching stages. The current study is ongoing.

Keywords: Betta Splendens, Egg Size, Embryonic Developmental Stages

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DEHYDROGENATION OF DIMETHYLAMINE BORANE CATALYZED BY Pd@NPC NANOCLUSTERS AT NEARLY ROOM TEMPERATURE

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Abstract

This work reports the in-situ synthesis and characterization of palladium nanoclusters supported on natural polymer cellulose (NPC). This catalyst shows high catalytic activity, stability and usability towards the green dehydrogenation of dimethylamine borane under solventless at nearly room temperature (35.0±0.1°C). Firstly, the dehydrogenation of dimethylamine borane in green environment (solventless) was studied in the presence of alone precursor $Pd(acac)_2$ salt at nearly room temperature and it was observed that $Pd(acac)_2$ very slow converted to active catalysis at this temperature. As a result, natural polymer cellulose (NPC) and natural polymer starch (NPS) were used as supporter and activity of precursor $Pd(acac)_2$ salt in the presence of these was tested in the catalytic green dehydrogenation of DMAB. But, we observed that NPS wasn't enough to stabilization of palladium nanoclusters. The activation parameters (Ea, $\Delta H^{\neq}$ and $\Delta S^{\neq}$) for dehydrogenation of DMAB catalyzed by Pd@NPC nanoclusters were calculated from kinetic studies based on the catalyst and substrate amounts and temperature. In addition, obtained new catalyst, Pd@NPC nanoclusters, and dehydrogenation products were isolated and characterized by TEM, SEM, P-XRD, XPS and UV-Vis spectroscopy. Thus, it is believed that the synthesis of Pd@NPC nanoclusters which exhibit catalytic activity for the dehydrogenation of DMAB at 35.0 ± 0.1°C and yields 2 moles of hydrogen gas from 2 moles of DMAB will contribute significantly to the literature.

Keywords: Cellulose, Dimethylamine Borane, Green Dehydrogenation, Palladium

Acknowledgment: We are grateful to the Bingol University Scientific Research Projects (BUBAP, Project Number: BAP-FEF.2017.00.011) for financial support.

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STARCH SUPPORTED NICKEL(0) NANOPARTICLE CATALYSTS FOR HYDROGEN GENERATION FROM THE GREEN DEHYDROGENATION OF DIMETHYLAMINE-BORANE

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Abstract

Use of catalysts located in the 12 principles of Green Chemistry is an important area of research. Application and investigation of catalysts that are non-perishable after use, non-toxic, easily separated and reusable after reaction can be considered one of the vital areas for the chemical industry. In addition to supercritical fluids, ionic liquids and fluorinated solvents produced and used for this purpose, "The best solvent is no solvent" approach has been the focus of our attention in this work. Herein, we report for the first time the preparation and catalytic use of the starch supported nickel(0) nanocomposite in hydrogen generation from the green dehydrogenation of dimethylamine-borane. They are in situ formed from the reduction of nickel(II) ions on the surface of starch powders during the catalytic dehydrogenation of dimethylamine-borane under solvent-less medium at 35.0 $\pm$ 0.1°C. Starch supported nickel(0) nanocomposite are isolated from the reaction solution by centrifugation and characterized by a combination of analytical techniques. All the results reveal the formation of uniformly dispersed nickel nanoparticles on the surface of starch powders. They also have high durability and recyclability as they retain 75% of their initial catalytic activity after the fifth cycle of dehydrogenation providing a release of one equivalent H_2 gas per mol of dimethylamine-borane under solvent-less medium at 35.0 $\pm$ 0.1°C. The less activity loss in successive runs of dehydrogenation is attributed to the deactivation due to agglomeration. High activity and stability of starch supported nickel(0) nanocomposite are ascribed to the unique nature of starch. Our report also includes the results of kinetic study of catalytic dehydrogenation of dimethylamine-borane depending on the temperature, catalyst and substrate concentration.

Keywords: Green Dehydrogenation, Nickel Nanocomposite; Starch Support

Acknowledgment: We are grateful to the Bingol University Scientific Research Projects (BUBAP, Project Number: BAP-FEF.2017.00.011) for financial support.

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CHROMIUM (Cr VI) REMOVAL FROM WATER WITH STARCH-MAGNETITE NANOCOMPOSITE

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Abstract

The inappropriate discharge of industrial wastewaters containing hexavalent chromium Cr(VI) poses serious threats to the ecosystem and human health. The Cr(VI) species are highly toxic ions since they have carcinogenic, mutagenic, and teratogenic activity in biological systems. Adsorbents in nanoscale, called nanoadsorbents, have attracted considerable attention due to their small sizes and high surface areas. Nowadays, magnetic nanoadsorbents are used commonly in the removal of heavy metal ions from wastewater. In this study, starch coated magnetite (Fe_3O_4) nanoparticles were prepared to remove chromium (Cr^{+6}) ions from water. Several batch experiments were performed to determine optimum conditions in the adsorption studies for starch-magnetite composite nanoparticles such as pH, contact time, and chromium ions concentrations and adsorbent dosages. In order to define surface characterization of the adsorbent, several techniques including SEM, FTIR, XRD, and EDX were also used. The experimental results were analyzed in the framework of Langmuir, Freundlich and Tempkin models to evaluate the maximum adsorption capacity and the extent of affinity.

Keywords: Adsorption, Chromium, Nanocomposite, Nanomagnetite, Starch

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INVESTIGATION of CHROMIUM (Cr VI) and COLOR REMOVAL FROM WATER WITH BENTONITE-MAGNETITE NANOCOMPOSITE

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Abstract

A large amount of wastewater with hazardous chemical dyes has been continuously produced and discharged to aquatic medium, which represent a serious threat to several living forms due to their adverse effects. The high concentration of these chemicals results in a reduction of sunlight penetration and a reduction of photosynthesis. Thus, bioavailable oxygen for aquatic life reduces, and these colored chemicals threat to livings because of their toxic structure. The inappropriate discharge of industrial wastewaters containing hexavalent chromium Cr(VI) poses serious threats to the ecosystem and human health. Cr(VI) can accumulate in food chain and alter the human physiology. It can also cause severe health problems ranging from simple skin irritation to lung cancer. Adsorbents in nanoscale, called nanoadsorbents, have attracted considerable attention due to their small sizes and high surface areas. Nowadays, magnetic nanoadsorbents are used commonly in the removal of heavy metal ions from wastewater. In this study, clay (bentonite) composed magnetite (Fe_3O_4) nanoparticles were prepared to remove color and chromium (Cr^{+6}) ions from water. Several batch experiments were performed to determine optimum conditions in the adsorption process for clay-magnetite composite nanoparticles such as pH, contact time, chromium and color concentrations, and adsorbent dosages. In order to define surface characterization of the adsorbent, several techniques including SEM and FTIR were also used. The experimental results were analyzed in the framework of Langmuir, Freundlich and Tempkin models to evaluate the maximum adsorption capacity and the extent of affinity.

Keywords: Adsorption, Bentonite, Chromium, Color, Nanocomposite, Nanomagnetite

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CORRELATION BETWEEN FLOW RATE RATIO AND PH IN ARAÇ RIVER

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Abstract

In this study, data are taken from State Hydraulic Works (DSİ) of two analysis stations. These data analyzed from Araç river in the Black Sea region by DSİ's experts. The effect of the flow rate changing on the pH value was researched. When the data obtained, firstly time series analyze was done. This analysis shows that the flow rate changing ratio was high amount in seasonally in this river. Because the Black Sea region is one of the regions with high winter rainfall. In order to eliminate seasonal effect on this data set, the data for the same month were sorted then, the changing ratio were examined by year to year. In the evaluation, outlier detection analysis was performed on the data with Minitab® program and the data set were removed from the dirty data. Box plot method was used for outlier analysis. Then, cleared data were examined in this study. The effect of flow rate on pH for Araç river was investigated and a linear relationship was determined by correlation and regression calculation. For this linear relationship, regression analysis was performed and y = Ax + B linear model was formed for this river. These calculations and analyses were done both station data and they were compared. Finally MSE analysis were done to get exact linear model for flow rate and pH for this river.

Error ratio, variance, standard error and MSE analysis were performed on this model.

Keywords: Box Plot, Correlation, Flow Rate, MSE, pH

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WATER QUALITY PARAMETERS MONITORING BY USING GIS SOFTWARE FOR ARAÇ RIVER

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Abstract

Rivers are one of the important sources of life. For this reason, it is necessary to establish river monitoring systems in order to eliminate the pollutant effects caused by environment as soon as possible. For this study, a pilot system is arranged to enable monitoring of two stations for selected water quality parameter on Araç river by using GIS software which is ArcMap®. The selected water quality parameter were taken from the State Hydraulic Works's (DSI) two different stations at same time. It is possible to follow these data along a line on the map by using ArcMap. In addition that, graphical facilities have been prepared for selected parameters to be used by decision makers. In this study, digitized river line for Araç river is used on Turkey map in ArcMap software. After this digitization, a database connection with the database table has been established in order to synchronous the data received from the station with the geographic coordinate information. Graphics are created from these tables. In addition, the graphs can be presented to decision makers in a simultaneous manner with river map.

Keywords: Arcmap, GIS, Water Quality Parameter, Monitoring

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EFFECT OF BEST AVAILABLE TECHNIQUES CONCEPT AND BREF'S ON THE CONTINUOUS IMPROVEMENT OF INDUSTRIAL POLLUTION CONTROL TECHNOLOGIES

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Abstract

Best Available Techniques (BAT) concept is defined in the Industrial Emissions Directive of the European Union (IED-2010/75/EU) in order to improve the legislative framework of integrated pollution prevention and control introduced by the IPPC Directive (IPPC-96/61/EC). BAT conceptually provides an outline of the potential for reduction of emissions and impacts to the environment by the large industrial installations, which cannot be operated without complying with the standards, set in the Best Available Techniques Reference Documents (BREF's) and maintains it by permitting these installations in this manner.

This study assesses and lays out the conditions and procedures by which BAT and BREF's make it possible. Another important issue is the systematic approach followed. The procedure by which these documents are prepared and published is mostly consultative, inclusive and knowledge based. Key issues that make BAT concept a reality and BREF's effective are laid out in this manner. By compilation and assessment of the real life environmental and process data collected from real installations, techniques relevant to the activity under scope are defined, their environmental benefits, technological and economical availabilities are assessed. As a following step, conclusions for the best available techniques, including associated emission and performance levels are derived. These conclusions are published in the Official Journal of the European Union as legal text and act as Commission Decision, legally binding for the existing plants within four years. The study is repeated every eight years, so the Reference Documents and the Conclusions are revised and reviewed with up-to-date information. With the improvement of the technologies and emergence of new techniques, it's expected that the emission and performance levels identified in the BREF's also improve iteratively. The whole process, called Sevilla Process promotes environmental and industrial innovation.

Keywords: BAT Reference Documents, Best Available Techniques (BAT), Environmental Technologies, Industrial Emissions, Integrated Pollution Prevention and Control (IPPC)

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AGEING EFFECTS ON PERFORMANCE OF DOMESTIC WATER METERS

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Abstract

Water losses in water distribution systems are classified as real and apparent losses. Real losses result from leakage, pipe bursts etc. while apparent losses are caused by the inaccuracies of water meters, illegal consumption and data handling errors. Apparent losses, as one of the most important components of non-revenue water (NRW), are mainly due to inaccuracies of water meters in well-managed water distribution systems. Apparent losses represent the volume of water that are consumed but not paid. Therefore, reducing apparent losses helps increasing water utility revenue. Determination of apparent losses is also helpful for a proper water balance that is the first step of water losses management strategies. There are many factors effecting water meter accuracies such as meter type, class, size and age, unproper installation, water demand profile etc.

The aim of this study is to evaluate ageing effects on domestic water meters inaccuracies. For this purpose, a set of laboratory experiments was carried out for determination of water meter inaccuracies at different flow rates. Starting flow rates and metering errors of used domestic water meters were determined and ageing effects on performance of water meters were evaluated.

Keywords: Apparent Losses, Non-Revenue Water, Water Supply Systems, Water Losses, Water Meter Accuracy

Acknowledgment: This study was supported by the Scientific and Technological Research Council of Turkey (Project No.117Y301) and Akdeniz University.

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BIOREMEDIATION, BIOREMEDIATION STRATEGIES AND USING IN THE AQUATIC ENVIRONMENT

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Abstract

In recent years, aquaculture production systems have increased in parallel with the increase in nutritional requirements. Organic wastes in nature are controlled by organisms (plants, bacteria, algae, etc.) under controlled conditions. Bioremediation, in other words, biological cleaning, is also cost-effective compared to other techniques that use expensive chemicals, consume high amounts of energy or require expensive technology. Plants, bacteria, fungi, and algae are used especially in bioremediation studies. In this review, information is given about the most frequently used organisms, bioremediation methods and application areas in bioremediation mechanism.

Keywords: Aquatic Organisms, Bioaccumulation, Bioaugmentation, Bioremediation, Fitoremediation, Heavy Metals

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THE EFFECT OF VITAMIN K ON AQUATIC ANIMALS

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Abstract

K vitamin is essential for blood clotting and bone mineralization. It is in the group of fat-soluble vitamins and is naturally in the form of K1 (phylloquinone) and K2 (Menaquinone) or synthetically as vitamin K3 (menadione). Nowadays, in order to meet the rapidly increasing nutrient needs, the increase in production of fish farming has increased the use of synthetic vitamin K3 in animal feed. In this review, biochemistry of vitamin K and its importance in aquatic organisms are emphasized.

Keywords: Aquatic Organisms, Menadione, Menaquinone, Phylloquinone, Vitamin K

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EVALUATION OF POSSIBLE IMPACTS OF HIGH-SCALE TRANSPORTATION INVESTMENTS IN ISTANBUL ON LAND USE AND URBAN TRANSFORMATION PROCESSES

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Abstract

Transportation demand and transportation habits have been the primary factors affecting types and quantity of spatial interaction in cities. The frequency of travels, through which directions and in which way they will be performed, are in relation to housing, trade and recreation areas in the city. Additionally, the travels are directly related to the social, cultural and economic characteristics of the community that use these areas. The displacement of the population living in a region due to various urban interventions will change the current travel production, travel distribution, species selection and link capacities. This means reproduction of urban transportation and habits as well. Addressing urban transformation practices only in the context of housing-related issues means to cause new problems of urban renewal not considering in advance the influences on transportation, density and sustainability. In this context, in order to evaluate the effect of high-scale transportation investments on land prices and urban transformation processes, Istanbul has been determined as a study area because it has high-scale transportation investments and rapidly increasing population and number of vehicles. With the investments made, it became a necessity to produce solutions to the increasing population and the number of vehicles. As a result of the researches conducted, Marmaray, Third Bridge, Eurasia Tunnel and Third Airport projects were identified as examples of the solutions produced. The effects of the applied projects on the city have been investigated and the projects that have been done in the past have been examined as examples. The effects of the project on the projected and realized transformation scenarios and land prices were evaluated by considering the effects of similar practices in the past. As a result of the evaluation, principal approaches regarding the principles and approaches of high-scale transportation investments have been produced.

Keywords: Eurasia Tunnel, Marmaray, Third Airport Projects, Third Bridge Projects, Transportation

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THE EVALUATION OF EMERGENCY CALLS TO EMERGENCY HEALTH SEVICES WITH THE GEOGRAPHICAL INFORMATION SYSTEM (THE EXAMPLE OF ERZİNCAN PROVINCE)

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Abstract

The most important criterion for emergency health services is the time, which is between the arrival of the ambulance at the event location after the emergency call and the initiation of emergency response; and called as "response time". One of the most significant problems affecting the response time is the difficulty arising from the station settlement location. The shortening of the response time can be achieved by increasing the number of ambulances and personnel or by developing the existing station layout. Today's advanced information technologies and monitoring techniques are used commonly in detecting the station settlement location. One of the methods used for this purpose is the "Geographical Information Systems" (GIS). As the literature was reviewed, it was noticed that detecting the station settlement location was carried with GIS in some provinces in Turkey.

In this study, it was aimed to evaluate the Erzincan City Centre 112 Emergency Health Service stations, the coverage of service areas with the geographical information systems and detect the buffer area of the stations that will newly be constructed. The present research consists of the city centre of Erzincan and data were collected from the 112 Emergency Health Service Centre. To analyse the data in the ArcGIS environment, first, basic geographical data bases (map) were formed. Then, data were digitised in the same coordinate system and transferred into ArcGIS (ver 10.4) program. At the end of the research, the most appropriate ambulance locations were recommended with the locational analysis functions of GIS.

Keywords: Ambulance, Emergency Health Services, Geographical Information Systems,

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REMEDIATION OF SOILS CONTAMINATED BY POLYCYCLIC AROMATIC HYDROCARBONS

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Abstract

Soils undoubtedly play an important role in the life of living things. Almost all the foods of the human beings and animals are obtained from the soil. Plants also obtain their water and nutrients from the soil. Soil is a habitat for living organisms. Humans construct their cities and towns on it. These are some of the important roles of soils in the life of living things. However, nowadays, soils are contaminated by pollutants such as fuel hydrocarbons, polycyclic aromatic hydrocarbons, heavy metals, polychlorinated biphenyls, solvents, pesticides, which occur as a result of the human activities. Such soil contaminants do not only have negative impacts on plants, animals and microbial processes, and the properties of the soils, but also have negative impacts on humans and animals exposed to the contaminants through the food chain. Polycyclic aromatic hydrocarbons (PAHs) are known as important environmental pollutants, which are especially introduced into the environment as by-products of incomplete combustion of fossil fuel. They tend to strongly bound to the soil particles. It is known that some PAH compounds have harmful effects on humans due to their toxic, carcinogenic and mutagenic properties. In this study, soil pollution caused by PAHs was overviewed. Remediation technologies for soils contaminated by these pollutants were discussed and the recent studies on remediation of soils contaminated by PAHs were reviewed.

Keywords: Polycyclic Aromatic Hydrocarbons (PAHs), Pollution, Remediation, Soil

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REMOVAL OF AUTOMATIVE INDUSTRY WASTEWATERS BY USING ADVANCED TREATMENT

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Abstract

The increase of environmental pollution caused by industrial activities and the depletion of natural resources increase the responsibility of enterprises towards the environment. The automotive industry is a leading sector in terms of export capacity, by-products market creation and employment for the country's economy. Furthermore, due to the high amount of chemical and water use and the amount of hazardous waste from an environmental point of view, due to international agreements and legal requirements, the use of clean production technologies in service and production processes is mandatory. In this study, the treatment of wastewater from an automotive industry after membrane treatment of membrane technologies was investigated. Flat sheet polymer type ultrafiltration (PES and thin) membranes were used in cross flow membrane process. Removal efficiencies of chemical oxygen demand (COD), suspended solids (SS), turbidity, conductivity 17.5%, oil and grease with ultrafiltration (UF) membrane working at 6 bars was obtained as 86.4%, 94%, 87%, 98% respectively.

This type of ındustrial wastewaters can be treated using polymer UF membranes.

Keywords: Advanced Treatment, Industrial Wastewater, Membrane, UF

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HYDRAULIC MODELING FOR REDUCING WATER LOSSES IN DISTRIBUTION NETWORK

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Abstract:

Hypothetical hydraulic modeling studies have been carried out to reduce water losses and to adjust the pressure (calibrate) in the Mıdık and Hadırlı districts of Seyhan, Adana, where water loss is among the highest in the Adana water distribution network. This work has been carried out as a guide for pressure planning in networks. The geographic and topographical status, population, and population density of the study area were utilized and supported by field studies. The highest pressure was 4.9 bar, whereas the lowest pressure was 3.7 bar. As a result of these studies, the diameter of the pressure reducing valve has been determined using the model and network calibration has been achieved with the pressure adjustments to be made. the preparation for the work. Attractive flow of the line to the water network was considered. Hypothetical modeling study was performed by using Epanet v2.0.0.12 program. Pressure changes were determined in the networks of the mentioned regions and their pressure profiles were formed.

Keywords: District Metered Area, Hydraulic Modeling, Pressure Regulating Valve, Pressure Change

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ARTIFICIAL REPRODUCTION OF SIAMESE FIGHTING FISH, (*BETTA SPLENDENS*) CULTURED UNDER LABORATORY CONDITIONS

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Abstract

Betta splendens is a popular aquarium fish species. Aquarist uses them to create new morphs with variable colors. The males of this species are more attractive than the females and have the economic value. There is a huge market demand for *Betta splendens*. Therefore, it is extremely important to produce under standard laboratory conditions and to describe the embryonic developmental stages. Mainly seven developmental stages of embryogenesis were described; the zygote, cleavage, blastula, gastrula, segmentation, pharyngula and hatching stages. The current study is ongoing.

Keywords: *Betta splendens*, Egg Size, Embryonic Developmental Stages

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ACTIVITY OF NEW GENERATION MESO POROUS SILICA PILLARED CATALYST IN CATALYTIC WET PEROXIDE OXIDATION OF PHENOL

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Abstract

In recent years, it has been focused on advanced oxidation processes in the phenol and phenolic compounds removal wastewater treatments by which disintegration of the nonbiodegradable pollutants to nontoxic intermediates and end products. Catalytic Wet Peroxide Oxidation (CWPO) as is an environmentally benign economical alternative, moreover iron and titanium are preferred metals in due to their high activity, low price, chemical and photo-strength. Catalyst separation difficulty of liquid phase catalytic reactions and low surface area and diffusion limitations of solid catalyzed reaction porous supported catalyst systems are advantageous. The Silica Pillared Clays (SPCs) structures stand out when viewed from the thermal stability, micro-mesoporous structure and as additional base, acid centers.

The standard Wyoming SWy-2 as the host mineral, SPC support structures were synthesized with Si/modified clay molar ratio ranging within 20-150 by the formation of meso sized silica galleries by exchanging small cations of clay with long chain organic surfactants (CTAB) and forming silica wall by the addition of silica (TEOS) and followed by the surfactans removal upon calcination. Hydrothermal synthesis of iron and titanium SPC catalysts having metal/Si molar ratio between 0.03-0.15 were performed. Various wet peroxide oxidation (CWPO, ultrasound+CWPO, UV+CWPO, ultrasound+UV+CWPO) methods were applied for phenol removal of synthetic water samples with a concentration ranging between 50 and 500 ppm. Fe-loaded catalysts were found more active in all methods except for ultrasound+UV+CWPO method. The catalytic performance increased significantly with the amount of catalyst and temperature and decreased with pH increase while the increase in phenol concentration was not very effective. Aromatic intermediates such as catechol, hydroquinone and benzoquinone have been converted into carboxylic acids during the progressive oxidation. Catalysts with high silica content showed higher performances, CWPO and PCWPO (99.42 and 99.24 % conversion values in 60 minutes, respectively) methods were more effective for SWy-2 based catalyst. The conversion value within 15 minutes observed as 31.44% at 30 ºC increased to 99.85% at 60 ºC.

Keywords: Characterization, Mesoporous Material, Phenolic Oxidation, Reaction, Silica Pillared Clay

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DEVELOPMENT OF LONG-TERM SUSTAINABLE WATER LOSS MANAGEMENT STRATEGY: KAYSERI DISTRIBUTION SYSTEM CASE STUDY

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Abstract

Reduction and control of non-revenue water (NRW) in water distribution and supply systems is very important for long-term urban water management. A sustainable strategy should be introduced to recognize and reduce unreported leaks, one of the most important components of non-revenue water. In this study, the long term water loss management strategy in drinking water distribution systems and their results are discussed. For this aim Kayseri water distribution system was selected as study area. In order to present the long-term strategy in the field of application, current situation analysis was performed based on main components such as; (i) the measurement of the data, (ii) automation systems in the measurement and distribution of water, (iii) subscriber and fault management, (iv) performance analysis and monitoring. According to the analysis, the strengths and weaknesses of water utility in terms of water management were tried to be put forward. In this scope, isolated measurement zones are planned in the application area and the regions where the zero pressure test studies are completed are integrated into SCADA automation and instantaneous monitoring activities are carried out. Daily water loss analysis is performed and the system is continuously monitored. by establishing instant flow and pressure monitoring system. According to the preliminary results of the study, significant gains were obtained in terms of water and energy efficiency by creating isolated zones and using the automation systems actively in water management.

Keywords: Non-Revenue Water, Sustainable Water Management, Un-Reported Leakages,

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EFFECT OF ACID ACTIVATION ON PROPERTIES OF BENTONITE AND PERFORMENCE ON CATALYTIC WET PEROXIDE OXIDATION

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Abstract

Phenolic compounds are primary pollutants due to their high toxicity even at low concentrations. Although bioprocesses are suitable at low concentration, to bioconcentrate them is not achieved significantly. Wet air oxidation (WAO) which uses high reactivity of hydroxyl radicals in an aqueous solution is one of the forceful removal methods which are too dilute to incinerate and too concentrated for biological treatment but elevated temperature and high pressure requirements are the disadvantages. Use of catalyst in wet air oxidation (CWAO) is the most effective advanced oxidation process for reducing the severity of operating conditions. In such air used oxidations, gas phase oxygen supply creates diffusion limitations, moreover use of air as the source gets dilution problem. Catalytic Wet Peroxide Oxidation, (CWPO) using hydrogen peroxide as the oxidant with suitable catalyst is a clean alternative among them which also eliminates the diffusion limitations.

The acid activation of bentonite from Middle Anatolia with a hot solution of 2M H_2SO_4 was performed and tested in CWPO of phenol together with the raw bentonite keeping pH f reaction mixture ~ 5.0. Although it was nearly half of the activated samples did, it was seen that the crude bentonite was also active in CWPO of phenol. The increase of especially H bonded Brönstead sites in acid activated sample gave conversion of more than 82% in the first three hours at CWPO at 25 ^oC the phenol conversion reached to 96 % within 135 minutes at reaction temperature of 50 ^oC. The reaction data fitted to first order dependency with respect to phenol was found in a good agreement and the activation energy was estimated ~ 19.8 kJ/mole. The rate constant which was estimated ~ 0.12 h^{-1} by use of raw clay reflected around five times increase with acid activation.

Keywords: Acid Activation, Bentonite, Characterization, Kinetics, Phenol Oxidation

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HEALTY RISKS OF NITROGENEOUS COMPOUNDS IN WATER AND AND AMMONIA REMOVAL BY ADSORPTION WIH SEPIOLITE

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Abstract

Control of water pollution has rather importance for both alive in water and alive who is benefit from water. It is well known nitrogenous compounds are threatening the human health and increases in quantities taken by water and food cause serious diseases. The two most important nitrogen compounds nitrate (NO_3^-, an anion), nitrite (NO_2^-, an anion) and ammonium (NH_4^+, a cation) are more commonly encountered contaminants in wastewater, groundwater and wells. High concentrations of nitrite cause methemoglobinemia, causing the oxygen carrying capacity of the blood to decrease. Nitrate decreases functioning of the thyroid gland and vitamin A shortages. Nitrates and nitrites fashioning of nitro amines, which are known as one of the most common causes of cancer, in some studies have been cited as a risk factor in developing especially gastric an intestinal cancer. The other way the researchers think the increased prevalence rates of Alzheimer's, Parkinson's and diabetes might be caused due to the use of nitrites and nitrates in food processing, food preservation, agriculture and water getting spoiled by fertilizer and industrial waste. The Environmental Protection Agency (EPA) limits to 10 mg/L standard as the maximum contaminant level (MCL) for nitrate-nitrogen and 1 mg/L for nitrite-nitrogen for regulated public water systems.

Ammonium adsorption isotherms were obtained using sepiolite for the solutions having initial solution concentrations in the range of 8.32–388.06 mmol NH_4^+/L at 25°C. The change of the ‘‘g sepiolite/mL solution’’ ratios from 1/10 to 1/70 caused an increase in the adsorption from 1.82 to 3.70 mmol NH_4^+/g. Around 60% ammonium removal, of which 90% was achieved within 500 s. Langmuir and Freundlich models were found insufficient to explain the adsorption equilibrium, while Langmuir–Freundlich and Tooth isotherms explained the data well. Goodness of fit increased with the increased sepiolite quantity in the treated suspension.

Keywords: Adsorption Isotherm, Ammonia, Nitrogeneos Compounds, Risk, Sepiolite

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ACTIVITY TEST OF AL/PILLARED CLAY SUPPORTED HPA SUPER ACID CATALYST IN ETHANOL DEHYDRATION REACTIONS

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Abstract

Due to the decrement of fossil fuel sources and the effect of greenhouse gases, ethylene production with catalytic bioethanol dehydration reaction has focused on instead of the hydrocracking of hydrocarbons. Diethyl ether (DEE), a valuable chemical in green fuel alternative, is also occur in the presence of acid catalysts at low reaction temperatures in ethanol dehydration reaction. As a result of this reaction, trace amounts of acetaldehyde and by-product water are formed. Ethanol dehydration reaction is usually carried out with solid acid catalysts. Heteropoly acids (HPA) are the most popular acid catalysts due to their Bronsted acidities. The water formed as the by-product in the reactions can damage the active centers of the catalyst. When HPAs are loaded on favorable support, stability can be achieved in the polar environment. Clays compatible with HPAs due to their acidic structure have disadvantages such as low surface area, thermal instability and non-continuous porosity. The most effective method for eliminating these disadvantages is the pillaring of clays. By introducing bulky cations in between the clay layers and fixing them upon calcination the obtained Pillared Intercalated Structures (PILC) can be a good catalytic support. Al-Keggin cation is the most commonly used as pillaring agent in terms of thermal stability and catalytic activity in the pillaring process.

Hydrothermally HPA loaded Al-PILCs with Al/g clay (3, 10) and W/Al (0.25, 1.0) ratios were tested in ethanol dehydration in a differential reactor. The highest ethanol conversion at 300 ^{o}C was found as 88%, while almost complete conversion at 500 ^{o}C occurred. DEE was observed as the main product at low temperatures and ethylene selectivity increased to 1.0 by the temperature increase. It was determined that the catalyst properties and acidity were maintained from the FTIR spectra after the reaction of the catalysts used in the reaction.

Keywords: Catalytic Activity, Ethanol Dehydration, Heteropoly Acid, Pillared Clay

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MODELING OF WATER QUALITY INDEX OF DRINKING WATER TREATMENT PLANT EFFLUENT WITH ARTIFICIAL NEURAL NETWORKS

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Abstract

In this study, modeling of drinking water treatment plant was studied by using Artificial Neural Network tool of Matlab software v. 2018b with different architectures. All data were obtained from the drinking water treatment plant by taking the average of monthly data for 1 year. Treatment efficiency of the treatment plant was determined by taking into account of input values of total 19 physicochemical, chemical, and microbiological parameters with output value Water Quality Index which was developed by Steinhard, Schierow, and Sonzogni. The model performance was evaluated with the parameters of Mean Squared Error, and Correlation Coefficient. The suitable architecture of the neural network model was determined after several epochs and errors. According to the modeling study, ANN can estimate plant performance by more than 0.95 according to the consistency between the observed and predicted output variable.

Keywords: Artificial Neural Network, Drinking Water, Treatment Plant, Model, Water Quality Index

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A INTER-LABORATORY COMPARISON TEST FOR ELECTROCHEMICAL ANALYTICAL METHODS IN REAL WASTEWATER SAMPLE: Z-SCORE MODEL AND PARTICIPANTS EFFECT

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Abstract

The study was conducted to evaluate the z-scores of accredited and non accredited laboratories for the electrochemical analysis namely pH, conductivity and salinity through an inter-laboratory comparison test carried out on real wastewater samples. The participants were small scale 16 non-accredited and 9 accredited wastewater analysis laboratories in Turkey. The samples from a wastewater treatment plant were collected from influent, effluent point and these samples were mixed to obtain three different levels of these measurements namely high, low and medium, respectively. pH, conductivity or salinity are the measurements based on electrochemical analytical methods in which the influence of the other factors such as technical staff ability on the measurement is limited. However, the method used in z-score calculation could have a substantial effect on the z-score performance of the laboratory. Therefore, four different Z-score calculation approaches using SDPA and different assigned value were applied to the inter-laboratory comparison test results. The assigned value was determined through average, and median of accredited laboratories results and by robust analysis. The performances of the non-accredited ones compared with respect to accredited laboratories. The results indicated that the method used in z-score calculation does not substantially affect the scores of the laboratory. No population quality effect on the z-score exists. The laboratory with low performance will not pass the comparison test whatever the z-score calculation method.

Keywords: Conductivity, Inter-Laboratory Comparison Test, pH, Salinity, Wastewater, Z-Score

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EFFECT OF INFLOW DISTRIBUTION RATIO ON NITROGEN REMOVAL PERFORMANCE IN STEP-FEED ANOXIC-AEROBIC SEQUENCING BATCH REACTOR

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Abstract

In this study, the effect of the inflow distribution ratio to nitrogen removal performance in the step-feed anoxic-aerobic sequencing batch reactor was investigated. The experimental study was conducted in three different reactors (R1, R2 and R3). The inflow distribution ratio was chosen as 50: 33: 17 in R1, 34: 33: 33 in R2 and 17: 33: 50 in R3. COD removal efficiency was found to be 91% in all three reactors. The NH_4^+-N removal efficiencies in R1, R2 and R3 are 98%, 97% and 90%, respectively. Total inorganic nitrogen (TIN) removal efficiency was found to be 89%, 88% and 77% in R1, R2 and R3, respectively. Similar results were obtained in the input distribution rates of 34: 33: 33 and 50: 33: 17 in terms of nitrogen removal efficiency, but there was a decrease in nitrogen removal at the input distribution rate of 17: 33: 50. It has been found that the inflow dispersion rate is an important factor in the nitrogen removal performance of an anoxic-aerobic sequencing batch reactor.

Keywords: Inflow Distribution Ratio, Nitrogen Removal, Sequencing Batch Reactor, Step-Feed,

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THE PRODUCTION OF BORIC ACID WITH CITRIC ACID FROM BIGADIC BOR WASTES

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Abstract

In this study, citric acid application has performed as an alternative method to recover the amount of boron in the concentrator plant slurry wastes, where boron minerals containing sodium/calcium were stored in the Bigadiç Boron Operation Directorate between 1980-95 and it has been aimed to obtain boric acid by leaching process with different concentrations of this acid.

This plant at issue, new waste ponds/dams are needed due to the waste ponds are completely full, and the insufficient waste dam being filled and even increased in the sedge. This study was carried out in order to allow recovery of boron contents of 9-11% B_2O_3 content in the mentioned waste ponds. Experiments were carried out for 1 hour at 60-65 ° C with different concentrations of citric acid (99.5%), recovery studies were conducted. As a results, these recoveries were obtained in 60-80% yields.

In the light of all these evaluations, it will lead to the elimination of the waste ponds which is mentioned with the improvement of the achievements.

Keywords: Boric Acid, Citric Asit, Sodium/Calcium Containing Boron Minerals, Waste Pond/Dam

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ARSENIC REMOVAL FROM AQUEOUS SOLUTIONS BY PHOTOCATALYTIC PROCESSES

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Abstract

The consumption of arsenic-containing water resources has been a problem in many countries due to its toxic effect. Limiting the recommended value for arsenic to 10 µg/L in the water restricted the use of water resources and increased the need to take precautions to control arsenic pollution. In this study, the use of photocatalytic oxidation processes was examined to remove arsenic (III) from aqueous solutions. As a semiconductor catalyst for photocatalytic processes ZnO was preferred and removal efficiencies were compared with TiO_2. By using ZnO which was not used in the literature, necessary optimum process parameters were determined, and a prototype system was developed to meet the demand. The pH, As concentration range (1-10 mg/L), UVA and LED lamps, catalyst loading and As adsorption properties were examined as process parameters. By modifying the existing photocatalytic reactor, optimum process parameters were determined.

Keywords: Arsenic, Photocatalytic Oxidation, Zno, TiO_2

Acknowledgment: This study was conducted under the project called "Arsenic Removal from Aqueous Solutions by Photocatalytic Processes" funded by Gebze Technical University Scientific Research Projects Coordination Unit.

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INVESTIGATION OF ADVANCED PRE-TREATMENT FACTORS FOR CORNCOB TO INCREASE THE RENEWABLE ENERGY POTENTIAL VIA PLACKET BURMAN DESIGN

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Abstract

Nowadays energy demand has been increase sharply because of industrial development and population rise. It is known that the harmful global warming effect of energy production from fossil fuels, which must be taken under control to protect planet ecosystem, have to give place to renewable energy sources. Biomass is well known renewable energy source, which can be convert various kind of energy such as biogas, bioethanol or biobuthanol via microbial production. As a kind of agricultural and agro industrial waste, Corncob has high potential for the renewable energy production. To utilize the Corncob as a raw material by the microorganisms, the lignocellulosic and cellulosic structure of the Corncob must have brake down before the bioprocess. Advanced pretreatment is a value added solution to crack lignocellulosic structure.

In this study sulfuric acid pretreatment was examined in order to increase energy potential of Corncab. Placket Burman factorial experimental design was used to determine the factors which directly related to the advanced treatment processes. Mesh size, reaction time, acid ratio, reaction temperature and Corncob solid ratio was investigated and finally total sugar and reduced sugar concentration could be reach to 5, 19 g/L and 4, 78 g/L respectively. The factor of acid ratio, reaction time and mesh size are significantly important for the bioprocess. Although temperature and solid ratio was important, they are not affected the other factors.

Keywords: Corncob, Renewable Energy, Advanced Treatment, Factorial Design

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APPLICATION OF ZERO WASTE MANAGEMENT SYSTEM TO NİĞDE ÖMER HALİSDEMİR UNIVERSITY

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Abstract

Zero waste management system is a method developed as a solution to the negative effects of ecological and receiving environments caused by solid wastes. Zero waste approach is an understanding that includes the steps of preventing waste, reducing waste at source, preventing and minimizing waste generation. This approach can be applied in different areas from individual efforts to regional dimensions.

As of August 2018, zero waste management system has been implemented in Niğde Ömer Halisdemir University for zero waste approach. For this purpose, a coordination unit was established in the first step and then a separation infrastructure was prepared in the waste resource. In all buildings, waste boxes were placed in 6 sets, glass, metal, plastic, paper, organic and non-recyclable. Different education and awareness activities were carried out in order to gain the awareness of separation of waste at the source. There are also awareness activities within these awareness activities, including students. Thus, academicians, working staff and students interacting within the building make the zero waste management system a habit in their lives and makes them aware of the fact that every waste they separate makes a contribution to the future. In this study, all these studies and activities were evaluated.

Keywords: Zero Waste, Waste Management, Recover, Circular Economy

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EXAMINATION OF DIFFERENT VARIABLES THAT AFFECT THE TEACHER CANDIDATES' CLIMATE CHANGE AWARENESS

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Abstract

In this study, it was aimed to examine prospective teachers' awareness about climate change in terms of their grade point average, monthly income, mother education level, father's education level, attendance on environmental issues, participation in environmental activities and environmental problems. Survey method was used as a research method in the study. The research group of the study constituted 250 teacher candidates who were studying at different departments of the Faculty of Education at Nigde Omer Halisdemir University. In order to collect data, 'awareness scale towards to climate change' developed by researchers and applied to teacher candidates. The data obtained from the measurement tools were recorded with SPSS 15.0 statistical software. In the analysis of data, the normal distribution of the data, the scale of awareness scale for climate change standard deviation, skewness, kurtosis values, histogram and normal probability (QQ plot) graphs, frequency and percentage analysis were applied. The results of the analysis are based on the mean scores of pre-service teachers about their awareness on climate change (F (2-249) = 1.53, p> 0.05), mother education levels (F (4-249) = 2.42, p> 0, 05), there is no significant difference in terms of father education levels (F (4-249) = 1.00, p> 0.05). On the other hand, among the awareness scores related to climate change, the grade point average (F (2-249) = 2, 23, p <0, 05) was significant in terms of monthly expenses (F (7-249) = 3.954, p <0, 05). a difference was determined. In other words, the awareness of prospective teachers on climate change varies significantly with respect to grade point averages and monthly expenses. Students who have high average scores have higher awareness about climate change. At the same time, students' awareness of climate change decreases as their monthly financial expenses. In addition, teacher candidates had moderate level awareness towards to climate change.

Keywords: Awareness, Climate Change, Teacher Candidates, Education.

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CONSTRUCTION OF CONDUCTING POLYMER/CYTOCHROME C/THYLAKOID MEMBRANE BASED PHOTOBIOELECTROCHEMICAL FUEL CELLS GENERATING HIGH PHOTOCURRENT VIA PHOTOSYNTHESIS

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Abstract

Photosynthesis is an efficient, sustainable and complex process converting the light energy into chemical energy in fuel cells. Thylakoid membranes and photosystems isolated from plants or cyanobacteria are frequently used as a source for converting the light into electrical energy [1].

In this study, a photo-bioelectrochemical fuel cell, pBFC, was constructed for photocurrent generation by illuminating the electrodes within an aqueous solution. Gold electrode was coated with poly 4-(4H-Dithieno[3, 2-b: 2′, 3′-d]pyrol-4-yl) aniline, P(DTP-Ph-NH2) conductive polymer film by using electrochemical polymerization. Then, P(DTP-Ph-NH2) conductive polymer film coated surface was electrochemically modified with cytochrome C, Cyt C which covalently linked onto the surface via bis-aniline functionality of the polymer film and formed crosslinked-structure. The thylakoid membrane was attached on the surface of this electrode by using bissulfosaxinimidyl suberate and used as photo-anode in pBFC. The photocathode of the pBFC fabrication was followed by the modification of conductive polymer poly [5-(4H-dithieno [3, 2-b: 2′, 3′ d]pyrol-4-yl) naphtalene-1-amine] film coating, glutaraldehyde activation, and bilirubin oxidase enzyme immobilization. During the photosynthesis occurring in thylakoid membrane under the light, water was oxidized and separated; while oxygen was released in anode side, the cathode side was reduced the oxygen gas into the water via a bioelectrocatalytic method [1].

The highest photocurrent measured from the electrodes having Cyt C compared to the other electrodes (without Cyt C). The maximum power generation of biofuel cell was reached at pseudo-steady state as 4.9 mW/m2 at a current density of 15 mA/m2 under illumination of visible light 1400 W/m2. This system shows how to obtain high efficiency from photo-bio-fuel cells and its importance; good electrical communication and the use of natural components. Moreover, in such bio-hybrid systems, achieving high photocurrent is dependent on the well-organized electrode platforms which allow electron transportation [1].

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Keywords: Conductive Polymer, Photo-bioelectrochemical Fuel Cell, Photocurrent Generation

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HOUSEHOLD WATER MANAGEMENT TECHNOLOGIES FOR URBAN SUSTAINABILITY

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Abstract

Due to population growth and urbanization, water consumption for domestic, industrial and irrigation activities has increased dramatically since the beginning of the 20th century. In addition, water shortage in many countries becoming an important problem, since global warming affects more increase dramatically such as Mediterranean countries. Domestic water demand constitutes 10% of the total water demand. On the other hand, to find enough water resources for the population living in cities is not easy.

Methods to increase water supply such as to find new surface water sources from long distance to the cities or get water from deeper groundwater or constructing new dams, establishing long transmission lines or treating sea water are the activities that bring high costs and may also be harmful to the environment. Therefore, "*Reuse of Wastewater (grey water)*" "*Water Management* (including Storm Water)" and "*Water Saving*" terminology has become a vital role for achieving of "*Sustainability of the water*" for the next generations.
In this study, the aim was to evaluate applicable water management technologies for city buildings. For that reason, Water management technologies were considered in two major parts: The first is the feasibility of reuse technologies for grey water and the second is the feasibility of stormwater technologies. Firstly, grey water was defined, and then, on-site new greywater treatment technologies and approaches handled, and applicability of these technologies examined by comparing its advantage and disadvantages with traditional treatment methods. Next, it was examined how the Storm Water Recycling Technology can be applied in multi-store buildings and their effects on total water consumption. In the conclusion part, it was clearly showed the decreasing impacts of both factors on total water consumption if they applied separately and together.

Keywords: Greywater, Rainwater, Sustainability, Treatment, Water Management

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THE EFFECT OF IRRIGATION WATER USED IN LANDSCAPE ON FACING STONES

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Abstract

Arid and semi-arid climate types are common for many parts of Turkey. In regions with this climate type, precipitation is generally seen in winter and spring months. In these regions, since vegetation has not started or has just started, a considerable amount of water is needed during the vegetation period. This need increases the importance of irrigation for plants, and a large amount of water is necessary for all plants. Irrigation water should have the required criteria. Particularly in the central campus of our university, where groundwater is used, it causes crust formation in the facing stones used in landscaping irrigation areas due to differences in chemical content in the waters of some wells. In the concept of this study, 2 wells in the central campus are sampled and it is observed that these waters are Ca-Mg-HCO_3 and Ca-SO_4-HCO_3 type. According to the Saturation Indices (SI) calculations on sampling temperatures, sample 1 is close to saturation according to calcite, aragonite, anhydrite, and dolomite and sample 2 is saturated according to aragonite, calcite and dolomite. It means waters tend to precipitate these minerals as a result of puddling and evaporation. Surface hardness, moisture measurement, thermal imaging, surface roughness, surface imaging, and water chemistry studies were carried out to understand the negative effects on the facing stones. It was determined that the formation of the crusts was affected by lower surface hardness and solar radiation.

Keywords: Crust Formation, Facing Stone, Groundwater Mineral Content, Surface Hardness

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APPLICATION OF ELECTROCOAGULATION FOR NUTRIENT REMOVAL AND RECOVERY FROM FRESH HUMAN URINE

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Abstract

Human urine contributes 80% nitrogen and 50% phosphorus in domestic wastewater and is, therefore, an important source of nitrogen and phosphate. Because of these properties, it can be a good alternative as a natural fertilizer. In conventional wastewater management, all liquid wastes are collected in the sewage system and transferred to the central wastewater treatment plant then treated there. In the last case, it is important to collect and re-utilize useful components and reusable water in the wastes generated in the houses and so to prevent waste of resources and get many economic and environmental benefits. With the ECOSAN approach, nitrogen and phosphorus can be used as natural fertilizers in contrary to classical approaches and in addition this; pollution load of wastewater treatment plants is reduced. By ECOSAN or source separated systems approach, nitrogen, and phosphorus could be used as natural fertilizers in contrast to classical approaches and in addition to this; pollution load of wastewater treatment plants can be reduced and eutrophication problems are ended by causes from municipal wastewaters.

In this study, electrocoagulation processes were applied to the fresh human urine that was collected separately for nutrient removal and recovery aiming. Using aluminum and iron electrodes compared percentages of removal efficiencies. PO4- P removal efficiency was obtained in the range of over 90% in fresh urine by using both aluminum and iron electrode. However, these values were obtained in a shorter time with an iron electrode compared to the process using the aluminum electrode. TN removal for both electrodes did not exceed 40% in fresh urine. Sludge was search about nitrogen and phosphorus by XRD investigation and release of nutrients were investigated by different acidic solutions.

Keywords: Al Electrode, Fe Electrode, Nitrogen, Phosphate, Nutrient, Recovery Sustainability, Yellow Water

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AN EXAMINATION ON CLIMATE CHANGE RESILIENCE ON DENİZLİ

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Abstract

Climate change is one of the major global problems today. It has been affecting both ecosystems and physical systems adversely. There is no place on earth that will not face climate change impacts. Cities are focal areas of climate change phenomenon in terms of being main reason of human-activity related changes in climate and being affected by climate change impacts severely. On the other hand, cities are important part of solution to climate related stresses. Resilience is the key concept against climate change impacts on cities and producing solutions. Climate change resilience contains both mitigation strategies to eliminate the factors causing climate change and adaptation strategies to be able to adjust new climate conditions. These both strategies are crucial in viability of urban system and protecting inhabitants.

In this study, we aimed to examine the level of climate change resilience in Denizli. For this purpose, we investigated climate-related mitigation and adaptation projects, actions, plans and implementations, made interviews with municipality departments, governmental agencies and Ngo's. This study covers major urban systems that are water management, energy, transportation, waste management, natural areas and buildings. Denizli is one of the major cities in Turkey due to its economic capacity of industry and agriculture sectors and densely populated urban settlement. Any disruptive impact of climate change would create severe problems on urban system and inhabitants. Strategies to decrease ghg emissions, control the activities causing climate change, increase adaptive capacity and eliminate vulnerabilities and risks have vital importance for Denizli. The results of this study highlight the position of Denizli towards a climate change resilient city, positive improvements on mitigation and adaptation strategies and gaps to reach resilience.

Keywords: Adaptation and Mitigation Policies, Climate Change, Urban Resilience

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TOXICITY OF ANALGESIC AND ANTI-INFLAMMATORY PHARMACEUTICALS

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Abstract

Pharmaceutical compounds are biologically active substances and they have certain effects on living organisms. Variety, production and use of pharmaceutical compounds are increased with increase in the standard of living of the people and the development of medicine. The pharmaceutical compounds cannot be fully metabolized by humans after use in hospitals or houses. As the main form and its metabolites are excreted into the sewage system. Unused pharmaceuticals can also be discharged into the sewage system. Pharmaceutical compounds through sewerage system reach wastewater treatment system. The pharmaceutical compounds can be discharged to the receiving environment by the effluent from the treatment in the wastewater treatment plant or they can accumulate in sludge and reach the environment by applying sludge to the soil. The toxicity of the pharmaceuticals and metabolites in environments is not fully known. However, toxic effects on non-target organisms are expected. When the studies on the toxicity of pharmaceuticals were examined, the acute and chronic toxicity of 6 anti-cancer drugs were investigated for 4 different test organisms (*Daphnia magna, Ceriodaphnia dubia, Brachionus calyciflorus and Thamnocephalus Platyurus*) in the primary consumer class of the aquatic food chain. The acute ecotoxicological effect was higher than the estimated concentrations in the environment. In a different study, the acute and chronic toxic effects of 11 pharmaceutical compounds were studied using the *Hydra attenuate* as the test organism and the LC_{50} values were calculated. LC_{50} of ibuprofen, naproxen, gemfibrozil had 22.36 mg/L, while the other compounds had a higher LC_{50} value.

In this study, acute toxicity of analgesic and anti-inflammatory pharmaceuticals were determined on *Lepidium sativum*, *Vibrio fisheri*, *Daphnia magna* representing different trophic levels. *Lepidium sativum* toxicity test was performed for 6 controls solutions and 3 different concentration antibiotics solutions. *Vibrio fischeri* toxicity test was used Hach-Lange LCK 482 Lange LUMIStox 300 luminometer with EN ISO 11348-2 (Luminesent bacteria test kit). *Daphnia magna* microbiotest was performed according to Daphtox FTM Standard Procedure. EC_{50} values of *Lepidium sativum, Vibrio fisheri* and *Daphia* magna toxicity tests were determined as $4.65*10^{-5}$mg/L, 3.58 mg/L, 2.23 mg/L, respectively. The highest toxicity was observed in *Lepidium sativum* toxicity test. The values obtained are higher than the concentrations found in environmental conditions, but the bioaccumulation properties of the compounds should not be ignored.

Keywords: Environmental, Pharmaceutical, Toxicity.

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OCCURRENCE OF ANTIBIOTICS IN SEWAGE SLUDGE OF URBAN WASTEWATER TREATMENT PLANT

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Abstract

Antibiotics are used in many applications to remove unwanted microorganisms. It is estimated that 100000 tons to 200000 tons of antibiotics are used worldwide every year. Antibiotics, which are frequently used in hospitals, veterinary clinics, farms and houses, are mixed in wastewater with feces and urine. Conventional wastewater treatment plants showed low-performance for the removal of antibiotic compounds and these compounds remain in the effluent or the treatment sludge. In most of the studies related to antibiotics, the effluents of the wastewater treatment plant are examined to investigate the sources of antibiotics in environment. However, treatment sludge is an important way for antibiotics to reach environments due to their application to agricultural areas. Absorption of antibiotics into sludge depends on the chemical structure, mobility, hydrophobicity and degradability of the antibiotic as well as the properties of the treatment sludge. It is known that adsorbed antibiotics are more stable than those remaining in wastewater.

In this study, the commonly used antibiotic compounds (trimethoprim, oxytetracycline, erythromycin, clarithromycin, azythromycin, doxycycline, sulfamethazine, ciprofloxacin, chlortetracycline, sulfamethoxazole) were investigated in stabilized sludge taken from Konya urban wastewater treatment plant. The plant has activated sludge system and sludge treatment is carried out sludge thickener, anaerobic sludge digester, sludge dewatering units. The daily wastewater flow rate is approximately 190000 m^3/day and produced sludge quantity is 140 tons/day. Sludge samples were taken from the decanter outlet. Samples were taken for a year to see the seasonal change. The total concentration of antibiotic compounds was detected 51 and 3191 ng/g dry matter. The most dominant antibiotic compounds were clarithromycin, azithromycin. Maximum concentrations of clarithromycin, azithromycin were determined as 1496 ng/g dry matter, 1494 ng/g dry matter, respectively. When the seasonal changes of the determined concentrations were examined, antibiotics were found in the highest winter season. In force in our country, Regulation on the Use of Domestic and Urban Treatment Sludge in Soil, heavy metals and organic pollutants such as AOX, LAS, PAH, PCB are given limit values in the treatment sludge, while pharmaceuticals do not have any limit values. For human and environmental health, it is necessary to monitor in pharmaceutical sludge and further research in pharmaceutical compounds.

Keywords: Antibiotic, Sewage Sludge, Wastewater Treatment Plant.

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NUMERICAL INVESTIGATION OF ZnO-WATER NANOFLUID FLOW IN A SPIRAL COIL

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Abstract

Convective heat transfer plays an important role for industrial heating or cooling operations. Especially, due to the issues of efficient using of energy an important topic nowadays, increased interest in studies on heat transfer. Studies have been carried out for a long time in order to improve convective heat transfer. It is realized from studies that it can be developed convective heat transfer with changing the flow geometry or boundary conditions or improving the fluid thermophysical properties.

Improving the heat transfer performance of fluids used for convective heat transfer took place one of the most studied topics recently. One technique used to improve the performance of heat transfer fluids adding the solid particles which have higher thermal conductivity than the thermal conductivity of the fluids. Until now, this type of fluid and solid particles comprising the use of suspensions of solid particles millimeters in size is in question. As a result of the recent studies new discovery of nanofluids which have 10-50 nanometer-sized solid particles in suspension, led to increase the studies about this subject. The most important reason, even very small concentrations of nanoparticles, surprisingly nanofluids have high thermal conductivity values. Today, metals, oxides, carbides, or nano-carbon tubes are generally used as nanoparticle in nanofluids. In the main fluid, water, ethylene glycols, cooling fluids or engine oil used often in the heat exchangers as fluid are used. It is expected that using the nanofluids for increasing heat transfer due to the high thermal conductivity of nanofluids will increase in the future.
In this study, ZnO-water nanofluid flow in a circular cross-section spiral ducts will be analyzed numerically. ZnO-water nanofluid will be taken different nanoparticle volume fractions (1.0%, 2.0%, 3.0%, 4.0%). The study will be carried out under turbulent flow regime. Constant temperature boundary condition will be applied on the duct surface and optimum nanoparticle volume fraction will be determined.

Keywords: Spiral Coil, ZnO-water Nanofluid, CFD

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INVESTIGATION OF LIGHT POLLUTION IN NIGDE OMER HALISDEMIR UNIVERSITY CAMPUS

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Abstract

Nowadays, the increase in electricity consumption is faster due to the growing and developing industry, tourism, population and consumption habits and demand for more effective lighting. The use of luminaries and lamps that do not comply with lighting rules is also becoming widespread. As a result, light pollution is gradually increasing. Light pollution has negative effects on human and wildlife and the natural environment. In addition, light pollution causes waste of energy resources due to negative effects such as wasted energy and puts an additional burden on the economy of the country. Protection of the national economy and natural environment can be ensured by the regional planning of the amount of lighting that meets the needs and prevents pollution. However, the needs of each city and its parts (industry, campus, hospital, recreational areas) can vary. In this study, the causes and effects of light pollution were investigated in the Niğde Ömer Halisdemir University Campus. At 120 points, the illuminance level was measured with digital light meter and values between 2-150 luxury values were determined. The spatial change of light intensity was mapped by Kriging method with the help of MapInfo in ArcGIS 10.6 software. The values were examined in terms of general lighting rules and light pollution and problems were determined and solution suggestions were developed.

Keywords: Light Pollution Map, Light Intensity Map, Campus Illumination

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ENVIRONMENTAL IMPACTS OF LAND CONSOLIDATION PROJECTS

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Abstract

The rapid increase in the world population is also increasing the pressure on limited natural resources such as soil and water. Therefore, in the future, the food demand and security concerns of the growing population, will increase the search for production based on limited natural resources and force the investment and support limits in this area. With the increase in population, industrialization and inadequacies in rural areas caused migration to increase from rural to urban areas. In our country, the continuous division of agricultural land due to inheritance, sales and migration caused the number of agricultural enterprises and rural population to decrease and the number of parts per enterprise increased. This situation led to land fragmentation. The most effective method to solve these problems is land consolidation projects. Land consolidation is an effective land management approach to increase agricultural production to ensure food security, to improve modern agriculture and to improve sustainable development and to prevent land fragmentation.

Land consolidation projects interfere with the rural environment too much. With these projects, planning of agricultural infrastructure and superstructure services and development of rural environment are provided. The aim of this study is to determine the impact of land consolidation projects on rural environment.

Keywords: Land Consolidation, Land Management, Environment

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ELECTRICAL AND ELECTRONIC WASTES AND CONSUMER BEHAVIOURS: NİĞDE CASE STUDY

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Abstract

Electrical and electronic equipment (EEE) have become indispensable part of our daily life. The production of EEE is growing rapidly worldwide. Along with advancing technology, more new models are introduced to the market and the consumption increases. Many people have no idea about what is done with the expired electrical and electronic devices. E-waste (also known as waste electrical and electronic equipment) is one of the fastest-growing waste streams worldwide. All in all, people today are faced with a new type of waste called as electronic waste. E-waste problem becomes even greater when we consider that large space they occupy and the toxic substances in them. Increasing amounts of e-waste pose detrimental effects to the environment and public health through improper recycling and disposal techniques. Because of the hazardous components they contain, e-waste can cause environmental and human health threats if they are not properly managed. It is important to know the potential e-waste amount and the behaviors of people in the production of e-waste to realize a proper e-waste management in our country.

In this study, the amount and property of electrical and electronic equipment and e-waste generation potential per person in Niğde was investigated. A questionnaire was prepared and applied to a group of people including 150 person in 10 districts with different income levels. The questions were to investigate the behaviors in the use, replacement, and management of electrical and electronical equipment. The findings showed that usage of lamps (fluorescent and others) were higher than the other equipment, and usage of mobile phones were found to be highest in terms of devices. It was also found that when the mobiles become e-waste since the owners do not want to use them, they are not just thrown away and kept at homes instead.

Keywords: E-waste, Niğde, Questionnaire, Recycling, Waste Management

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CURRENT SITUATION ANALYSIS OF HYDROGEN FUEL CELL VEHICLES IN THE WORLD AND THE FUTURE OF FUEL CELL VEHICLES IN TURKEY

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Abstract

Fuel cells are high efficient energy conversion devices and can be used wherever electrical energy is needed. As a result of the studies over the past two decades, fuel cells are commercially available in many sectors and are known to have many advantages especially in the automobile industry over internal combustion engines and electric vehicles.

Fuel cells are the systems that generate electricity as a result of the electrochemical reaction of hydrogen - air and only water emerges from the exhaust as a waste. Therefore, it is more silent, efficient and environmentally friendly than the conventional vehicles working with internal combustion engines. Moreover, the interest in the fuel cell has increased due to the fact that the electric vehicles have a heavy battery and a long charge-discharge time.
The number of sales of fuel cell vehicles, which have been commercially available in the world since 2015, is increasing day by day and more than 25000 cars have been sold only in USA. It is so crucial that our country should not fall behind the world in the production of fuel cell car with the domestic and national automobile production plans.

Keywords: Clean Energy, Electric Vehicles, Fuel Cell, Hydrogen Energy

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BIO-INSPIRED BIPOLAR PLATE DESIGN FOR FUEL CELLS

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Abstract

Fuel cells are electrochemical devices that convert energy directly into electricity by using the energy of fuel. Fuel cells come to the fore with their high efficiency and can be used wherever energy is needed. In addition, only water is discharged to the nature and does not cause emissions caused by fossil fuels. Therefore, fuel cells are a system that protects the environment completely.

The biggest obstacle to the spread of fuel cells is the high cost. Therefore, it is used generally in military applications. By increasing the power density of the fuel cells, the unit power cost will also decrease. Therefore, many studies in the literature aim to improve the performance of fuel cells. The performance of the fuel cells depends on a lot of physical and chemical factors including the operation conditions, transport phenomena inside the cell and kinetics of the electrochemical reactions, membrane electrode assembling (MEA). However, the design of the flow channels is one of the most important factors affecting the performance of fuel cells. The homogeneous distribution of the reaction gases over the flow fields channels, it leads to improve the chemical reactions and thus to improve the performance of the fuel cell. Bio-inspired flow fields such as veins in tree leaves which efficiently distribution from one central source to large areas. A mathematical model has been developed to use a real leaf design as a flow field in fuel cells to optimize the flow field with minimal pressure drop, optimum heat, water and current distribution.

Keywords: Bio-Inspired, Channel Design, Fuel Cell, Hydrogen Energy Systems

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THE EFFECT OF ENVIRONMENTAL AWARENESS ON HOUSEHOLD PRACTICES AND PURCHASING BEHAVIOR

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Abstract

The increase in the amount of carbon-containing greenhouse gases in the atmosphere, which is the main cause of global warming, has made carbon management a significant issue for whom should be of interest, both individuals and households as well as industrialists. Household shopping behaviors, heating choices, and households' way of living cause environmental pollution and increase in greenhouse gas emissions. It is thought that the studies aiming to prevent these consequences can be planned and implemented more easily in societies where environmental awareness is high. The awareness of individuals and the attitudes and behaviors that are expected to be developed after this awareness are of great importance for the development of environmental awareness and reduction of the amount of greenhouse gases.

This study is a part of the comprehensive research carried out in Nigde province and presents the findings obtained from the data obtained from 403 households with the awareness of environmental problems and the relationship between the main environmental practices carried out in residences and purchasing behavior.

Keywords: Environmental Awareness, Global Warming, Purchasing Behavior

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ENVIRONMENTAL AWARENESS AND CARBON FOOTPRINT: THE CASE OF NIGDE

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Abstract

Environmental pollution and global warming affect all life forms. Human beings, who have the biggest share in the formation of these problems, also have the most important role in diminish these. In order to reduce the emission of greenhouse gases, which are accepted as the most important reason for global warming, households' (families) approach to environmental issues and their knowledge about the carbon footprint values will be an important starting point for planning and conducting efforts to improve environmental awareness and reduce emissions. In this study, the carbon footprints of households (electricity, heating and transportation) were investigated in Nigde province and the relationships between footprint size and environmental awareness were investigated.

Keywords: Carbon Footprints, Environmental Awareness, Global Warming

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TREATMENT OF SLAUGHTERHOUSE INDUSTRY WASTEWATER BY MICROFILTRATION AND ULTRAFILTRATION MEMBRANES AND USE AS AGRICULTURAL IRRIGATION

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Abstract

Slaughterhouse wastewater is one of the most produced industrial wastewater in the world. This wastewater can cause a high level of pollutant effect when the process is given to riverbeds or sewage systems without any treatment. In this study, the use of wastewaters with high organic, nitrogen (N) and phosphorus (P) as an agricultural product has been examined. . In the light of the results, it is thought that the wastewaters of the slaughterhouse industry can be used as irrigation water after passing through the microfiltration and ultrafiltration membrane because of the high amount of N and P.

Keywords: Membrane System, Slaughterhouse Waste Water, Irrigation Water

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WEATHERED LIMESTONE AND GABBROIC ROCKS AND SOIL DEVELOPMENT IN ORDU PROVINCE, TURKEY: THE QUATERNARY GEOMORPHOLOGICAL EVOLUTION

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Abstract

Geochemical and mineralogical analysis is widely used to characterize soil parent material and to relate it to the host rock. When it is applied to a soil profile, it can give a genetic signal of chemical and mineralogical transformations due to soil-forming processes. In this study, ten selected soil profiles in Altınordu, middle Blacksee region, were analyzed for genetic signals of soil ageing, eluviation and illuviation, and other processes. The mineral assemblages and geochemical content in a vertical weathering profile developed over a Limestone and Gabbro terrain were studied for their relative abundances. The soils are classified as brown podzols and defined by distinct A-, B- and C-horizons with thicknesses of 10-20, 60-80 and 140-150 cm, respectively. It is observed that the ratio of sand and clay in soil horizons developed on Limestone and Gabbro increased with the depth of the profile. Prevailing minerals through the **Limestone** profile are calcite, and the clay minerals including smectite and illite. The primary mineral assemblage of **Gabbro** profile consists of 50-60% feldspars, 25-40% pyroxene, 20-30% olivine, 20% hornblende and 05% opaque minerals. The mineralogical studies carried out on Gabbro indicate that the amount of quartz minerals in upper horizons of the soil increased, but that the amount of feldspar, pyroxene, amphibole and olivine minerals decreased. The soil horizons developed on Limestone and Gabbro, the amount of oxides such as Al2O3, Fe2O3 and MnO were increased and CaO, MgO, Na2O, K2O and P2O5 decreased with respect to host rock. It is observed that in this locality, the mobile trace elements such as Co, Sr and Cd were leached vertically, the semi-mobile trace elements such as Cu, Ni, Ba and Zn, are leached away completely and the immobile trace elements such as Cr, Nb, Ce, and Zr were concentrated in soil profile. The data obtained from this locality is in the range of the North American Shale Composite (NASC).

Keywords: Altınordu, Forest Soils, Quaternary, Limestone, Gabbro, Acid Soils, Mineralogical and Major and Trace Element Content

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ENERGY RECOVERY OF THE BIOMASS MIXTURE AND SEWAGE SLUDGE

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Abstract

As per renewable resources, European countries have declared the need for alternative fuels with the Directive on the promotion of the use of biofuels and other renewable fuels for transportation (2003/30/EC). In 2009, a new Directive with more ambitious goals (2009/28/EC) was set. This directive aims the integration of renewable energies in the final consumption of EU up to 20% by 2020. Furthermore, it targets an integration of 10% of renewable energy in transportation sector.

The purpose of the papet is to produce a prototype that could be used for biocrude production from sewage sludge, to upgrade it and to sanitize rejected water by transforming water soluble organics into combustible gas. Experimental campaign that will be led on that prototype will be used to study systems efficiency and to design an integrated process. The aim of paper is to upgrade produced fuel in order to be compatible with vehicle engines. Produced fuel will be characterized according to European norms and engine tests will be also performed in order to analyse performance and emissions of engines fuelled with final product. Besides the construction of reactor, the sustainability of system will be studied in depth. Thus energy balance and efficiency of each process and of the integrated plant will be studied, then a scale-up study will be led based on eco-innovation and closed loop theory and hazard and operability analysis will be performed on the system. Finally, environmental analysis and life cycle assessment will be realized. During the project, communication and dissemination of results to stakeholders will be also addressed via stakeholder board that is under composition. Keeping in mind that the process should not change the final functionality of the WWTP, water leaving the process should meet requirements of environmental norms. Thus COD, BOD, total SS, pH, NO2, NO3, NH3, Kjeldahl N, total N, total P, colour and minerals should be measured and compared to norms.

Keywords: Municipal Sewage Sludge, Energy.
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SEWAGE SLUDGE FOR FUEL PRODUCTION

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Abstract

In Europe, the potential of operational wastewater treatment plants is about 815 million population equivalents (PEs), corresponds to 90 – 100 g of suspended solids/day.
Amongst waste sources, municipal sewage sludge is gaining increasing attention nowadays as a feedstock for the production of biofuels as the dry sludge could comprise 30% - 40% Carbon on dry basis. Additionally, waste sewage sludge is a relatively cheap, abundantly available feedstock, which offers wide opportunities as a feedstock for energetically and economically profitable biofuel production. For instance, a study of Research and Markets, estimates the investment costs of wastewater treatment to be 37.6 billion Euros in EU28 during 2017. Considering that the cost of sludge management for WWTPs (wastewater treatment plants) is 50%. The aim of this project is to suggest a pilot scale plant able to transform organic part of wastewater into valuable transportation liquid fuels and to reject sanitized water. In addition, the very ambitious objective of coupling the wastewater treatment with the production of biofuel cannot be realized without using a multidisciplinary approach: together with the optimization of the transformation of components and their upgrading, a complete overview needs to be applied to the overall problem, looking the end at the economic and the environmental sustainability of the process, as well as the final nature of the effluents produced. The most important objective will consist into strongly modify the nature of a WWTP, without changing its final functionality, even improving the nature of the effluents produced. One of the main objectives of this paper is to obtain a positive energy balance. Thus, it is very important to manage energy fluxes and avoid wasting energy. The main sources of loss are: uncompleted conversion of organic fraction, energy content of rejected water and heat losses through the walls of reactors. Thus, one of the innovations targeted by this project is to produce bio-crude, to upgrade it and finally to analyze its behaviour on diesel engine.

Keywords: Municipal Sewage Sludge, Biofuel

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ANALYSIS OF TECHNICAL CHARACTERISTICS AND MAIN ENGINE PROFILE OF FULL CONTAINER SHIPS IN THE TURKISH SEABORNE TRADE FLEET

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Abstract

In this study, it is aimed to analyze the technical characteristics and main engine profile of the Turkish flagged full container ships which is a part of the Turkish Seaborne Trade Fleet and to determine the current situation. For this purpose, data on the technical characteristics such as ship's place of built, year of built, length over all (LOA), grosstonnage (GT), deadweight tonnage (DWT), TEU carrying capacity and data on the main engine profile such as main engine's power (KW), maximum speed (knot), fuel capacity and builder of 73 full container ships which have been already registered to the Turkish National Ship Registry and Turkish International Ship Registry (TUGS) as of 15.03.2019 were classified and analyzed using the MS Office Excel Software. According to the results of the analysis, it has been determined that the Turkish flagged full container ships in the Turkish Seaborne Trade Fleet, which have a total carrying capacity of 1, 427.106 DWT and 101, 646 TEU, were mostly built in Europe region, especially made of Germany, built between 2001 and 2010, in the range of 10.000-19.999 tonnages (GT, DWT) and length between 151–249 meters and Handy/Sub-Panamax (1000-2999 TEU) size. In addition, they have a main engine which was mostly made in Germany and with power between 10.000-19.999 KW, maximum speed in the range of 16.1 to 21.9 knot and fuel capacity of 1, 000-1, 999 m3. In the discussion and conclusion section of the study; the technical characteristics and the main engine profile of the Turkish flagged full container ships have been evaluated for the developments in the international seaborne trade and shipbuilding industry as well as for marine and environmental safety.

Keywords: Container Shipping, Container Ships, Main Engine, Seaborn Trade, Turkish Seaborne Trade Fleet

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OPTIMUM PROCESS CONDITION DETERMINATION FOR DISPERSE BLUE 60 REMOVAL BY ELECTROCOAGULATION WITH TAGUCHI METHOD

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Abstract

Dyestuffs are used extensively in the textile industry. Wastewater produced in textile processes cannot meet the discharge criteria especially in terms of color content and therefore the treatment demand occurs. In many studies, electrocoagulation has been used in the removal of dyestuff. High removal efficiency, low space requirements and easy controllability are the main advantages of the process. In this study, removal of Disperse Blue 60 (100 mg/l) dye stuff by electrocoagulation with taguchi method was investigated. In the reactor monopolar-parallel connected Al anode and stainless steel cathode were used as electrode material. The initial EC-pH, current density and treatment time values were changed and the effects of these parameters on the dyestuff removal efficiency were investigated. The treatment conditions have changed according to experimental matrix as ; initial EC 500, 1000 and 1500 µS/cm, pH 5, 6 and 7, current density (J) 40, 80 and 100 mA/cm^2, electrolysis time (t) 2.5 5 and 10 min. The lowest dyestuff removal efficiency was 34% at; EC = 500 µS/cm, pH = 5, J = 40 mA/cm^2, t = 2.5 min conditions, and the highest removal efficiency (99%) was obtained at EC=500 µS/cm, pH=6, J= 80 mA/cm^2, t=10 min.

Keywords: Electrocoagulation, Disperse Blue 60, Textile Wastewater, Stainless Steel Electrode, Dye Removal

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APPLICATION OF VISUAL MODFLOW FLEX FOR SIMULATING GROUNDWATER FLOW IN ALTINOVA ANTALYA TURKEY: IMPLICATION FOR WATER RESOURCES MANAGEMENT

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Abstract

The aquifers in Turkey hold significant amounts of water that is widely used for irrigation and domestic purposes along the Mediterranean region of the country. Therefore, understanding and modeling of the aquifer system is crucial for the management of groundwater resources. The present study aimed at assessing the current condition of groundwater resources in Altinova and to analyze management scenarios by predicting the forthcoming groundwater table elevations. During the course of the study, groundwater flow in the region was simulated using Visual MODFLOW Flex, and the model was run as 2D in steady-state. The data sets used for the simulation of the system were hydraulic conductivity and groundwater table elevation. The other data included were surface and bottom topography of the aquifer derived from DEM (Digital Elevation Model) and well depths.

The first step employed in analysis was creation of an initial database and preprocessing in ArcGIS 10.3.1, then conceptual model was designed with dimensions of 25600 m^2, where the numbers of rows and columns were equal to 87 and 62 respectively. Second step was conversion of the conceptual model to numerical. Calibration of the model was automatically performed using the parameter estimation tool (PEST). The contour maps of the measured and the simulated groundwater table elevation matched well in the whole model domain except a small part in the south of the study area.

The modeling results show decline in groundwater level up to several meters below ground level. Therefore, it is proposed to arrest the declining groundwater level by adopting groundwater management approaches for irrigation sector.

Keywords: Altınova, Groundwater Management, Modeling, Visual MODFLOW.

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INTERPOLATION OF SOIL QUALITY PARAMETERS FOR A DRY AGRICULTURE FIELD WITH IDW METHOD

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Abstract

In this study, pH, electrical conductivity (EI), organic matter (OM), oil-grease, dissolved organic carbon (DOC), dissolved inorganic carbon (DIC), dissolved total carbon (DTC) and dissolved total nitrogen (DTN) values measured from the samples that were taken from dry agricultural land in Niğde. The spatial estimations of the variable concentrations in soils have been made by weighted inverse distance interpolation (IDW) technique. The effects of soil use on soil quality parameters were analyzed with T-test and ANOVA.

The analyzes were carried out according to EPA standards. The pH values of the soil were generally between 8.37-8.77 and it was observed to be alkaline. Salinity in the field varies between 144-626 µs. he water content of the soil ranges between %0, 536 and %5, 054. The oil-grease was between %0.014 and %2.233 in the soil. The IDW technique and the ArcGIS software were used to spatially quantify the distribution of soil quality parameters.

Keywords: IDW, Soil Parameters, Dissolved Organic Carbon, Dissolved Organic Nitrogen, Land Use, Oil-Grease

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EFFICIENCY OF MAGNETIC PUMICE CATALYSTS FOR FENTON-LIKE OXIDATION OF WASTEWATER ORIGINATING FROM A TEXTILE CHEMICALS PRODUCTION INDUSTRY

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Abstract

Advanced oxidation process are very favourable to abate recalcitrant compounds and color present in industrial wastewaters. If Fenton-like process is operated with heterogeneous catalyst impregnated with iron precursors on the surface of support materials such as pumice there will be no need to settle of iron sludge. The main objective of this study is to explore the efficiency of the magnetite pumice catalysts syntesized from three types of puımices (nanosized for water filters use, clean and spent from a Denim factory) in the Fenton-like process for removal of COD and color from a textile chemicals producer industry.
Wastewater sample was taken from the equalization tank of wastewater treatment in the textile chemicals producer industry located in European Free Zone in Cerkezkoy (Tekirdag), Turkey. Remazol Brillant dye was added into the wastewater sample to adjust its initial COD and color to a medium character. Feton-like experiments were performed in 100 mL sample volume that were shaked at constant temperature using water baths. The effect of the amount of magnetite nanosized pumice catalyst, H_2O_2 concentration and pH were first investigated to effectively remove COD and color in wastewater. When optimum conditions were assessed the COD and color removal efficiencies were investigated varying temperature in the range of 25-45 °C and oxidation time from 0 to 120 min. After that, magnetite catalysts synthesized using clean and spent pumices were tested for both color and COD removal at the same optimum contidions. Color was monitored using a UV–vis spectrophotometer. The magnetite pumice catalysts were synthesized using Fe^{3+} and Fe^{2+}.

A maximum COD removal (80.1%) was obtained at the experimental conditions of 7.5 g/L magnetite pumice catalyst synthesized from nanosized pumice and 500 mg/L H_2O_2 concentrations, pH 3 during 120 min oxidation time at 35 ^{0}C. The data fitted well the second order kinetics and the k_2 of COD removal increased with enhancing the temperature. At the same conditions UV absorbance at 606 nm that indicated peak value of color, was also removed at the highest ratio for all three types of catalysts. Although nanosized magnetite pumice catalyst yielded the best COD removal efficiency its COD removal capacity droped to 47% when it was recycled and reused. This value was slightly lower than the removal efficiency of

clean magnetite pumice catalyst (48.5%). Anyhow, Fenton-like oxidation process was found to be effective to remove COD and color from a textile chemicals producer industrial wastewater.

Keywords: Fenton-Like, Oxidation, Magnetite Pumice Catalysts, Textile Chemicals, Wastewater, Color, COD

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OCCURRENCE, HEALTH RISKS AND GEOCHEMICAL MECHANISMS OF FLUORIDE IN GROUNDWATER OF THE NORTHEASTERN REGION, GHANA

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Abstract

The quality of groundwater in the Northeastern region of Ghana is yet poorly known though the rural folks rely on groundwater for their domestic water supply. In this study, a total of eighty-eight (88) samples were collected from active boreholes in the Northeastern region of Ghana and analyzed for concentrations of the hydrogeochemical parameters to understand the general hydrogeochemistry of groundwater with special reference to fluoride (F^-). The study also determined the spatial distribution, origin of groundwater F^- and the level to which the underlying geology influences the groundwater F^- concentrations. Human health risks of F^- were also assessed based on the model of the US Environmental Protection Agency. The region is overlain by shales and carbonate-bearing rocks with intercalations of sandstones and mudstones of the Oti/Pendjari Group. Groundwater is alkaline in this area and the dominant hydrochemical facies is Na-HCO_3 type, reflecting the local geology of the region. The F^- concentrations range from 0.05 – 13.29 mg/L with an average value of 3.26 mg/L, suggesting that majority of the boreholes (~ 70%) have F^- concentrations higher than the acceptable limit (1.5 mg/L) of the World Health Organization. Most of the affected boreholes are around the northeastern, southeastern, central, and western parts. The F^- is mainly coming from geogenic sources and is principally controlled by hydrogeochemical factors such as alkaline nature of the water, water-rock interaction, intense weathering, ion exchange reactions, moderate evaporation, mineral dissolution and precipitation. However, minimal contribution from anthropogenic sources such as discharge from industrial and domestic sewages cannot be precluded. The non-carcinogenic adverse health risk (hazard quotient) for F^- is higher in children (0.07 – 18.83) than infants (0.02 – 4.43), teenagers (0.03 – 8.86) and the adult population (0.03 – 6.86). Hence, children are more exposed to initial symptoms of dental and skeletal fluorosis. Complete defluoridation is therefore recommended in order to reduce the groundwater F^- threat in the region.

Keywords: Fluoride, Ghana, Groundwater Quality, Hydrogeochemistry, Health Risk Assessment

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MECHANICAL PROPERTIES OF HEMP FIBER REINFORCED GEOPOLYMER COMPOSITES

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Abstract

Geopolymers based on fly ash are an emerging alternative to ordinary Portland cement, with a low impact on the environment and a potential to increase the sustainability of the concrete-based construction. Reported here is the design and investigation of new hemp fiber-reinforced geopolymer composites (HFRGC) based on fly ash and hemp fiber (5-50 wt. %). These HFRGC materials showed promising mechanical properties: compressive strength at cylindrical test (6.05-17.40 MPa); force load at upper yield at cylindrical test (0.25 - 1.51KN); compressive modulus at cylindrical test (92.22-917.40 MPa) flexural strength (2.95-9.99 MPa); and flexural modulus (53.96-564 MPa). The density of HFRGC decreases with the addition of hemp fiber. SEM and optical images showed short hemp fibers 3D randomly oriented inside of HFRGC. SEM images showed a good adhesion of geopolymer matrix around hemp fiber and unreacted spherical shape fly ash.

Keywords: Hemp Fiber; Fly Ash; Geopolymer Composites; Fiber Reinforced Geopolymer Composites

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CIRCULAR ECONOMY IN THE WATER MASSIVE TEXTILE INDUSTRY

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Abstract

It is generally well recognized that specific areas in many countries are facing further severe water shortage problems, adding to many countries already attaining the limit of their water supply. Europe has always been considered not in danger concerning water resources. However, due to overexploitation of resources and deterioration of existing water bodies, water scarcity problems have been observed in the southern regions of Europe. The equilibrium between water demand and availability is already under pressure in some regions of Europe, mainly in Turkey, Cyprus, Greece and Spain. Nowadays water scarcity has already affected main water demanding sectors such as agriculture, industry and energy as well. Among water demanding industries, the textile industry is, one of the most polluting industry in the world, as the industry generate a massive amount of wastewater including many different hazardous compounds. Thus, textile wastewater used to be considered as just waste due to the negative effects provoked when arriving in the environment. Water scarcity together with the high amount of salts and hazardous compounds in the brackish textile wastewater, leads to the recognition of wastewaters to be managed in a circular economy concept. However, here is no standardized approach to creating a circular economy. Thus, defining appropriate policies in terms of circular economy or zero waste approaches must be considered if they are suitable for the textile industry. Because the transition to a circular economy requires significant changes in production systems. In this study, the related literature and industrial application examples were reviewed to evaluate challenges faced by the textile industry in adapting to the circular economy model.

Keywords: Circular Economy, Near Zero Discharge, Salt Reuse, Textile Industry, Wastewater Reuse

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CAR WASH INDUSTRY IN TURKEY: DECREASE WATER POLLUTION BY WASTEWATER REUSE

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Abstract

Car wash wastewater contains significant concentrations of contaminants such as nutrients, organics, particulate matter, sand, oil, grease, diesel detergents and so on. Nowadays water scarcity has already affected many countries. In Turkey, the equilibrium between water demand and availability is already under pressure. Water reuse not only saves water but also has great potential benefits such as protection of water resources, augmentation of river, prevention of aquatic life, sustainability of water resource management and so on. This contribution deals description of the current state of car wash water reuse with particular emphasis on water saving and environmental aspects. Car wash wastewater reuse potential and its cost-benefits analysis are presented and discussed. Special attention is given to the challenges that car wash sector faces today. Finally commercially available reuse technologies for car wash sector are evaluated regarding the safety, sustainability and suitability of applied reuse practices. The operational problems are discussed in terms of health and corrosion/scaling chemical risks. The cost-benefit analysis shows that for a car wash reuse system in Turkey over 10 months are needed for the amortization of the equipment of a car wash wastewater reuse system.

Keywords: Car Wash Wastewater, Cost Benefit Analysis, Reuse Practices in Turkey, Wastewater Reuse

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COMPARISON OF EFFICIENCY OF REMOVAL METHODS FOR DIFFERENT BORON CONCENTRATIONS

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Abstract

In this study; It is aimed to determine different removal methods for different concentrations of boron in order to reuse the waste water. For this purpose, two different wastewater with low (200 mg / L) and high (4700 mg / L) boron content were used. In the first stage for the treatment of wastewater with low boron content, boron removal was carried out at different temperatures using the Amberlite IRA743 resin. Boron analyzes were performed with ICP-OES. Boron concentration was found to be zero until the solution volume of 1500 mL elapsed. Then, the boron concentration increased to the input level. According to this fracture curve, the capacity of the resin was calculated as 7.5 mg Boron / g Resin (2.7 g Bor / L Resin) and boron was measured after 10 bed volumes.

Two-pass (pass) membrane studies were performed with SW30 and BW30 membranes for membrane studies carried out in wastewater with low concentration of boron. Fluid time graphs were obtained by filtering the water (permeate) collected at the first membrane exit by using a new membrane for the second time. This test was not carried out for the SW30 membrane with low flux. In the single-pass SW30 system with 80% recovery, the boron content of the filtrate was 32.09 mg / L, the pH was 9.81 and the conductivity was 176.7 µs/cm. In BW30 two-stage studies, the 1st stage output concentration was 16, 74 mg Boron / L, the pH was 8, 97 and the conductivity was 54, 8 µs/cm. 2. The output concentration was 11.69 mg Boron / L, the pH was 8.10 and the conductivity was 7, 7 µs/cm.

Chemical removal studies carried out in wastewater with high boron concentration; pH studies were performed using chemicals and combinations such as H_2O_2, $BaCl_2$, $CaCl_2$, $Ca(OH)_2$ At the end of the studies, the best yield was taken in the use of $Ca(OH)_2$ and the pH value was 10.5 and above and the boron concentration decreased to 1000 mg / L.

Keywords: Boron, Boron Removal, Ion-Exchange Resin, Membrane

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INVESTIGATION OF POLYLFONE MEMBRANE PRODUCTION AND PERFORMANCE FOR DYE REMOVAL

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Abstract

Industries has to treat their wastewater, accordance with the regulated dischange standarts before discharging to a receiving media. The textile industry is rapidly growing in Turkey. Treatment of textile wastewater to acceptable environmental standards has become one of the major problems. During the dyeing process, 50% to 100% of the dye is absorbed and the non-absorbed dye is mixed randomly into the wastewater. Textile industries typically generate 200-350 m^3 of wastewater per ton of finished product resulting in an average pollution of 100 kg COD per ton of fabric. It has been become more important to properly treat dyed wastewater in the textile industry due to strigent discharge regulations and increased water prices. In addition to the wastewater, there are also significant chemical wastes from the raw materials used in production. If they are not removed with appropriate treatment methods, they poses a danger for the environment, water and human health. Since the 1990s, coagulation/flocculation, adsorption on actived carbon, ozone oxidation and membrane processes are suggested for the treatment of textile wastewater. Compared to conventional wastewater treatment methods, membrane processes provide effective results for both dye removal and water recovery. In this thesis, novel polysulfone membrane was manufactured and applied for the treatment of dye wastewater. Membrane production was carried out by phase inversion method. Contact angle, flux, SEM analysis an dye removal rates were followed to determine membrane characterization. The membranes were composed of Polyvinylprrolidone (PVP) polymer 1-2%, N-methyl-2-pyrrolidine (NMP) and Dimethylacetamide (DMAC) solutions 72-75 %, and Polysulfone (PS) 24-26%. The membrane manufacture was carried out with Titanium Dioxide (TiO_2). The overal results indicated a reduction of Remozal Red195 from 100068 PCU to 265 PCU at a flux of 17 L/m^2/h.

Keywords: Textile Wastewater Treatment, Membrane Phase Inversion, Membrane Production, Membrane Characterization.

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DISCRIMINATION OF THE GEOLOGICAL, PEDOGENIC AND ANTHROPOGENIC PARTS OF THE HEAVY METALS IN ACIDIC SOILS

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Abstract

The study area is located in Yeşilköy (Altınordu-Ordu). The main objective of the study is identifying the ingredients of heavy metals of the soil profiles formed over the gabbro and limestone. Physical, chemical and morphological methods (pH-measurement, EDTA-extraction, AAS) have been used. The pH measurements of the samples taken from gabbro and limestone have been made. İt is observed that the measurement values are high in below zones, while they are low in upper horizons of the soil. The samples taken from the soil profiles on the gabbro and limestone rocks have been examined and the values of the Pb, Cu, and Cd depth gradients have been established. Since Pb is an indistinct heavy metal, it increases in the upper zones of the soil and decreases in the lower zones because of washing processes during soil formation. The heavy metals like half-mobile Cu and mobile Cd in upper horizons of the soil get poorer in terms of value, while they have enriched in lower horizons. The anthropological effect in the soil profiles on the gabbro and limestone is almost invisible. The acids and harmful materials moved from the far places such as the Balkans and Ukrania and then fall into the ecosystem of the soils as acidic rains in black sea region. The enrichment of heavy metals in term of pedogenic formation is observed in upper horizons of soils as Pb and in lower horizons of soils as Cu and Cd. Since the region and its surroundings are rich in mineral deposits, that is thought to cause heavy metal enrichment in the upper soil horizone.

Keywords: Altınordu, Forest Soils, Acid Soils, Heavy Metals, EDTA Extraction

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REMOVING ALUMINUM AND RECYCLING OF CAUSTIC SODA SOLUTION FROM ALKALINE CLEANING WASTE EFFLUENTS GENERATED IN THE ALUMINUM INDUSTRY

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Abstract

In the Aluminum anodizing industry, the scouring baths applied after caustic cleaning process aims to neutralize the surface of the aluminum products. The wastewater generated from scouring processes is alkaline and contains high amount of aluminum. The disposal of spent caustic from the anodizing process is costly and harmful to the environment. The acid demand for neutralization is main operational cost to deal with this wastewater. Because of increasing conductivity after neutralization, it is not possible to reuse wastewater. The treated saline wastewater creates another environmental problem. Thus, the caustic recovery from the scouring wastewater is the only environmentally friendly method to reach close loop water usage in the Aluminum industry. This study aims to recover both caustic and wastewater for reuse. For this propose, alkaline alum coagulations were applied to decrease aluminum concentration in the alkaline wastewater. The reversal electrodialysis (ED) membrane process was performed after alkaline coagulation for the caustic recovery. The cost and benefits of the reuse system were analyzed for different reuse scenarios in the industry.

Keywords: Aluminum Anodising, Caustic Recovery, Electrodialysis, Treatment, Wastewater

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ECOSAFEFARMING BY SOLAR TREATMENT AND DESALINATION OF BIOLOGICALLY TREATED BRACKISH WASTEWATER

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Abstract

Four billion people across the globe are in danger of serious water shortages. This situation has become a serious global problem in many countries, including some European countries. Water scarcity brings with it many social, economic and political problems, such as the food crisis and mass migrations. The use of urban wastewater in agricultural crops and hydrogen production is of great importance as it constitutes the six basic pillars of sustainable energy systems; (I) better efficiency; (ii) lower cost; (III) better resource use; (IV) better design and analysis; (v) better energy safety; and (VI) better environment.

The use of treated wastewater is considered to be a very rational solution in agricultural irrigation and energy needs. Therefore, there has been an increasing interest in the use of urban wastewater for various purposes recently. The aim of this study is to provide effective treatment-disinfection and desalination with a low-energy photocatalytic electrodialysis (PCED) reactor system, which is a new and energy efficient tertiary treatment technology that enables the re-use of purified urban wastewater in agricultural irrigation.

Keywords: Desalination, Disinfection, Domestic Wastewater, Photocatalytic Electrodialysis, Wastewater Reuse

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EVALUATION OF KOSBI WASTE WATER TREATMENT PLANT BY USING LIFE CYCLE ANALYSIS

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Abstract

The irregular usage of natural resources leads to environmental problems and a decrease in natural resources. In order to prevent this situation, various studies have been carried out. One of the techniques developed for this purpose is Life Cycle Analysis (LCA) method. LCA is a method that allows us to evaluate all environmental impacts from the procurement of raw materials to the disposal of a product. In this study, the environmental load of the waste water treatment plant in Kemalpaşa Organized Industrial Zone (KOSBI) was determined and LCA was applied. In the life cycle analysis and inventory analysis, the data in the facility's internal report were analysed by using GaBi 8.7 Education Software.

Keywords: LCA, Wastewater Treatment Plant, Gabi

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A SYSTEMATIC SURVEY OF FIVE ANTIBIOTICS IN TWO URBAN WASTEWATER TREATMENT PLANTS IN ISTANBUL

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Abstract

Human use antiotics originate in wastewater treatment plants as both parent compound and biometobolite froms which than end in receiving environments due to the insuffient treatment. Thus, antibiotics contribute to the antibiotic resistance in the bacterial population in both treatment plants and receving waters. Since studies on this subject in our country are very few yet, this work aimed to monitor some common use of human antibiotics (Sulfamethoxazole, SMX (sulfonamide), Erythromycin, ERY (macrolide), Levofloxacin, LVX (quinole), Cefaclor (beta-lactam), Amikacin (Aminoglicoside)) in the samples from two large urban wastewater treatment plants (UWWTP) with nitrification and denitrification process, located in Istanbul. After a detailed scientific literature survey for the detection and treatment of antibiotic residues in wastewater, the method validation was done for LC-MS/MS (Oasis cartridge) at the original pH of wastewater (around neutral). The concentrations of five antibiotic residues were determined on the monthly collected 24h-composite samples from the inflow and outflow of the Paşaköy and Ambarlı UWWTPs (May, June, July 2017). Method validation was not possible for amikacin while other antibiotics were validated at the highest ratio (100%) from 5 to 200 ng/L. As amikacin is an acidic compound it should be due to the neutral pH value of wastewater with the present cartridge and method optimized. The concentrations of SMX, ERY and LVX varied versus sampling periods and sampling points. The average removal ratios of SMX, ERY, LVX and Cefalor Table 1) were observed in accordance with the literature findings indicating that antibiotics are fairly removed, thus mostly present in the effluents of UWWTPs.

Table 1. Concentrations and removals of antibiotics studied.

Antibiotics	UWWTP	Influent (ng/L)	Effluent (ng/L)	Removal (%)
SMX (Recovery=60%, LOD=0.1 ng/L)	Ambarlı	4, 2	7, 0	None
	Paşaköy	5, 2	26, 3	None
ERY (Recovery=70%, LOD=0.1 ng/L)	Ambarlı	88, 6	73, 1	18
	Paşaköy	93, 9	727, 0	None
LVX (Recovery=85%, LOD=0.3 ng/L)	Ambarlı	13, 4	7, 0	38
	Paşaköy	31, 0	15, 0	48
Cefaclor (Recovery=72%, LOD=0.5 ng/L)	Both	Close to LOD	Close to LOD	Not determined.

Keywords: Human Antibiotics, Urban Wastewater, LC-MS-MS, Treatment of Antibiotics

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MEMBRANE PROCESSES (UF, NF, RO) FOR WASTEWATER REUSE

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Abstract

Recycling municipal wastewater offers a reliable and sustainable solution to cities and regions facing water shortages. Reuse of Konya wastewater treatment plant (WWTP) effluents was intended for irrigation of urban green areas (landscaping area, refuge, etc.) after the advanced treatment. The wastewater reclamation plant with a capacity of 3600 m^3/day was established in 2012 at Konya WWTP which have 200.000 m^3/day capacity. The plant called purple pipe network, have rapid sand filter, UV disinfection and chlorination processes. 24 km reclaimed water distribution system (purple pipe network) was built for irrigation of restricted urban landscapes.

In addition to this system, which has been used for irrigation of urban green areas in summer months since 2012, a new pilot-scale wastewater reclamation plant with a capacity of 90 m^3/day consisting of membrane processes (Ultrafiltration (UF), Nanofiltration (NF) and Reverse Osmosis (RO)) has been established in 2017. Konya WWTP effluents was treated with membrane processes and the output water quality was monitored. COD, BOD_5, turbidity, conductivity, residual chlorine and fecal coliform removal efficiencies were monitored in purple pipe network and pilot scale membrane plant. According to the results obtained; different water reuse alternatives of treated wastewater of Konya city were assessed.

Keywords: Membrane Processes, Nanofiltration, Reverse Osmosis, Ultrafiltration, Water Reuse

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Pd@POLY(CMA2OEM-co-DVB-co-AMPS): SYNTHESIS, CHARACTERIZATION AND USE IN THE GREEN DEHYDROGENATION OF DIMETHYLAMINE-BORANE

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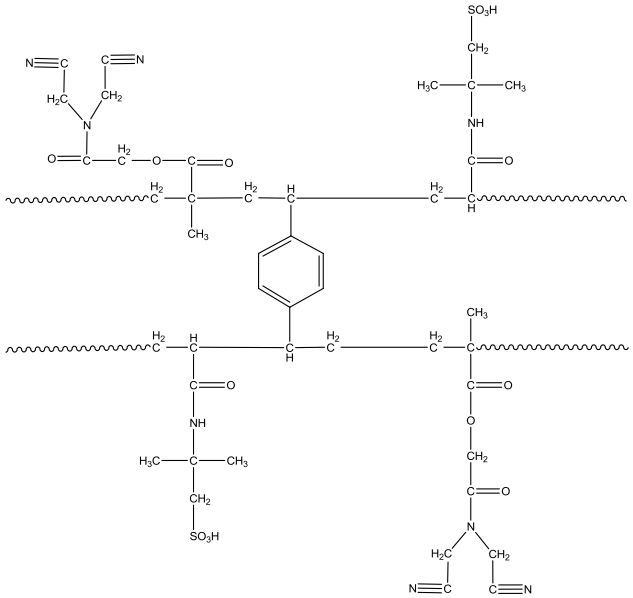
Abstract

2-(bis(cyanomethyl)amino)-2-oxoethyl methacrylate (CMA2OEM) monomer was pre-synthesized and characterized by our team. In this work, a new chelating resin, poly [2-(bis(cyanomethyl)amino)-2-oxoethyl methacrylate-co-divinylbenzene-co-2-acrylamido-2-methyl-1-propanesulfonic acid] poly(CMA2OEM-co-DVB-co-AMPS) was synthesized by free radical chain polymerization reaction and characterized. This chelating resin was used as adsorbent for palladium and Pd@poly(CMA2OEM-co-DVB-co-AMPS) nanocatalysts were *in-situ* synthesized for hydrogen generation from dehydrogenation of dimethylamine-borane (DMAB) in the green environmental (non-solvent) at nearly room temperature. Concomitantly, these Pd@poly(CMA2OEM-co-DVB-co-AMPS) nanocatalysts were tested on catalytic dehydrogenation of DMAB to investigation of kinetic activity. The chemical structure of the chelating resin poly(CMA2OEM-co-DVB-co-AMPS) is shown in the figure below.



Keywords: Chelating Resin, Dimethylamine-Borane, Green Dehydrogenation, Hydrogen Generation, Renewable Energy.

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SYNTHESIS, CHARACTERIZATION AND CATALYTIC USE OF PALLADIUM NANOPARTICLES SUPPORTED ON POLY(CMA2OEM-co-DVB-co-VIM) FOR HYDROGEN GENERATION

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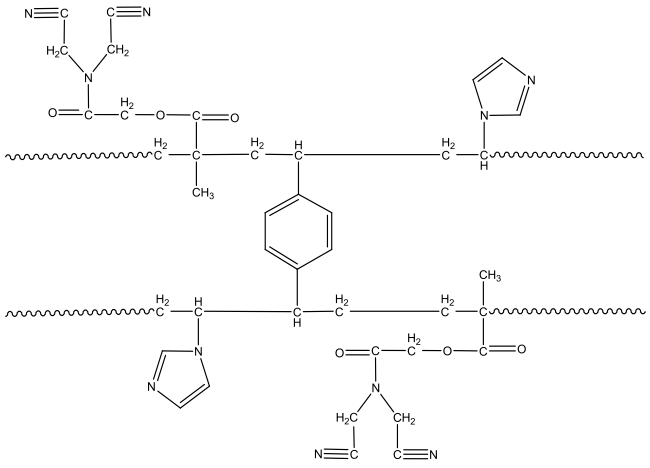
Abstract

2-(bis(cyanomethyl)amino)-2-oxoethyl methacrylate (CMA2OEM) monomer was pre-synthesized and characterized by our team. In this work, a new chelating resin, poly [2-(bis(cyanomethyl)amino)-2-oxoethyl methacrylate-co-divinylbenzene-co-vinylimidazole] poly(CMA2OEM-co-DVB-co-VIM) was synthesized by free radical chain polymerization reaction, and characterized. The chemical structure of the chelating resin poly(CMA2OEM-co-DVB-co-VIM) is shown in the figure below. Therefore, this chelating resin was used as supporting material to synthesis of palladium nanoparticles. In this study, we focused on the preparation and catalytic use of palladium nanoparticles supported on poly(CMA2OEM-co-DVB-co-VIM) in hydrogen generation from the green dehydrogenation of dimethylamine-borane (DMAB) at nearly room temperature (35.0 $\pm$ 0.1°C). The reaction constant versus the DMAB concentration, apparent activation energy and rate constant were determined from the hydrogen evolution curves. It was noticed that the green dehydrogenation kinetics depends on (i) temperature of reaction and (ii) reactant concentration. Therefore, the kinetic constants were analyzed using existing kinetic models. ,



Keywords: Chelating Resin, Hydrogen Generation, Kinetic Study, Palladium Nanoparticles

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DETERMINATION OF PM_{10} DISPERSION BY USING AERMOD VIEW: A CASE STUDY IN NIGDE (TURKEY)

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Abstract

The impact of air quality on the environment is a new focus in scientific area. There has been increasing concern within the community over the effects of air quality on health. People strive to maintain their lives in higher quality and comfortable living spaces. The newly constructed modern living places are the biggest sign of this. In this study, in order to measure the air quality of Niğde, the trend of air quality data was estimated. One of the most important air quality's indicator parameter that is called as PM_{10} was modelled. In this study, AERMOD View software approved by the Environmental Protection Agency is used in modeling studies. Epidemiological effects of air pollution in the regions that are particularly at risk have to be investigated and databases should be established for this purpose by using AERMOD View and Geographical Information Systems. For local governments, it is very important to carry out such activities in their areas of responsibility in terms of protecting the environment and human health.

In this study, effect of PM_{10} on air quality, which has an important role in cancer, heart problems, respiratory diseases, infant mortality, has been discussed by modeling through burning fossil fuels used in domestic heating systems in Niğde city center. Air quality distribution model results for Niğde province center are compared with national and international air quality indices for the years of 2018 and 2028. The results of this study stated that air quality is satisfactory and there is no risk considering PM_{10} amounts

Keywords: AERMOD, Air Quality, Environment, Model, PM_{10}

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USAGE OF CLEAN AND RENEWABLE ENERGIES IN THE SEA: WIND AND SOLAR POWERED VESSELS

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Abstract

Wind power is the use of air current through wind turbines for providing mechanical power to run electric generators. Solar power is the conversion of energy from sunlight into electricity, either directly using photovoltaics (PV) or indirectly using concentrated solar power, or a combination. Concentrated solar power systems use lenses or mirrors and tracking systems to focus a large area of sunlight into a small beam. Photovoltaic cells convert light into an electric current using the photovoltaic effect. Fossil fuels that are used by maritime transportation, carbon dioxide emissions produced by ships significantly contribute to global climate change and acidification. Maritime transport emits around 1000 million tonnes of CO_2 annually and is responsible for about 2.5% of global greenhouse gas emissions. The aim of the MARPOL Annex VI is to reduce 1% of global greenhouse gas emission.

Solar power and wind power are both at very early stage in the maritime transportation. Some ships are installed solar panel or wind turbine or both of them. These "hybrid powered" ships will use wind power and solar power together as a source of energy and propulsion (along with the ship's main engines) in order to reduce harmful emissions and lower fuel consumption. But these vessels are very limited.

In this paper authors analyzed wind and solar power technologies which are used maritime transportation and discussed how usage of clean and renewable energy sources can be increased in the maritime transportation to contribute the reduce global warming.

Keywords: Environment, Global Warming, Maritime Transportation, Solar Power, Wind Power

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PRODUCTION OF LEATHER DYE FROM WASTE WALNUT AND HAZELNUT BROWN SHELLS: A REUSE STUDY

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Abstract

Nowadays, it is observed that there is an increasing interest in the use of natural substances instead of synthetic ones. As the synthetic materials and products are more complex in comparison to natural substances, it will take a long time to complete their natural cycles and return to nature, thus, causing environmental pollution. Synthetic dyes have harmful effects on the environment and human beings. The purpose of this study is to produce natural dye from waste brown walnut and hazelnut shells, compare quality of these dyes and apply them separately in untreated leather.

Before chemical processes, the walnut and hazelnut shells were ground in a grinding mill. They were dried in an oven to eliminate the humidity and extracted in Soxhlet apparatus by using ethanol solution. Then, the ethanol solution was evaporated in a controlled way and the produced dyes were mordanted by using potassium aluminium sulphate (PAS). The dyes were analysed by Thin Layer Chromatography (TLC), ultraviolate visible light (UV-Vis) and Fourier Transform Infrared (FT-IR) Spectroscopy, whereas dyed leathers were analysed by colorfastness test. The present study showed that brown hazelnut shell dye having higher color values was better for water, perspiration and rubbing fastness properties compared to brown walnut shell dye. Better lightfastness test results were obtained from brown walnut shells.

Considering leather dye produced from hazelnut and walnut shells, this is the first study in the literature. Using shells as a source of dye will increase the value of the walnut and hazelnut production, not only offering utilization for by-products but also contributing cleaner production.

Keywords: Dye, Environment, Leather, Reuse, Waste

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PRODUCTION OF BUILDING PANEL FROM WASTE ASHES: A REUSE STUDY

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Abstract

With the increase in industrialization, the amount of fly ash (FA), which is one of the industrial solid wastes causing environmental and human health problems, is increasing day by day. Waste valorisation and reuse methods need to be developed for this waste ash (WA). The construction industry is the main sector where it is used. In this study, it is aimed to evaluate the usability of industrial FAs in the production of economical and useful building panels and to determine their physical-mechanical properties. WAs supplied from Afşin Elbistan and İsken Sugözü Thermal Power Plant (AETPP and ISTPP, respectively) as FAs and ordinary Portland cement (OPC) supplied from ÇİMSA Cement Industry and Trade Inc. are the materials of this study. Particle distribution graphs were determined with gradation curve laser scanning method for FA. In this study, compressive and flexural strengths, water absorption, unit weight and porosity as mechanical and physical tests were made in the building panels having the combination of FA+cement in contribution ratios of 10, 30, 50, 70 and 90% FA.

The results of the experiments show that the highest compressive strengths values in 28 days found in the building panels having combination of 90% cement+10% AETPP-FA and 90% cement+10% ISTPP-FA are 64.7 and 64.2 MPa, respectively. It was determined that the building panel could be produced from FA as industrial solid waste in the appropriate proportions of cement contribution.

Keywords: Building Panel, Environment, Fly Ash, Reuse, Waste

Acknowledgment: The authors would like to thank Prof. Dr. Ahmet Bilgil for his valuable comments and contribution. We thank ÇİMSA, one of the leading companies of Turkish cement industry, which supports this study and Dr. Adnan GÜVEN who is former manager of the ÇİMSA Niğde Plant.

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PRODUCTION OF FLY ASH-BASED GEOPOLYMER COMPOSITE MATERIALS BY USING DIFFERENT DESIGN PARAMETERS

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Abstract

This study reports an experimental program to optimize mix design parameters of fly ash-based geopolymer engineering composites. Fly ash (FA) supplied from Çatalağzı Thermal Power Plant (Zonguldak, Turkey) and Rilem Cembureau Standard Sand were used together with a constant ratio of 0.50 for producing geopolymer. In the first step, two different alkaline solution/material ratio (FA+standard sand) (L/M) were determined as 0.20 and 0.40, respectively. After that, sodium silicate ((Na_2SiO_3) and 12 M sodium hydroxide (NaOH) were utilized at a ratio of 1, 1.5, 2, 2.5 and 3, respectively. 20 mixtures obtained by using different design parameters were cured at 70 °C and 100 °C for 24 hours, respectively, and then they were stored at room temperature until testing age. While the physical properties of the samples were measured by the bulk density, water absorption and porosity tests at 28 days, mechanical properties were tested via the compressive and flexural strength tests at 7, 28 and 90 days, respectively.

The results indicated that the highest compressive strength for geopolymer materials was found as 50.4 MPa (90 days) in the mixture produced with the ratios of L/M=0.2 and Na_2SiO_3/NaOH=2 (by weight) by curing at 70 ^oC for 24 hrs. However, less alkali reaction caused by using excessive activator solutions decreased the strength characteristics of geopolymer.

Keywords: Environment, Fly Ash, Geopolymer, Reuse, Waste

Acknowledgment: This study is a part of the project "Development of eco-friendly composite materials based on geopolymer matrix and reinforced with waste fibers" funded by the European Commission, within the 7th Framework Programme for Research and Technology Development (FP7), Topic #02: Waste management, recycling and urban mining (Project No. ELAC2015/T02- 0721) under the ERANet-LAC: Latin America, Caribbean and European Union and supported by a grant of the Turkish Scientific and Technological Research Council of Turkey (TÜBİTAK). The Turkish project number is 116Y549. We thank Turan Şevki Köker, Arife Gözde Akan, Pervin Nas and Betül Dikkaya for their efforts in experimental part of this study.

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RADIATION ABSORPTION OF GEOPOLYMER BUILDING MATERIALS: PRELIMINARY RESULTS FROM NEW DESIGN MEASUREMENT SYSTEM

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Abstract

Fly ash (FA), which is an industrial solid waste released by the burning of coal in thermal power plants, is responsible for causing environmental problems. Radiation is also an environmental problem besides causing health problems for human being. Geopolymer is a specialized building material resulting from the reaction of a source material, which is rich in silica and alumina, with alkaline solution. It is ordinary Portland cement (OPC) free building material. This material is being studied worldwide and offers a greener alternative to OPC building material. It has been reported that geopolymer building material has good engineering properties with a reduced carbon footprint resulting from the total replacement of OPC.

In this study, it is aimed to measure radiation absorption of geopolymer building materials produced from the reaction of FA, which was supplied from İsken Sugözü Thermal Power Plant (Adana, Turkey) and rich in silica and alumina in total content of 83.74, with alkaline activators (sodium hydroxide and sodium silicate) at curing temperatures (70 ^{o}C and 100 ^{o}C).

In this study, lattice measurement system consisting of nested lead plates to avoid unwanted radiation was designed to determine radiation absorption of geopolymer building materials. By using this new design measurement system, geopolymer building material was found to be 5% better radiation absorption capacity when it is compared with OPC building material.

Keywords: Environment, Fly Ash, Geopolymer, Industrial Solid Waste, Radiation

Acknowledgment: The geopolymer building materials of this study were produced in the project "Development of eco-friendly composite materials based on geopolymer matrix and reinforced with waste fibers" funded by the European Commission, within the 7th Framework Programme for Research and Technology Development (FP7), Topic #02: Waste management, recycling and urban mining (Project No. ELAC2015/T02- 0721) under the ERANet-LAC: Latin America, Caribbean and European Union and supported by a grant of the Turkish Scientific and Technological Research Council of Turkey (TUBITAK). The Turkish project number is 116Y549. This study includes partial sections of the project supported by TUBITAK 2209/B Programme, project grant no. 1139B411701722. The authors would like to thank Prof. Dr. Ahmet Bilgil, Associate Prof. Dr. Hatice Öznur Öz, Pervin Nas, Arife Gözde Akan, Betül Dikkaya, Türkan Vural and Turan Şevki Köker for their support during this study.

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CHLORPYRIFOS REMOVAL BY SINGLE-WALL CARBON NANOTUBES (SWCNTs)

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Abstract

Organophosphorus pesticides (OPs) are one of the largest and most diverse pesticide groups, accounting for about 40% of pesticides in the world. The extensive or inappropriate use of OPs has become a major risk to human health and the environment due to contamination of water, soil and agriculture produce. Chlorpyrifos, is one of the most commonly used OPs in agricultural activities. Different methods for the removal of organophosphorus pesticides (OPs) include photocatalysis, biochemical decomposition, electrochemical decomposition, separation with a variety of membranes, oxidation and adsorption.

In this study, represents the applicability of the adsorption process for the removal of organophosphorus chlorpyrifos pesticide from water using single-wall carbon nanotubes (SWCNTs). Synthetic samples were subjected to adsorption process by using SWCNTs. Samples were extracted using the solid phase extraction (SPE) and analysed by gas chromatography–electron capture detector (GC/ECD). The effects of different parameters such as contact time (1, 2, 5, 10, 15, 30, 60, 120, 240 min), adsorbent dose (3.3, 6.6, 13.3, 26.6, 40, 53.3 mg/L) and different temperature (20, 25, 30, 35 ^{0}C) were applied for removing chlorpyrifos by SWCNT adsorption process. Adsorption efficiencies of SWCNTs were obtained between 84 % - 97%.

Keywords: Adsorption, Carbon Nanotubes, Chlorpyrifos, Solid Phase Extraction, Pesticide

Acknowledgment: This study is supported by the Pamukkale University Scientific Research Project (PAUBAP).

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DETERMINATION OF EFFECTS OF DISSOLUTION TIME ON MECHANICAL PROPERTIES OF AL6082 ALLOYS FOR FORGING

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Abstract

6082 type Al alloys have strategic importance because of their light weight structural. Also aluminum has become one of the preferred materials in the automotive sector due to the fact that its density is one-third of steel and has excellent resistance to corrosion. So lighter vehicle makes the CO_2 emissions reduced. Designs using this alloy lead to environmentally friendly structural parts.

Al 6082 alloys are used in many areas in the automotive industry, especially in the suspension system, vehicle chassis, engine etc… and its usage area is increasing. In defense industry, they are used in frames of flight control systems.

In this study, the dissolution time effects on mechanical properties of 6082 Al alloys are investigated. First, solid solution is obtained by applying 500 °C. Dissolution time is determined as 4, 6, 8, 10 hours. Later, samples are quenched inside water. The hardness of the samples is measured and tensile tests are carried out at the deformation rate of 8 mm/min. As a result, straightening curves are obtained that are very useful when designing of an aging process. At the end of the study, streigtened curves usefull for designer are obtained. A case study by including acquired CO_2 emission reduction for a personal auto is given when 6082 aluminum alloy is used instead of steel materials.

Keywords: CO_2 Emissions, Environmentally Friendly Structural Parts, 6082 Aluminum Alloy; Dissolution Time; Aging; Mechanical Property.

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ACID RED 73 DYE REMOVAL WITH ADVANCED OXIDATION PROCESSES AND EVALUATION OF ENERGY CONSUMPTION

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Abstract

Industrial and agricultural wastewaters contain different pollutants such as metals, dyes, pesticides, fertilizers, organic substances, and suspended particles, which have a negative impact on water quality and ecosystem. Natural and synthetic dyes having a complex aromatic structure can be present in nonionic, cationic and anionic form. 10-15 % of the dyes used in many industries are discharged into the aquatic environment and these untreated substances cause different environmental problems. Dyestuffs, while deteriorating water quality, cause various diseases such as allergies, skin irritation, dysfunction of liver and kidneys and cancer. In this study, the removal of anionic Acid Red 73 (AR 73) dye by sole ultraviolet (UV), sole ultrasound (US), UV/H_2O_2, US/H_2O_2, Fenton, sono-Fenton and photo-Fenton and the evaluation of energy consumption of the processes were investigated. In this study, operating conditions (initial dyestuff concentration, pH, UV radiation value, ultrasound frequency and iron (Fe^{+2}) and hydrogen peroxide (H_2O_2) were kept constant and the effect of processes on removal efficiency and the amount of energy required to remove one kg of a pollutant under the same conditions was calculated. The removal efficiencies were found 27, 06; 39, 80; 50, 41; 53, 86; 78, 80; 82, 78 ve % 84, 91 at sole ultraviolet (UV), sole ultrasound (US), UV/H_2O_2, US/H_2O_2 fenton, sono-fenton ve photo-fenton under these conditions. The electric energy consumption was 402, 65 ve 785, 18 kWh/kg at sono-fenton and photo-fenton that showed maximum yield. Although the removal efficiencies of these two systems are close to each other when compared to electrical energy consumption, about twice as much, they should be evaluated economically as well as their removal efficiency.

Keywords: Acid Red 73 (AR 73), Fenton, Sono-Fenton, Photo-Fenton, Energy Consumption

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WASTE TO VALUE: CASE STUDIES

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Abstract

In this study, it is aimed to shed light on to an alternative waste management approach in contrast to conventional environmental engineering methodology based on degradation and/or final disposal of wastes, especially organic ones. For this purpose, "Waste to Value" concept will be presented by the help of real case studies in which a biorefinery concept is realised. In this approach, organic waste materials are valorised into value added chemicals in the form of either biofuels ($BioH_2$, $BioCH_4$, BioEtoH, Biodiesel etc.) bioplastics or other biomaterials. Thereby, a new perspective for waste management in Environmental Engineering will be attempted to nourish which will support the sustainable waste management and circular economy through environmentally friendly waste valorisation.

Keywords: Biofuel, Biorefinery, Bioplastic, Biomaterials, Valorisation, Sustainability

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NEW PARADIGMS AND FUTURE DIRECTIONS IN ENERGY TECHNOLOGIES FOR CLEAN ENVIRONMENT

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Abstract

The world has been facing critical challenges due to the increased energy and environmental problems and the need for sustainable resources. Energy has been a key domain with a multidisciplinary nature and played an important role in the world's politics. In this regard, one should remember that it has shaped the past, is shaping the present and will shape the future. There has been a strong need to achieve the sustainability targets for better efficiency, better resources use, better economics, better environment, better energy security and better management. In this study, the focus is about new paradigms on innovative energy solutions and their ultimate contributions. This study will also make a prime focus on newly-developed multi-purpose energy generating systems and their performance assessment through energy and exergy efficiencies as well as other newly developed parameters. Also, novel system design, analysis, assessment and improvement options will be discussed. Various parametric studies will be presented to highlight the importance of new energy systems and mindset chance when it comes to more efficient and effective and environmentally-benign operation. There will be some hydrogen focused solutions and it role in new energy portfolio for future. Furthermore, there will be a general discussion about carbon-free society and its complications.

Keywords: Energy, Environment, Sustainable Development.

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PERFORMANCE AND ENVIRONMENTAL IMPACT ASSESSMENT OF COAL AND BIOMASS INTEGRATED CO-GASIFICATION SYSTEM FOR POWER AND HYDROGEN PRODUCTION SYSTEM

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Abstract

Coal gasification systems are systems which produces a high energy density gas from coal that is rich with carbon monoxide and hydrogen, which can be used to produce power in higher efficiency systems such as combined cycle (fuel for the gas turbine) and it can be used as well to produce hydrogen. Biomass gasification is also an emerging technology that is intended to give us the same advantages of coal gasification, however with a carbon natural process. It was shown in the literature that the co-gasification of coal and biomass lead to improve in the efficiency and the utilization of the both fuels as well as reducing the harmful sulfur based emission. Furthermore, this paper investigates the performance in terms of energy and exergy efficiencies and assess the environmental impact is terms of reduction of emissions by the co-gasification for various combination percentages of coal and biomass. The performance improvement is measured accordingly through the increase in the gasification system energy and exergy efficiencies as well as the maximum potential hydrogen production.

Keywords: Co-Gasification, Biomass, Coal, Green House Gas Emissions, Efficiency.

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ENVIRONMENTAL IMPACT ASSESSMENT OF A NEW INTEGRATED OCEAN THERMAL ENERGY CONVERSION BASED TRIGENERATION SYSTEM

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Abstract

In this study, an Ocean Thermal Energy Conversion (OTEC) based trigeneration system, which produces methanol, cooling and power, is thermodynamically and environmentally assessed based on its performance and the Green House Gas (GHG) emissions. The study includes a comparative environmental impact assessment based on GHG emissions with other sources of energy. The OTEC plant utilises the temperature differences that is inherently available in some geological locations in various oceans to drive an ammonia Rankine cycle. In this system, a two-stage Rankine cycle is used for power production, along with an ECEM reactor for carbon dioxide and hydrogen production to feed the methanol production system. The maximum methanol production rate was found to be 1.36 kg/s at the power input of 51.5GW. Three different cases for the overall performance and emissions. Case 1: ECEM reactor operates at its current efficiency with fuel production and district cooling being the only products, Case 2: ECEM reactor operates at PEM efficiency, and Case 3: Only power was produced with no fuel.

Keywords: Green House Gas Emissions, OTEC, Methanol, Hydrogen, Carbon Dioxide, District Cooling

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THEORETICAL AND EXPERIMENTAL METHODS FOR SELECTIVE RECOVERY OF METAL VALUES FROM ELECTROPLATING SLUDGE

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Abstract

This keynote lecture deals with a serious environmental issue of the metal plating / electroplating and surface finishing industry: **the metallic hydroxides sludge**, a problematic industrial solid waste, produced by the precipitation treatment of liquid effluents. The minimization / inertization of this sludge or its valorization are the main research and industrial trends to prevent pollution by heavy metals.

The oral talk aims to present:

- A chronological overview of this strategic industry, corner stone of various modern technologies, and its hazardous effluents;
- A review of the pollution prevention technologies and methods, specific to the electroplating industry; it will describe the new ideas and concepts as “Zero Discharge”, “Waste Minimization”, “Clean and Sustainable Technologies”, … it will compare the US, an advanced country, and Algerian experiences.
- A deep theoretical, numerical and experimental investigation of some hydrometallurgical routes aiming to sludge valorization, volume minimization and detoxification, through selective metal values separation.
- Precise case studies as selective ammoniacal leaching of Cu and Ni, leaching solutions recycling by diffusion dialysis, selective metal precipitation as phosphates, …

Keywords: Hydrometallurgy, Metal Hydroxide, Numerical Calculation, Selective leaching, Sludge.

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ENVIRONMENTAL NANOTECHNOLOGY AND RISK ASSESSMENT

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Abstract

Engineered nanoparticles (ENPs) are defined as manmade materials with a size between 1 and 100 nm. ENPs are used in a broad range of products, from pharmaceuticals, personal care products and facade paints to self-cleaning surfaces and many more. One additional sector of using ENMs is environmental nanotechnology that is the application of nanotechnology techniques to reduce or prevent damage to our environment. In other words, nanomaterials are promising for reducing greenhouse gases, cleaning toxic wastes and building alternative energy sources. Using ENMs in water and wastewater treatment has been pursuaded by adsorption, advanced oxidation processes, mainly photocatalysis and hybrid processes such as nanopacticles enhanced membranes. New generation of ENMs has been promising to abate many toxic pollutants as well as antibiotic resistance. On the other hand, released some toxic nanoparticles enter and threaten ecosystems. Therefore, research should focus on the sustainable use of nanomaterials to avoid environmental contamination.

This review is focused on using ENMs to abate micropollutants in water and wastewater considering the risk due to the release of ENMs in the effluent.

Keywords: Environmental Remediation, Nanoparticles, Risk Assessment

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THE PLACE AND APPLICABILITY OF TURKISH PENAL CODE IN PROTECTING ENVIRONMENTAL QUALITY

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Abstract

The objective of the Environmental Law is to ensure the protection of the environment, which is the common asset of all living things, in accordance with the principles of sustainable environment and sustainable development. Based on this law, the relevant ministries have issued regulations for the protection of water, air and soil quality. Turkish Penal Code (TPC) has been enacted for those who do not comply with the regulations, ie. for those polluting the environment.

The purpose of the TPC is pointed out as "to protect public health and the environment, to prevent the committing of a crime…". However, Article 181 and Paragraph 1 of the Law "Any person who intentionally discharges waste or refuse material into the earth, water or air, contrary to the technical procedures as defined in the relevant laws and in such a way as to cause damage to the environment, shall be sentenced to a penalty of imprisonment for a term of six months to two years" appears that the punishment of public offender is regulated with this article while it does not regulate who and how the contaminated environment should be cleaned. Article 181, Paragraph 4 states that "Where an offence is committed as defined under paragraphs one and two in relation to waste or refuse material which has a characteristic which may cause the alteration of the natural characteristics of plants or animals, enhance or create infertility or cause an incurable illness in humans and animals, the offender shall be sentenced to a penalty of imprisonment for a term of not less than five years and a judicial fine of up to thousand days". Therefore, the features mentioned in this statement are not issues that can be measured on a parameter basis and require long-term and costly research studies. Consequently, the adequacy of the relevant articles of the TPC in the prevention of environmental pollution and whether they are applicable for sustainable environmental quality should be discussed.

Keywords: Environmental Law, Turkish Penal Code, Environmental Pollution.

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EVALUATION OF RESEARCH ACTIVITIES DEALING WITH SOLID WASTE MANAGEMENT IN MEDITERRANEAN SEA BASIN COUNTRIES

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Abstract

Solid waste management (SWM) has become more important municipal issue because of the rise of environmental and health awareness. The world population has tripled in the last century and also consumption habits, welfare and education status of societies which have huge impacts on solid waste management have changed dramatically. Hence the change in waste generation and composition makes it hard to manage the problem. Especially in developed and less developed countries of the Mediterranean Sea Basin.

The Mediterranean (Med) Sea is the largest of the semi-enclosed European seas. It is surrounded by 23 countries and has shores on three continents with a coastline of 46 000 km. The countries of the Mediterranean basin cover 8,759 million km^2 and presently hold 427 million people. It is forecasted that the population of the northern Med Sea countries will reach to 196 million in 2025 whereas the population of the southern and eastern Med Sea countries will be 327 million within this period. The population living in the coastal regions of the basin will reach to 174 million by 2025.

The countries subject to evaluation in this study are classified as Northern-rim countries: Namely Albania, Croatia, France, Greece, Italy, Slovenia, Bosnia and Spain; and South-eastern-rim countries: Namely Algeria, Egypt, Israel, Lebanon, Libya, Morocco, Syria, Tunisia and Turkey.

Because of the economic and political instability in most of South-eastern Rim countries, it is hard to create solid waste management strategies. In addition, the lack of usable data regarding solid waste generation and disposal technologies is an issue. However, numerous scientific research studies have been carried out on different aspects of solid waste issue in these countries.

There are more than 27 thousand published articles with reference to “solid waste” in Science Citation Index (SCI) database including all countries in the world within the time range between 1970 and 2019 from which only 20% (5599) are conducted by Med Sea countries. This number of publications differs a lot in case of north and southern rim countries respectively: 4303 publications in the NR countries and 1296 publications in the SR countries.

In the northern part of the Med Sea basin, 69% of the publications are published by 2 countries which are Italy and Spain whereas 53% of the publications in the South-eastern-rim are conducted by Turkey alone.

In this study, results of bibliometric analysis of solid waste management in Mediterranean Sea Basin countries was evaluated using the literature in SCI database will be presented.

Keywords: Solid waste, Solid waste management, Bibliometric Analysis, Med Sea Basin