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8TH INTERNATIONAL CONFERENCE ON ENVIRONMENTAL SCIENCE AND TECHNOLOGY

May 18-22, 2022

BOOK OF ABSTRACTS

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WELCOME TO ICOEST 2022

On behalf of the organizing committee, we are pleased to announce that the 7th International Conference on Environmental Science and Technology (ICOEST-2022) is held from o May 18-22, 2022 in Istanbul, Turkey. ICOEST 2022 provides an ideal academic platform for researchers to present the latest research findings and describe emerging technologies, and directions in Environmental Science and Technology. The conference seeks to contribute to presenting novel research results in all aspects of Environmental Science and Technology. The conference aims to bring together leading academic scientists, researchers and research scholars to exchange and share their experiences and research results about all aspects of Environmental Science and Technology. It also provides the premier interdisciplinary forum for scientists, engineers, and practitioners to present their latest research results, ideas, developments, and applications in al lareas of Environmental Science and Technology. The conference will bring together leading academic scientists, researchers and scholars in the domain of interest from around the world. ICOEST 2022 is the oncoming event of the successful conference series focusing on Environmental Science and Technology. The scientific program focuses on current advances in th eresearch, production and use of Environmental Engineering and Sciences with particular focus on their role in maintaining academic level in Science and Technology and elevating the science level such as: Water and waste water treatment, sludge handling and management, Solid waste and management, Surface water quality monitoring, Noise pollution and control, Air pollution and control, Ecology and ecosystem management, Environmental data analysis and modeling, Environmental education, Environmental planning, management and policies for cities and regions, Green energy and sustainability, Water resources and river basin management. The conference's goals are to provide a scientific forum for all international prestige scholars around the world and enable the interactive exchange of state-of-the-art knowledge. The conference will focus on evidence-based benefits proven in environmental science and engineering experiments.

Best regards,

Prof. Dr.Özer ÇINAR

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REMOVAL OF TETRASYCLINE FROM WASTE WATERS WITH ANODIC OXIDATION METHOD

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Abstract:

Antibiotics in water are receiving increasing attention due to their biological effects and potential risks to the environment and human health. Various techniques, including biological processes, coagulation, sedimentation, adsorption, ozonation, photocatalysis, and photoelectrocatalysis, have been widely investigated for the removal of APIs from wastewater. Among the pollutants of anthropogenic origin reaching the environment, pharmaceuticals, cosmetics, biomedical, personal care products (PCPs), endocrine disrupting chemicals (EDCs) and flame retardants are very important. Most of the macro and micro pollutants contained in the hospital wastewater, which reach the urban wastewater treatment systems in many places in our country without any preliminary treatment, reach the receiving environments without being metabolized and create long-term serious problems that are not visible in water resources. Tetracycline (TC), which has an important place among them, is one of the most widely used drugs that have important effects on human health, and therefore, appropriate approaches are needed for its elimination. Among various antibiotics, tetracycline (TC) is widely used to treat human ailments and raise lifeboats due to its great therapeutic values. As a form of expense; Tetracycline electrochemical oxidation at the titanium anode followed a first-order kinetics, but Tetracycline (TC) removal efficiency reached 52.8% in 60 minutes. Influencing factors on tetracycline degradation kinetics include current density, anode-cathode distance, and initial Tetracycline concentration. This anode also has high durability and the Tetracycline removal efficiency has been maintained above 95% after five reuses. For the first time, the entire path of tetracycline electrochemical oxidation has been resolved using high performance liquid chromatography (HPLC) and gas chromatography (GC) combined with mass spectrometry (MS). By comprehensively analyzing the influencing factors of TC electrochemical oxidation at the titanium anode and the complete degradation pathway, our research provides deeper insights, assessing intermediates and risks, and identifying new perspectives for practical electrochemical oxidation to effectively eliminate quantity and toxicity.

Keywords: Tetracycline (TC) , Titanium (Ti) Anode, Electrochemical Oxidation, Decomposition Pathway, Liquid Chromatography (HPLC)

Acknowledgement: This work was supported by the Research Fund of Erciyes University under Grant number FYL-2021-10724 and performed in the Department of Environmental Engineering of Erciyes University, Kayseri, Turkey

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PHOTOCATALYTIC DEGRADATION OF PHARMACEUTICAL COMPOUNDS UNDER DIFFERENT IRRADIATION SYSTEMS

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Abstract:

Nowadays the overconsumption of Pharmaceutical Compounds has led to their occurrence in aquatic environment. Commonly, pharmaceuticals exist in mixtures which might lead into undesirable effects and have been detected in various systems, including wastewaters, surface waters, groundwater as well as drinking water. Conventional wastewater treatment plants (WWTPs) are not designed to remove complicated mixtures of these compounds. Cimetidine (CIM) is used for treatment of acid-peptic disease and heartburn diseases. CIM was reported in aquatic systems at concentrations ranging from 0.5 to 280.9 ng/L. Amisulpride (AMD) is antipsychotic drug and is being prescribed for schizophrenia, psychiatric disorders etc. AMD was detected in aquatic systems at concentrations from 10 to 566 ng/L.

This study investigates the simultaneous photocatalytic degradation of CIM and AMD using different irradiation sources (UV-A and Vis irradiation) in various water matrices (ultrapure, drinking and lake water). High removal percentages were observed for both compounds under UV-A and Vis irradiation in ultrapure water. In ultrapure water the degradation percentages were for CIM 78.5% within 35 minutes under UV-A irradiation and about 66% under Vis irradiation within 120 minutes. Regarding AMD, the degradation percentages were about 92% and 60.8% under UV-A and Vis irradiation within 120 minutes, respectively. In lake and drinking water slower degradation rates were shown that could be attributed to the complex composition of these matrices. Scavenging experiments highlighted the significant role of various reactive species (h+, O2●-) involved in the reaction mechanisms. Oxidation, dealkylation and deamination were the main degradation pathways.

Keywords: Pharmaceuticals; Cimetidine; Amisulpride; Photocatalysis; Kinetics; Reactive Species

Acknowledgment: *This paper has been financed by the funding program "MEDICUS", of the University of Patras*

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COMPARATIVE STUDY OF THE CYTOTOXICITY BETWEEN TWO PHARMACEUTICALS AND THEIR OXIDATION PRODUCTS ON HUMAN CELLS

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Abstract:

Wastewater treatment plants (WWTPs) are the main sources of the entrance of pharmaceutical active compounds (PhACs) in the aquatic environment. After entering the aquatic environment, PhACs may have an adverse impact on the environment and subsequently on human health. Cimetidine (CIM) and Amisulpride (AMD) are two characteristic PhACs that have been detected with high frequency worldwide. As PhACs commonly coexist in aqueous matrices, the objectives of this present study were to evaluate the capability of various oxidants (peroxymonosulfate, persulfate and chlorine) to simultaneously degrade CIM and AMD. The concentration of CIM was reduced by 86.7% with peroxymonosulfate, 55% with persulfate and 53.2% with chlorine, after 5 minutes of contact. The removal percentages of AMD, at the same time, were notably lower, proving that this compound is more recalcitrant to common oxidants. Specifically, a decrease of 27.9%, 40% and 6.9% for AMD was observed by peroxymonosulfate, persulfate and chlorine, respectively. Additionally, the in vitro cytotoxicity of the processed samples was evaluated with Trypan Blue exclusion test. Human lymphocytes were treated with 5% v/v of each processed mixture for 48 hours. In all cases, cells' viability percentages and number of cells were not presented important alterations, in comparison with the control cultures. The above results indicate that no toxic transformation byproducts were produced after all the studied oxidative processes. However, further toxicity studies are suggested to ensure that there is no risk with the application of these processes, to human health and the environment.

Keywords: Pharmaceuticals; Cimetidine; Amisulpride; Oxidants; Trypan Blue Exclusion Test; Human Lymphocytes

Acknowledgment: *This paper has been financed by the funding program "MEDICUS", of the University of Patras*

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EFFECTS OF MUCILAGE ON TURKISH STRAITS SEA AREA AND MARINE ENVIRONMENT

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Abstract:

As of May 2021, the mucilage threat affecting the marine environment of the Sea of Marmara and the Turkish Straits has affected the environment and marine life. Significant in Mucilage formation is a slippery and gel-like mass of microorganisms composed of proteins, carbohydrates, and released fatty acids, often aggregated and covering large areas. It is also a structure expressed by single-celled organisms in polluted, polluted, and stressful marine environmental conditions. In particular, Mucilage can be seen in the Turkish Straits, although it is the waterway that connects the Caspian Sea and the Mediterranean Sea, both sea creatures and ships passing by sea creatures. One of the effects of Mucilage is the clogging effect in the filtration of the seawater taken to provide operation in the machine cooling water circuits of the passing ships. The study tries to define the effects of Mucilage on ships and the importance of sea pollution during cruising in the Turkish Straits.

Keywords: Mucilage, Turkish Straits Sea Area (TSSA), BWMS, MARPOL, Environment

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OPTIMAL MANAGEMENT OF CONSTRUCTION WASTE

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Abstract:

Construction waste is a key issue of modern society. Construction waste is a type of waste generated during the construction of buildings, reconstruction, demolition and maintenance of the existing buildings, and waste generated from excavated materials which cannot be reused for the construction of new buildings without prior recycling or processing. Moreover, construction waste is generated during the production of semi-finished and finished construction products and materials, as well as during the construction and reconstruction of roads. Large quantities of construction waste are generated by earthquakes, floods and destruction caused by war. Construction waste predominantly (95%) consists of inert waste which means that it is not subject to physical, chemical or biological changes, that it does not dissolve or chemically react, is not flammable, and is not degradable using biodegradable means. Some types of inert construction waste are ceramics, plaster, gypsum, concrete, iron, steel, waste from demolition of buildings, wood, plastics, etc. It may contain hazardous components such as asbestos or asphalt binders, and these components classify it as hazardous waste. Construction waste can generally be divided into three broad categories, such as construction material, demolition waste and hazardous waste. We generate less waste by construction than by demolition. Construction and demolition waste account for the largest percentage of total waste in the European Union – in terms of its volume, it accounts for almost one-third of all waste. For the purpose of achieving the optimal management of construction waste, the following hierarchical approach must be followed: prevention of waste, preparation for reuse, recycling, other treatment procedures, waste disposal. It is necessary to develop a circular economy covering the cycle from construction to demolition to new construction that uses recycled waste materials. Using the available modern technologies, it is possible to reuse most of the construction waste as secondary raw material. The optimal management of construction waste significantly reduces environmental pollution.

Keywords: Circular Economy, Construction Waste, Optimal Management, Pollution, Recycling

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USING ALKALI-MODIFIED FLY ASH/FE3O4/CUO NANO-COMPOSITE FOR HETEROGENEOUS FENTON TREATMENT OF DENIM INDUSTRY WASTEWATER

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Abstract:

This study aims to use Alkali-Modified Fly Ash/Fe3O4/CuO nanocomposite for COD removal from denim industry wastewater with Heterogeneous Fenton oxidation. The characterization of the catalyst was made before and after the Heterogeneous Fenton process with Fourier Transform Infrared Spectroscopy (FTIR) and Scanning Electron Microscopy (SEM). The synthesized catalyst has a weight ratio for Fe and Cu of % 39.32 and 16.39 %. According to the FTIR results, Fe3O4 and CuO nanoparticles were successfully doped to the alkali-modified fly ash. The operational parameters such as initial wastewater pH (2.5-8.5), H2O2 dosage (0.5-2 g/L), and catalyst dosage (0.5-2 g-L) were investigated in a batch system. The optimum conditions were determined for pH, H2O2 and catalyst dosage as 2.5, 2 g/L, and 2 g/L. Under optimum conditions, COD removal efficiency was calculated as 78.85%. The catalyst's performance was investigated for adsorption, H2O2, and the Heterogeneous Fenton process. The dominant process was the Heterogeneous Fenton process, while adsorption was a less effective process. The catalyst can be evaluated as a promising catalyst for the pretreatment of denim industry wastewater with the heterogeneous Fenton process. It can be developed to achieve more effective COD removal.

Keywords: Advanced Oxidation Process, Catalyst, COD Removal, Denim Industry Wastewater

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REMOVAL OF PHENOL FROM OIL REFINERY PHENOLIC WASTEWASTER WITH PHOTO-FENTON-UVC254 PROCESS

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Abstract:

In oil refining industry; for one unit of crude oil refining, between 0.4 and 1.6 units of process water is needed and industrial wastewater is generated at this rate after the process. Wastewater with high phenol concentration, which is formed in the delayed coking units of oil refineries, is caused a high inhibition effect on microbiological activity, hence the biological treatability is low. Therefore, the phenolic wastewaters are diluted 1/10 with oily wastewater and is given to the activated sludge system. In this study; the photo-Fenton (UVC) process phenol removal performance from phenolic stripped real refinery wastewater having characteristics of pH: 10.2, phenol: 80.6 mg/L, COD: 1682.4 mg/L, total cyanide: 6 mg/L, oil-grease: 12.2 mg/L, S-2: 0.172 mg/L and NH4+-N: 360 mg/L has been investigated at laboratory scale. Experiments were planned with Taguchi experimental design and process time (60, 90, 120 min), H2O2/Phenol rate (5, 7.5, 10), H2O2/Fe+2 rate (5, 10, 15) and light intensity (number of UVC lamps: 2, 3, 4) parameters on phenol removal were evaluated. Phenol removal performance of the photo-Fenton process was evaluated by response surface methodology. The effluent phenol value was reduced to 4.89 mg/L with 95% removal efficiency with photo-Fenton process under optimum operating conditions (process time: 120 minutes; H2O2/Phenol: 10; H2O2/Fe+2:5 and number of lights: 4). Consequencely, it has been determined that the photo-Fenton process is very effective in removing phenol, sulphur, cyanide and oil-grease and the effluent can be directly fed into the activated sludge system without dilution. In addition, with alternative applications such as longer-term photo-Fenton application in the presence of higher iron and H2O2 for COD, TDS and NH4+-N removal or the use of membrane processes after the oxidation process, the treated water can be sent to the wastewater recovery unit or deep sea discharge depending on the treatment efficiency.

Keywords: Refinery Industry, Phenolic Wastewater, Photo-Fenton (UVC), Taguchi Experimental Design, Optimization.

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FATES OF BACTERIAL/ARCHAEAL COMMUNITIES AND ANTIBIOTIC RESISTANCE GENES UNDER AZITHROMYCIN AND COPPER COMBINED POLLUTION: THE GRADIENT INCREASING AND DECREASING EXPOSURE MODES

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Abstract:

Wastewater treatment plants (WWTPs) are known as main reservoirs for antibiotics and heavy metals. However, the effects of combined pollution on microbial communities and antibiotic resistance genes (ARGs) under the gradient increasing and decreasing exposure modes are insufficient. In this study, the responses of bacterial/archaeal communities and ARGs to azithromycin and copper combined pollution in activated sludge systems under gradient increasing (from 0.5 to 10 mg/L) and decreasing exposure (from 10 to 0.5 mg/L) modes were investigated. Nitrification was inhibited more obviously under gradient increasing exposure mode than gradient decreasing exposure modes. Responses of archaeal community and function structure were more obvious than bacteria under both exposure modes. The dominant bacterial and archaeal compositions (Hyphomicrobium, Euryarchaeota, etc.) were affected by two exposure modes, except some rare archaea (Methanoregula and Methanosarcina). There were more positive correlations between bacteria and archaea, and Nitrospira was keystone genus under two exposure modes. Ammonia-oxidizing archaea (0.37-3.06%) and complete ammonia oxidizers (Nitrospira_ENR4) were enriched, and Nitrososphaera_viennensis was closely related to denitrifying genes (napA/B, nosZ, etc.). 50 ARG subtypes were detected and specific ARG subtypes (aac, ImrA, etc.) proliferated in two exposure modes. Bacteria and archaea were common hosts for 24 ARGs, which contributed to their transmission. Moreover, bacteria were main hosts for ARGs and ARGs also changed bacterial/archaeal communities. Overall, this study could provide practical reference for ecotoxicity effects of combined pollution under two exposure modes to deal with occurrence of combined pollution in WWTPs.

Keywords: Combined Pollution; Gradient Increasing And Decreasing Exposure Modes; Bacterial And Archaea Communities; Args; Potential Hosts

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INVESTIGATION OF THE GENOTOXIC, CYTOTOXIC AND ANTIGENOTOXIC POTENTIAL OF PRICKLY PEAR PEEL ON HUMAN LYMPHOCYTES

Dormousoglou Margarita[a*], Charalambous Nikolina[b], Dailianis Stefanos[b], Vlastos Dimitrios[b], Antonopoulou Maria[a]

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Abstract:

The present study investigated the cyto-genotoxic and antigenotoxic effects of three different extracts of Opuntia ficus-indica L. (prickly pear peel, Ppp) peel on human lymphocytes. Specifically, after checking cell viability, using the Trypan blue exclusion test, the Cytokinesis Block Micronucleus (CBMN) and the Alkaline Single Cell Gel Electrophoresis (Comet) assays were performed on human peripheral blood lymphocytes. Human lymphocytes cultures treated with different concentrations (10, 100 and 200 μg mL-1) of Ppp extracted with methanol (PppM), ethanol-water (PppEW) and ethanol (PppE) by the Soxhlet's method with or without the presence of mitomycin C (MMC) at a final concentration of 0.5 μg mL-1 and hydrogen peroxide (H2O2) at a final concentration of 100 μM, respectively (positive controls in each case). According to the results, the PppM extract showed negligible cyto-genotoxic effects, as revealed by the high CBPI (Cytokinesis Block Proliferation Index) values and the low micronuclei (MN) frequencies, while its ability to attenuate MMC mediated genotoxic effects was high. The latter was further reinforced by the decreased levels of DNA damage in H2O2-PppM treated cells, at all concentrations tested. Moreover, PppEW extract showed similar results with the PppM extract regarding cyto-genotoxicity and antigenotoxicity. On the other hand, PppE showed high cytotoxicity at the highest concentration (200 μg mL-1), as well as low genotoxic and anti-genotoxic potential in all tested concentrations. Those findings reveal for the first time the protective potential of PppM and PppEW against cyto-genotoxic substances. Further studies, of the Ppp extracts, are in progress for the complete investigation of their potential genotoxic, cytotoxic as well as antigenotoxic effects.

Keywords: Prickly Pear, CBMN Assay, Comet Assay, Mitomycin C, H2O2

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THE EFFECT OF DIFFERENT FORMS OF PARABENS ON FRESH- AND SALTWATER ALGAE: THE CASE OF METHYL- (MEP) AND PROPYL (PRP) PARABEN.

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Abstract:

The present study investigates fresh- and saltwater algal species (Scenedesmus rubescens and Dunaliella tertiolecta, respectively) response after treatment with environmentally relevant concentrations of either methyl- (MeP) or propyl- (PrP) paraben (0.5 to 10 μg L-1 in each case). According to the results, differences among algal species sensitivity was observed in all cases. In case of Scenedesmus rubescens, a 24h lag phase inhibition period was observed in all cases (almost 100% inhibition of growth rate in treated algae). Further treatment (48-72h) showed a drastically attenuation of MeP inhibitory effects, while PrP toxic potential remain high (72h IC50 = 6.227 μg/L). On the other hand, the PrP toxic potential remains high in the case of Dunaliella tertiolecta (72h IC50 = 5.122 μg/L), indicating almost similar inhibitory effects to those observed in 72h MeP-treated cells (72h IC50 = 7.932 μg/L). The high PrP inhibitory potential observed in both algal species tested, and the significant attenuation of MeP ability to inhibit the freshwater species algal growth attenuates overtime, could reveal interspecies-specific sensitivity and responses against those forms of parabens being present within freshwater or saltwater aquatic media. The latter could be due to different responses among species belonging to the same division could be due to algae morphology and chemical composition, the presence of cell wall and their different response against stressors, while the environmental fate and behavior of parabens in freshwater and saltwater media could differentiate their toxic potential.

Keywords: Dunaliella Tertiolecta, Growth Rates, Methylparaben, Propylparaben, Scenedesmus Rubescens

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THE ENVIRONMENTAL EFFECTS AND USE OF CARBON NANOTUBES IN WATER TREATMENT

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Abstract:

Increasing consumption with industrialization and population growth has caused environmental pollution to reach incredible dimensions. With this increasing pollution in the water resources, this has become a threat to all living life. For this reason, the production of effective solutions with fast, economical and applicable treatment methods is of international importance. Nanomaterials used for this purpose have attracted great interest in recent years. It is used in laboratory and pilot scale treatment systems in water treatment. The most interesting among nanoparticles is certainly carbon nanotubes (CNT). CNTs are preferred because of their new electronic and mechanical properties such as very strong magnetic abilities, mechanical and thermal durability, high electron mobility, and optical transmittance. Due to these unique properties, it is used in many areas such as water and wastewater treatment, building materials, electronics, heating elements, batteries, stain-proof fabric production, bone grafting, dental implants and drug production. Therefore, exposure to CNT can come from many sources. A method for the removal of CNTs after use has not yet been found. It has been reported that CNTs can be risky in terms of environmental effects and behavior in living metabolism. The harmful effects of CNTs need to be revealed due to its toxic nature. However, there are very few studies on this subject and the behavior of CNTs in the natural environment has not been sufficiently clarified. The consequences of CNT exposure, its effects on health, and determination of exposure limits are important factors to environmental harm. In this study, CNTs, which are very popular in water treatment, environmental effects after treatment will be examined.

Keywords: Carbonnanotube (CNT), Water Treatment, Environmental Impact

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THE INFLUENCE OF DIFFERENT ENERGY DISSIPATING INLETS ON THE HYDRODYNAMICS WITHIN THE CLARIFIERS

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Abstract:

The activated sludge process is an eminent treatment technology that has been universally implemented over a century. The process takes place in multiple reactors; among them, clarifiers are the final step, where the activated sludge is separated and well-clarified effluent is yielded.

The empirical approaches based on experiments and basic mathematical models are used in the conventional design of the clarifiers. The fundamental design parameters are the surface overflow rates and the solids loading rates. Although some advanced design methods take into account the size distribution, shape, and specific gravity of the solid influx, and sludge settling characteristics, these parameters are seldomly known and can be used in the design. Even though the inlet structure, distribution of inflow in the clarifier, and the energy dissipation impact the performance of the clarifier, these are either neglected in the design or designed by the experience of the designer from his/her previous installations.

It is necessary to go beyond the empirical approaches and focus more on real hydrodynamic behavior in the clarifiers to examine the impacts of fluid flow on overall clarification efficiency. Fluid flow patterns in clarifiers may be investigated by solving the partial differential equations that characterize mass and momentum conservation. Since the analytical solutions of these equations are not available, numerical solutions could be achieved using computational fluids dynamics (CFD) tools.

The main objective of this study is to retrofit the malfunctioning inlet structure of clarifiers in a municipal wastewater treatment plant by troubleshooting the poor distribution of inflow by mounting different energy dissipating inlets (EDIs). In this context, CFD tools were employed to evaluate flow and concentration fields formed in the clarification zone as a consequence of diversion by different EDIs. The influent streams, the distribution efficiency, density currents and disruption of settled sludge were investigated.

Keywords: Computational Fluid Dynamics (Cfd), Hydrodynamics, Clarifier, Malfunctioning, Troubleshooting, Energy Dissipating Inlet (Edi)

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THE EFFECT OF PH ON CAFFEINE ADSORPTION FROM AN AQUEOUS SOLUTION ONTO BENTONITE WITH SULFURIC ACID ACTIVATION

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Abstract:

Caffeine, which has been identified with the development of analytical methods in recent years and is in the class of new emerging micropollutants, is a natural alkaloid that can be obtained from many plant species. Materials containing micro-pollutants such as caffeine are considered an indicator of anthropogenic pollution especially in areas where people live and in their wastes, in the food industry, in the pharmaceutical production process, and in personal care products. In adsorption processes, adsorbents are preferred, which are considered attractive because of their natural high capacity and cheapness. In our study, Ca-bentonite with a 300.98 m2/g surface area activated with H2SO4 from the Kesan region was used as adsorbent. In many studies available in the literature, the importance of the effect of the adsorbent-adsorbate binding mechanism on the performance, which is formed by the correct pH selection in the adsorption process, is stated. In our study in which the batch procedure was applied, the initial concentration of caffeine was 15 ppm, the amount of adsorbent was 0.05 g, and 25 min was chosen as the working time. In the pH studies, the range of 3-10 was examined. When the adhesion mechanism of caffeine to the Ca-bentonite surface was examined, the high efficiency progressing from 91% to 96% in the pH range of 3.60-5.60 was due to the effect of π-π interactions and hydrogen bonds. The highest yield was obtained at pH 4. The remaining caffeine in the solution was measured as 0.16 mg/L. When looking at the pH range of 5.60-9.60, a yield decrease between 96%-68% was detected. This result is due to the repulsive forces between the caffeine molecules and the adsorbent with a negative surface charge. When the FTIR spectra before and after adsorption were examined, it was determined that the characteristic peaks of caffeine (1682-1634 cm-1 C=O) detected in the range of 1600-1800 cm-1 were also found in the clay structure after adsorption. Also, C-N at 1362 cm-1 indicates caffeine adsorption on clay.

Keywords: Caffeine, Acid Active Bentonite, Adsorption, pH

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THE EFFECT OF PORE SIZE ON EXTERNAL DYNAMIC MEMBRANE FORMATION

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Abstract:

In this study, an external Dynamic Membrane (DM) was used for synthetic dairy wastewater treatment. DM is formed by the accumulation of solids over support layer, made of mesh e.g. The support material should have convenient pore size for productive and sustainable DM operation. In this study, two nylon mesh with different pore sizes (10-70 µm) were applied in order to evaluate in terms of cake layer formation and filtration performance of DM. The support materials having different pore sizes in an external filtration unit were situated at the outlet of upflow anaerobic sludge blanket, treating synthetic dairy wastewater. The turbidity was applied to evaluate in terms of treatment performance for two pore sizes. After DM formed, all pore sizes obtained high turbidity removal (more than 95 %). However, external DM was formed in longer time during operation with 70 µm pore size such that the formation time of DM with 70 µm pore size was more 40 times than 10 µm pore size. Thus water quality in membrane effluent was better during filtration with 10 µm pore size than 70 µm in the beginning of operation. Trans membrane Pressure (TMP) values for both pore sizes, which were lower than 980 mbar, were close to each other. Flux was approximately 89±7.9 L/m2h and 47±18 L/m2h during operation with 70 and 10 µm pore size, respectively. Although, the flux in DM with 70 µm pore size was nearly two times of the flux in DM with 10 µm, DM formation time took very longer during operation with 70 µm pore size. 10 µm pore size was found to be the optimum pore size considering flux, DM formation time, TMP and treatment performance of DM. Considering conventional membranes, a higher treatment performance was obtained by DM under higher flux and lower TMP.

Keywords: External Dynamic Membrane,Support Material, Pore Size, Flux

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