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Estimation and comparison of brominated flame retardants levels based on dust loading and carbon contents in indoor dust

Layla Salih Al Omran
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Brominated flame retardants (BFRs) are synthetic chemicals added to a wide range of consumer products. Because they are used additively, they can transfer from such products into the environment. Evidence of their persistence and capacity for bioaccumulation has led to concerns about human exposure. Of the main exposure routes, indoor dust ingestion is a major pathway of exposure to such chemicals. It has been suggested that higher dust loadings will lead to dilute BFR concentrations in dust. On the other hand, as lipophilic compounds, BFRs are usually expected to sorb to dust particles with higher organic carbon contents. Thus, the study aims to test the hypothesis that any differences in BFR concentrations between different countries may attribute to differences in organic carbon content and dust loading. Thirteen BFR compounds were measured in 24 dust samples collected from Birmingham, UK and from Basrah, Iraq. With the exception of BDE-183 and BTBPE, average concentrations of BFRs in the UK dust samples were higher than those in Iraqi dust samples and significantly ($P<0.05$) higher for BDE-99, Σtri-hexa-BDEs, BDE-209, BEH-TEBP and $\Sigma NBFR_s$. The organic carbon contents (TOC) of UK dust samples (26.2-56.1%) exceeded significantly ($p<0.05$) those of Iraqi dust samples (1.54-3.66%). In contrast, dust loading of Iraqi dust samples (1.05-2.95 g/m^2) exceeded significantly ($p<0.05$) those of UK dust samples (0.22-0.64 g/m^2). Significant negative correlation was observed between log concentrations of BFRs and log dust loading for Iraqi dust samples and significant positive correlation was observed between log concentrations of BFRs and TOC for UK dust samples. Our findings in both UK and Iraqi dust samples revealed that, higher organic carbon contents and lower dust loading in UK dust samples could contribute to the higher concentrations of BFRs in the UK as compared with Iraq.

Figure 1: Comparison of BFR levels, TOC and dust loading between UK and Iraqi indoor dust samples.

Recent Publications

1. Al Omran L S and S Harrad (2016) Polybrominated diphenyl ethers and novel brominated flame retardants in floor and elevated surface house dust from Iraq: Implications for human exposure assessment. Emerging Contaminants 2(1):7-13.

2. Al Omran L S and Harrad S (2017) Influence of sampling approach on concentrations of legacy and novel brominated flame retardants in indoor dust. Chemosphere 178:51-58.
3. Morawska L and T Salthammer (2003) Indoor Environment: Airborn Particles and Setted Dust. Indoor Environment. Wiley ISBN:978-3-527-30525-4.
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Biography

Layla Salih Al Omran has completed her PhD degree in 2016 in the field of Environmental Chemistry at University of Birmingham, UK, College of Life and Environmental Sciences, Division of Environmental Health and Risk Management. Currently, she is an Assistant Professor in the Department of Chemistry, College of Science at University of Basrah, Iraq. Previously she worked at Department of Food Science and Biotechnology, College of Agriculture. She has more than 30 years of academic experience in the field of environmental chemistry and analytical chemistry.

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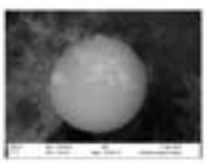
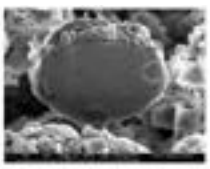
Identification and characterization of Particulate Matter (PM) at an historical site and southern industrial area in Jeddah, Saudi Arabia

Fahed Ayed N Aloufi, Adel El Turke and **Tom Scott**
University of Bristol, UK

The atmospheric pollution is one of the biggest challenges in Saudi Arabia. Particulate matter (PM) is one of the most problematic pollutants observed; this is due to the congested traffic and industrial activities. It can cause adverse health effects and material degradation. Moreover, the characterization of particulate matter is also influenced by meteorological conditions, including temperature, humidity, rainfall and wind speed. This work represents the characterization of these particle pollutants. The samples were collected from the historical site and southern industrial area in Jeddah, Saudi Arabia. The chemical composition of the PM were analysed using the techniques of scanning electron microscopy combined with energy-dispersion X-ray spectroscopy (SEM-EDX), X-ray fluorescence (XRF) and dual beam - focused ion beam microscopy (DB-FIB). The results gathered from the historical site were identified where in large amounts of spherical particles consisted of carbon, Fe, Cu and Zn. In addition, Al, Si, Ca, Na and Cl were also identified. The results from the industrial southern area revealed large amounts of Zn and Fe and small amount of Mn and Cu. In addition, S K, Ca and Ti were also identified.





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2. Brimblecombe P (2000) Air pollution and architecture: past, present and future. Journal of Architectural Conservation 6(2):30-46.
3. Lee R E (1972) The size of suspended particulate matter in air: size distributions of ambient aerosols must be studied in order to determine their effects on the environment. Science 178(4061):567-575.
4. Khodeir M et al. (2012) Source apportionment and elemental composition of PM2.5 and PM10 in Jeddah City, Saudi Arabia. Atmospheric Pollution Research 3(3):331-340.
5. Porter W C et al. (2014) Annual and weekly patterns of ozone and particulate matter in Jeddah, Saudi Arabia. Journal of the Air and Waste Management Association 64(7):817-826

Biography

Fahed Ayed N Aloufi is a Lecturer in the Department of Environmental Sciences, Faculty of Meteorology, Environment and Arid Land Agriculture in Jeddah, Saudi Arabia. He obtained his BSc in 2007, Environmental Science. In 2011, he received an MSc on the research entitled 'Sustainable Energy and Environment', Engineering School, University of Cardiff. His research study is focused on atmospheric pollution and environmental management. He is currently a PhD researcher at Interface Analysis Centre (IAC), University of Bristol. His current research involved the study of the effect of climate change and atmospheric pollution on historical buildings in Jeddah, Saudi Arabia. During his research, he gained experience on the art of analytical techniques including X-ray tomography (XRT), scanning electron microscopy (SEM) and focused ion beam (FIB) and laser Raman spectroscopy (LRS).

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Usage of novel plant material for removal of lead (Pb) from wastewater

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Treatment of wastewater and reuse, is a solution for the ever increasing demand for water and choosing a suitable and sustainable method is important, for meeting the sustainable goals of any country. Alongside the treatment process comes the removal of heavy metals that may pose a threat to the environment and human health. This research investigates the biosorption of heavy metal e.g. Lead (Pb), from wastewater, using novel plant material. The fruit of the plant is used as the biosorbent material, and the optimum conditions, such as pH, amount of plant material, metal concentration, and contact time, were investigated. Results, demonstrated that 90% of the Lead was removed at the following optimum conditions, pH 3, 0.7 g of the adsorbent plant material, 2.5 mg/L metal concentration and 2 h contact time respectively.

Biography

Mohamed Abouleish has completed his PhD from Tennessee Technological University (USA), MSc from University of Northern Iowa (USA). He is an Associate Professor at the American University of Sharjah (UAE), and previously worked as Product Coordinator at Shimadzu Scientific Instruments (USA). He has published several research works in reputed journals, such as Water Quality Research Journal and PloS ONE. The results of the research was presented at both international and regional conferences, such as International Conference on Environmental Sustainability, Development, and Protection (Spain) and National Meeting of the American Chemical Society (USA).

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The preparation of ZnO impregnated biochars from agrowaste for water remediation

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Statement of the Problem: Lack of access to clean drinking water is affecting billions and finding ways to cost-effective decontamination is essential. The filtration of water appears to be effective and economically viable way for water decontamination. The activated carbon filters show good results for removing chlorine, sediment particles and VOCs but struggle with mineral salts and dissolved inorganic substances. The combination of activated carbon or biochar with metal oxides such as ZnO could lead to improved performance.

Aim: The purpose of this study is to prepare and characterize composites of ZnO and biochar for water purification.

Methodology & Theoretical Orientation: The biochars were prepared by pyrolysis of agrowastes (corn cob, coffee husk) at 600°C for 2 h under nitrogen flux (150 ml/min). The biochars impregnation was done by precipitation of colloid $Zn(OH)_2$ and subsequent ultrasonication. The Zn content was determined using X-ray fluorescence. The textural parameters of the composites were determined by physisorption and the structure was analyzed using X-ray diffraction method. The adsorption kinetic experiments of Pb(II) were conducted.

Findings: The ZnO/biochar composite from corn cob showed almost 16-times higher content of Zn than the one from coffee husk and Zn was present as crystalline ZnO. Compared with unmodified biochars, the adsorption of Pb(II) was 4.5 times and 2 times more in both the ZnO/biochar composites, with coffee husk, and corn cob respectively. But the absolute highest adsorption of Pb(II) was observed for ZnO/biochar composite from corn cob.

Conclusion & Significance: The presence of ZnO significantly improved the adsorption of Pb(II) in both coffee husk and corn cob biochars. The most promising material appears to be the ZnO/biochar composite from corn cob. The use of ZnO impregnation on biochar appears to be a successful method to boost adsorption of heavy metals from water.

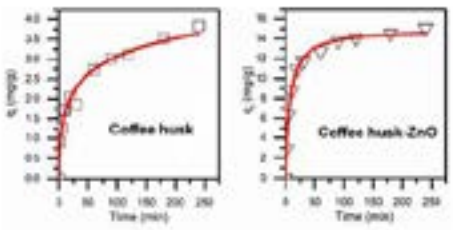

Figure 1: The adsorption kinetic experiment of Pb(II). The impregnation of biochar with ZnO significantly increased adsorbed amount of Pb(II).

Recent Publications

1. Ahmed M B et al. (2016) Progress in the preparation and application of modified biochar for improved contaminant removal from water and wastewater. Bioresource Technology 214:836-851.
2. Long L et al. (2017) Synthesis, characterization and mechanism analysis of modified crayfish shell biochar possessed ZnO nanoparticles to remove trichloroacetic acid. Journal of Cleaner Production. 166:1244-1252.
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4. Yuvaraja G et al. (2018) Application of ZnO nanorods as an adsorbent material for the removal of As(III) from aqueous solution: Kinetics, isotherms and thermodynamic studies. International Journal of Industrial Chemistry 9(1):17-25.
5. Cruz G J F et al. (2018) Composites of ZnO nanoparticles and biomass based activated carbon: Adsorption, photocatalytic and antibacterial capacities. Water Science and Technology 2017(2):492-508

Biography

Jaroslav Lang pursued his PhD from Technical University of Ostrava (Czech Republic) in 2018. He is currently a Junior Researcher at the Institute of Environmental Technology of the same university and also works as Postdoctoral Researcher at National University of Engineering (Peru). His major research interests are synthesis and preparation of photocatalysts and adsorbents for pollution remediation.

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Sensitized zebrafish mutant lines for environmental screens generated by CRISPR-Cas9

Viveca M Vélez Negrón and **Martine L Behra**
University of Puerto Rico, Puerto Rico

Rapid and cost-effective screens for waterborne pollutants that affect the flora and fauna, as well as human health are needed. We propose to develop an up-scalable assay to test watershed contamination using sensitized zebrafish larvae focusing on two environmental toxicological endpoints: (1) the development and the regeneration of a superficial sensory organ, the lateral line (LL), and (2) larval swimming behavior. Using CRISPR-Cas9 technology we generated at least one null allele in 4 different genes. Cannabis receptors 1 and 2 (*cnr1, cnr2*), necessary for proper functioning of the CNS, which will predictably be affected in swimming behaviors. Tnks1bp1 and atf5a involved in development and regeneration of the LL. We expect that in the absence of the respective gene products larvae will exhibit greater susceptibility to waterborne pollutants. To identify alleles for the genes and grow stable mutant lines into the F2 and F3 generation, we systematically genotyped potential heterozygote or homozygote carriers. To do so, we prepare genomic DNA (gDNA) from fin clips of juvenile and adult fish or from whole embryos and larvae. We designed PCR primers to amplify the targeted region in the gene and sequence the amplicons looking for insertions or deletions (INDELs) that will create a translational frame shift and eventually introduce an early stop codon. Three out of the four identified alleles are homozygote viable, meaning that unchallenged animals which are completely lacking the given gene products, are developing into healthy and fertile adults. Both, adult fish and larvae from those 3 lines will be ideal for testing water quality and are expected to display increased sensitivity in the presence of potential contaminants and can therefore serve as sensitized environmental sentinels in up-scalable environmental toxicology screens.

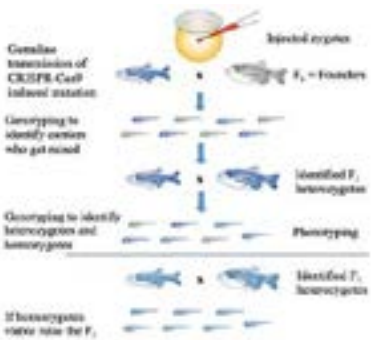

Figure 1: Zebrafish mutagenesis. The mutant lines developed will allow to generate environmental sentinels for toxicology screens.

Biography

Viveca M Vélez Negrón is passionate about environmental neuroscience. Her participation in this project using zebrafish has encouraged her to develop her research skills. Currently, her goal is to study pharmacy and combine it with research to take her career to the next level.

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Catalytic conversion of furfural to tetrahydrofurfuryl alcohol over supported palladium nanoparticles under mild conditions

Reem Albilali[1] and **Stuart H Taylor**[2]
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[2]Cardiff University, UK

The hydrogenation of biomass derived furfural using a series of supported palladium nanoparticles prepared *via* sol immobilization technique was investigated under mild conditions. The effect of support type as a major factor influencing the chemoselectivity of the formyl group was investigated using silica, alumina and titania as supports. It was found the highest selectivity towards the desired product (tetra hydrofurfuryl alcohol) was observed using the immobilization on titania support. Furthermore, the effect of metal loading was investigated, and the results indicated that best catalytic performance was observed using the 1% Pd/TiO_2. The catalysts were characterized using TEM, XPS and XRD and the structure-activity relationship was discussed.

Recent Publications

1. M Ma, H Huang, C Chen, Q Zhu, L Yue and R Albilali (2018) Highly active SBA-15-confined Pd catalyst with short rod-like micro-mesoporous hybrid nanostructure for n-butylamine low-temperature destruction. Molecular Catalysis 455:192-203
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3. Changwei Chen, Huang Haung, Yanke Yu, Jianwen Shi, Chi He, Reem Albilali and Hua Pan (2018) Template-free synthesis of hierarchical porous carbon with controlled morphology for CO_2 efficient capture. Chemical Engineering Journal 584-594.
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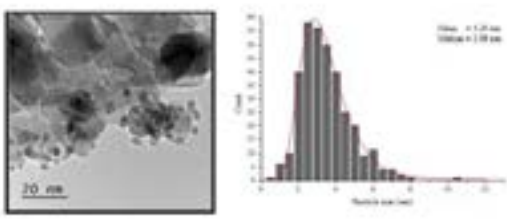

Figure 1: TEM images and particle size distribution for 1%wt Pd/TiO_2 prepared via sol-immobilization technique.

Biography

Reem Albilali is an Assistant Professor of Physical Chemistry at IAU University, Saudi Arabia since 2012. Her research interests are the synthesis and characterization of supported metal nanoparticles and their catalytic applications, the conversion of biomass derived molecules to biofuel. In September 2015, she joined Cardiff Catalysis Institute at Cardiff University, UK, as a Visiting Postdoctoral Researcher for 2 years. She has many publications in both Arabic and English language, and she is a (MRSC) member in the Royal Chemical Society (RSC) and a member in the American Chemical Society, Saudi Chemical Society and the National Association of Corrosion Engineers (NACE).

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Nanoparticles induced developmental properties, safety use of pesticides and risk assessment

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Recent growth in nanomaterials application in different science fields needs to understand the advancement of the base for engineering and create unique properties targeted towards specific applications. Historically, various fields such as biology, medicine, environmental science, and agriculture have employed the successful and safe use of nanomaterials. However, use in agriculture, especially for pest control and plant protection with nanoparticle materials is an under-explored area in the research community. Preliminary studies show that the potential of nanomaterials in improving pest control, plant protection, pathogen detection, chemical hazardous and residual effects of pesticides. This review summarizes nanomaterials application in good future agricultural assessment; helps to develop safety methods for pesticides through very careful regulation with minimal impact on human health and the environment. Well-maintained equipment with precautions that are required of pesticide application that could minimize human health exposure to pesticides and their adverse effects on the environment are also discussed.

Biography

Mamdouh I Nassar has completed his Bachelor's degree from Biology Department, Faculty of Science, Cairo University; MSc degree at the same University and PhD degree in Channel System at University of Maryland College Park (USA) and Cairo University. He did many studies in the field of sleeping sickness and Malaria diseases of vectors Stomoxys calcitrans and Anopheles in USDA Florida, Jazan and Jeda. He is the Staff Member at University of Maryland College Park, USA. He is a Professor of Biological Sciences at Cairo University, King Abd-Alziz, Univ. Jazan, and King Khalid Universities. He has worked as laboratory staff, for dietary Microbiology at Environmental system service, Beltsville, USA. He also was a Consultant Advisor at Home Care Company and Al-Nasr Chemicals Company.

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Effect of increased manganese content in drinking water on the balance of certain neurotransmitters in children

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Quality of drinking water is becoming especially vital in industrially developed cities in Russia, USA, Germany as it exerts considerable influence on population health. Manganese (Mn) is among priority contaminants which pollute drinking water. We performed our research on samplings created as per randomized clusterization technique with approximated modeling strategy. Our samplings were made up of children aged 4-7 years who drinking water with increased Mn contents. Mn content assessment results revealed persistent occurrence of this metal in drinking water in quantities equal to 0.81 mg/l or up to 0.4 RfDcr. Chronic exposure of children population was characterized with daily Mn dose being up to 0.002 mg/(kg·day) introduced orally with drinking water. Approximately 2.000 children aged 0-14, were an exposed sub-population. We detected 1.3-1.4 higher average Mn concentration in blood of children from the focus group against the same parameter in children from the reference group and the reference level (p=0.0001-0.010). On the basis of a relevant model, an increased Mn content in the blood which was higher than the reference level was validated as an oral exposure marker. In assessing the biochemical parameters characterizing the balance of the neuromediators, an increase in glutamic acid and dopamine (excitation neurotransmitters) in blood serum of children from the focus group was found 1.4–1.5 times higher and a decrease in γ-aminobutyric acid (inhibiting neurotransmitter) was found 1.8 times lower than the same indicator in the control group (p=0.0001-0.001). We proved that increase in glutamic acid and decrease in γ-aminobutyric acid depended on Mn content in blood (OR = 3.4–4.5; $2.2 \leq DI \geq 5.8$; p=0.0001–0.002; $0.64 \leq R^2 \geq 0.80$; p=0.0001). Chronic exposure to Mn in drinking water causes an increase in the incidence of diseases of the central nervous system in children (about 100 additional cases/1000 children) in the form of an astheno-vegetative syndrome, attention deficit hyperactivity disorder associated with external exposure of Mn to drinking water.

Biography

Kol'dibekova Yu is a senior researcher, head of the metabolism and pharmacokinetics laboratory at the Federal Scientific Center for Medical and Preventive Health Risk Management Technologies, Candidate of Biological sciences She has published over 60 articles in refereed journals.

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Sulfide precipitation coupled with polyelectrolytes for Cu and Ni removal from printed circuit board complex rising wastewater

Pakpong Sriprasert and **Nanthanat Sriprasert**
Mahasarakham University, Thailand

Heavy metals pollutants from various types of industrial effluents such as metal plating, tanneries, batteries, mining and electronic parts facilities, etc., become seriously environmental problems nowadays. Chemical precipitation, particularly, using hydroxide precipitation technique is the most widely implementation for soluble heavy metals removal from industrial wastewater due to its relatively inexpensive and simple application. Sulfide precipitation is also concerned one of the most effective method to treat heavy metal ions regarding to its non-amphoteric sludge characteristics. In addition, metal sulfide sludge has shown better thickening and dewatering properties in comparison with metal hydroxide sludge. In this study, real complex rising wastewater from printed circuit board manufacturing industry with initial pH of 8.1, 350 mg/L suspended solids (SS), 221 NTU turbidity, heavy metals in term of total and dissolved Cu and Ni of 86.6, 41.3 and 12.4, 4.3 mg/L, respectively, have been tested with 0 – 5 folds Na_2S of stoichiometry (considering to Cu removal) to evaluate Cu and Ni removal efficiencies. Thereafter, sulfide precipitated wastewater was further treated by cationic and anionic polyelectrolytes under dosing rates of 0.25 – 5.0 mg/L in order to evaluate sludge settling ability. The results showed that optimum dosage of Na_2S was 1.5 times of stoichiometry for copper removal with 5 minutes of reaction time. In this stage, it found that Cu and Ni concentrations and turbidity have been reduced for 98.1 and 98.6 and 99.9 %, respectively. Optimum dosages of cationic and anionic polyelectrolytes were found to be the same value at 4 mg/L, corresponding to total Cu removal of 99.1 and 99.2 %, Ni removal of 91.1 and 89.5 % for cationic and anionic polyelectrolytes application, respectively. Removing SS values in supernatant after cationic and anionic polyelectrolytes adding were 28 and 16 mg/L, referring to SV30 of 60 and 65 ml/L, which sludge setting velocities have been improved to 11 and 13-folds, respectively. Precipitated sludge characteristics obtained from XRD presented amorphous form with recovered Cu and Ni in dried sludge of 11.6 – 12.3 % and 0.006 – 0.007 % (w/w) for cationic and anionic polyelectrolytes applying, respectively.

Biography

Pakpong Sriprasert is lecturer of Environmental Technology, Faculty of Environment and Resource Studies at Mahasarakham University, Maha Sarakham, Thailand. Her research currently focus on pollution control and environmental sustainability, especially, the process of water pollution and treatment of both domestic and industrial wastewater. She specializes in wastewater treatment technologies including chemical and biological processes. She has built valuable results after years of experience in these researches. Sriprasert completed BEng in Environmental Engineering from King Mongkut's University of Technology Thonburi, Thailand. She has also completed her MEng in the same field at Chulalongkorn University, Thailand. Currently, she is doing PhD at the University of Southampton, UK, she works on application of two- and three- phase flow for anaerobic membrane cleaning.

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Dibutyl phthalate on *scenedesmus sp.*: Risk assessment of natural occuring concentrations

César Cunha[1], Jorge Paulo[1], Marisa Faria[1], Manfred Kaufmann[2,3] and **Nereida Cordeiro[1,3]**
[1,2] University of Madeira, Portugal
[3]University of Porto, Portugal

Phthalate esters are highly present in marine plastic litter, which can interfere with the biological processes in the wildlife. In this work, the commonly found freshwater microalga *Scenedesmus sp*. was exposed to environmental relevant concentrations (0.02, 1 and 100 μg L^{-1}) and to a higher concentration (500 μg L^{-1}) of dibutyl phthalate (DBP), which is an environmental contaminant. The *Scenedesmus sp*. growth inhibition and the effect on production of photosynthetic pigments and carbohydrates were evaluated as endpoint of the toxic effects. The main inhibition effect of DBP on the microalga growth was observed in thefirst 48 h of the exposition (EC_{50}: 41.88 μg mL^{-1}). A reduction in the photosynthetic pigments was observed for the 0.02, 1 and 100 μg L^{-1}conditions indicated that DBP regulated the growth rate and affecting the photosynthetic process. A significant increase in protein production was observed only under 500 μg L^{-1} DBP exposure. Extracellular carbohydrates production decrease slightly with the presence of DBP, with a sharper decrease to 500 μg L^{-1}. These results highlight the hazardous effects of DBP on the biochemical behaviour of microalgae and the importance of the real environmental concentrations study due to the DBP dose-dependent correlation effect.

Biography

César Cunha has completed his undergraduate degree in Biochemistry last summer in University of Madeira (UMa), Portugal. He started a professional internship in CIIMAR- Madeira, working as a Junior Researcher in LB3 (Laboratory of Bioanalysis, Biomaterials and Biotechnology) and in Madeira Algae Bank at University of Madeira.

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Effect of endocrine disruptors 4-MBC and DES pollutants on *P. tricornutum*

Jorge Paulo[1], César Cunha[1], Marisa Faria[1], Manfred Kaufmann[2,3] and **Nereida Cordeiro[1,3]**

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[3]University of Porto, Portugal

Diethylstilbestrol (DES) and 4-methylbenzylidene camphor (4-MBC) are classified as estrogen pollutants. These components have been widely found in marine environments. These contaminants are endocrine disruptors that have the potential to affect microorganisms In the current investigation, the marine microalga *Phaeodactylum tricornutum* was exposed to environmental relevant concentrations (1, 100 and 250 μg L^{-1}), individually and together, of DES and 4-MBC. *Phaeodactylum tricornutum* growth and the production of photosynthetic pigments, proteins and carbohydrates was assessed as endpoints of the pollutants trace concentrations toxic effects. Regarding growth inhibition, there was a significant decrease in the first 48-72h of the experiment for both pollutants. No significant decrease was observed for the production of photosynthetic pigments and proteins across all concentrations and pollutants. Extracellular carbohydrates production was down-regulated in the presence of both pollutants in all concentrations tested. The results on this work highlight the effects of realistic concentrations of widely found estrogen pollutants on the biological processes of microalgae.

Biography

Jorge Paulo has completed his undergraduate degree in Biochemistry last summer in University of Madeira (UMa). He started a professional internship in CIIMAR-Madeira, working as a Junior Researcher in LB3 (Laboratory of Bioanalysis, Biomaterials and Biotechnology) and in Madeira Algae Bank at University of Madeira.

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10th Edition of International Conference on **Water: Pollution, Treatment & Research**

March 14-16, 2019 London, UK

Wastewater chemical contaminants: Remediation by advanced oxidation processes

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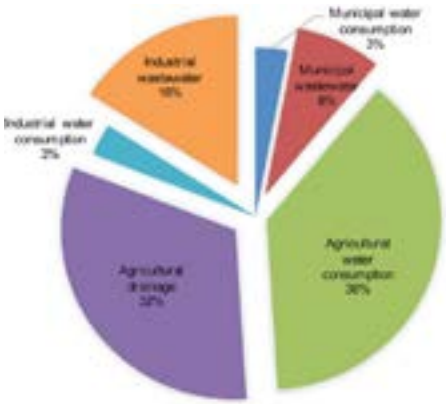
Approximately 70% of the terrestrial area is covered with water, but only a small water fraction is compatible with terrestrial life forms. Due to the increment in human consumption (Fig 1), the need for water resources is increasing, and it is estimated that more than 40% of the population worldwide will face water stress/scarcity within the next few decades. Water recycling and reuse may offer the opportunity to expand water resources. For that, the wastewater treatment paradigm should be changed and adequately treated wastewater should be seen as a valuable resource instead of a waste product.

The exact composition and elements concentration of wastewater vary according to its different origin sources, such as industrial, agricultural, urban usage of water, etc. (Fig 1). Thus, a variety of known and emerging pollutants like heavy metals, antibiotics, pesticides, phthalates, polyaromatic hydrocarbons, halogenated compounds and endocrine disruptors have been found in natural water reservoirs and it might also be due to the limited effectiveness of conventional wastewater treatment. The conventional approaches consist of a combination of physical, chemical and biological processes, aiming the removal of large sediments such as heavier solids, scum and grease and of organic content to avoid the growth of microorganisms and eutrophication of the receiving water bodies. However, this approach does not seem enough to reduce the chemical pollutants and much less the emerging chemical pollutants.

In this work, after some considerations concerning chemical pollutants and the problematic efficiency of their removal by conventional methods, an update is presented on the successes and challenges of novel approaches for wastewater remediation based on advanced oxidation processes. An insight into wastewater remediation involving the photodynamic approach mediated by tetrapyrrolic derivatives is underlined.

Among the advanced oxidation processes, heterogeneous photocatalysis has proven its efficiency to degrade recalcitrant organic compounds. The great hope in this technology lies in its ability for water decontamination and, in addition, the killing of pathogenic microorganisms. In addition to this potential, there is the possibility of immobilization of the photocatalyst on solid matrices and thus to be easily removed, recovered, and reused, making it an effective, less expensive and even environmentally friendly technology. Additionally, solar-driven processes can be considered as a green technology once they can employ sunlight as the irradiation source, thus circumventing the use of very high energy consuming UV-lamps.

After our analysis and with the data at hand, we think that photodynamic wastewater treatment may be worth drawing the attention from the scientific community and of political decision-makers. This approach has the potential to become a very robust solution to overcome the increasing need for water and wastewater treatment. We expect that the information compiled in this review can motivate the research community to put in more efforts in photodynamic wastewater treatment in order to gain progressive recognition.



Maria Bartolomeu is PhD student at the Department of Biology, University of Aveiro, Portugal, where she received her M.Sc. degree. Her research work has

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Biography

Maria Bartolomeu is PhD student at the Department of Biology, University of Aveiro, Portugal, where she received her M.Sc. degree. Her research work has been dedicated to Photobiology, specifically to microbial photobiology therapy and photodegradation of chemical compounds, with four publications in indexed journals.

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Assessing the impact of pollution on a river in North Central Nigeria; Using macroinvertebrates biological traits

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Statement of the Problem: In Nigeria, there have been increasing alarms on pollution loads in freshwater ecosystem.

Methodology & Theoretical Orientation: Macroinvertebrate biological traits were used to assess the impact of pollution in River Chanchaga. Selected biological traits were used in this study. Fuzzing coding system was employed to describe the link between a taxon and each trait classes with affinity scores that account for potential functional variation between members of the same family.

Findings: From the fuzzy coding system analysis; body size class A5 (>40-80 mm) dominated stations 1 and 2 while stations 3 and 4 were dominated by body size class A4 (>20–40 mm). The respiration classes B2 (tegument), B3 (spiracles), B4 (aerial/vegetation) and B5 (lung) in station 4 dominated other stations in relative abundance while B1 (gills) dominated station 1. Mobility traits; C1 (climbers) dominated stations 2 and 3 while skater (C5) and burrowers (C6) dominated stations 1 and 4 respectively. Streamlined (D1) body shape was highest in station 1 while D4 (cylindrical) body shape dominated station 4.

Conclusion & Significance: This study was able to elucidate the effect of pollution processes going on in River Chanchaga as a cause of differences in the organization pattern in the distribution and composition of some macroinvertebrates in the water course. The downstream stations most especially stations 3 and 4 were seriously affected as a result of the perturbed state occasioned by varied degree of anthropogenicity such as illegal gold mining activities, localization of industries, residential buildings, farm settlements.

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Biography

Edegbene Ovie Augustine completed his MSc Zoology (Hydrobiology and Fisheries) from Delta State University, Abraka and presently studying for PhD (Water Resource Science) at the Institute for Water Research, Rhodes University, Grahamstown, South Africa. He is an expert in the field of Applied Aquatic Ecology. He develops indices for monitoring pollution status in water bodies in Nigeria. He has published over 10 papers in reputed journals and is a serving Board Member of Proceedings of Applied Life Sciences (PALS), Published by "Cambridge International Academics". He is also a reviewer for many learned international journals.

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Intention to not waste food in Poland: An application of the Theory of Planned Behaviour

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Statement of the Problem: Consumers are responsible for about 40% of food waste in Europe, wasting about 88 million tons of food annually. Poland is in the top-5 of the most profligate countries in the EU. Therefore, there is a need to conduct research in this field in Poland and reveal the main factors influencing consumer's intention to waste food.

Findings: The presented results are built on the findings of a recent online survey, conducted online via the Survey Monkey tool from the 15th of June to the 31st of October 2018. Among 563 respondents in Poland, 414 filled out the survey completely and only those responses were considered for further analysis in STATA, using the confirmatory factor analysis (CFA) based on structural equation modeling and co-variances between latent variables. The CFA was estimated on the basis of the maximum likelihood method. The entire model had a good fit according to the root mean square error of approximation (RMSEA) equal to 0,054. According to Figure 1, the most essential latent variable influencing "Intention to not waste food" is "Personal attitude" (0,48, p<0,001), meaning that personal believes regarding food waste play an essential role in building the behavioural intention in Poland. In addition, "Financial attitude" and "Perceived behavioural control" are also correlated with "Intention to not waste food". On the one hand, "Financial attitude", encompassing perception of a linkage between wasting of food and wasting of money, was positively correlated with "Intention to not waste food" at p<0.05. On the other hand, "Perceived behavioural control" was negatively correlated with "Intention to not waste food" at p<0.001. The latter result reveals that respondents stated having difficulties in avoiding food waste, even though they expressed positive "Intention to not waste food".

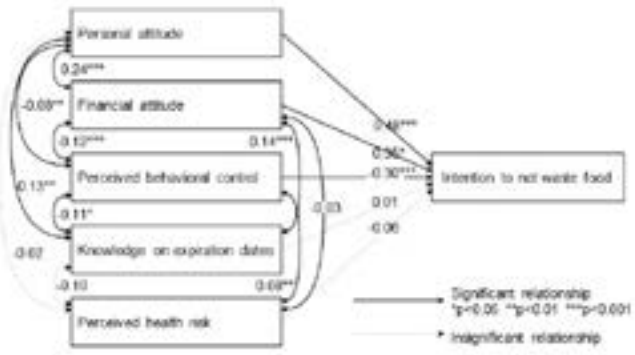

Figure 1. Intention to not waste food in Poland: Preliminary Results

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Biography

Ewelina M Marek-Andrzejewska, PhD is Assistant Professor at the Poznań University of Life Sciences (Faculty of Economics and Social Sciences) in Poland. She carries out research in the field of behavioural economics and social innovation in the context of environmental protection and food markets. She is particularly interested in the application of the above scientific fields to the development of public policy. She is an author of high-quality scientific articles, reports for policy-makers and a reviewer for "Sustainable Cities and Society" (Elsevier Publishing). She earned her PhD title from the University of Lyon, at the Transport Economics Laboratory that belongs to the French Centre for Scientific Research (CNRS, corresponding to the Polish PAN). Prior to that, she focused on consumer policy for the OECD and the European Commission. Interests: food waste, behavioural economics, consumer behaviour, decision-making, social sciences, sustainable development, transportation consumer policy, UX design.

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Heavy metals and organic compounds contamination in water collected from deir kanoun ras el ain dump and canal in Lebanon

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Environmental pollution generated from uncontrolled dumping is a major problem in Lebanon due to the lack of proper waste management plans. Deir Kanoun Ras El Ain is the village that harbors the worst dumps in Lebanon. Wastewater leachates of this dump influx into a nearby canal used for irrigation and drinking purposes. The aim of this study is to assess the concentrations of heavy metals (lead (Pb), cadmium (Cd), arsenic (As), and mercury (Hg)) and the presence of organic compounds (phthalates, Bisphenol A, and polycyclic aromatic hydrocarbons (PAHs)) in water samples collected from two different sites around the dump sites and two canal sites during winter and summer seasons. The concentrations of heavy metals were determined using atomic absorption spectrophotometry, while the identification of the extracted organic compounds was performed using GC–MS. The carried analyses revealed that water samples collected from dump and canal were heavily polluted by Cd, As, Hg, phthalates, Bisphenol A, and PAHs caused by pyrogenic and petrogenic sources. The concentrations of the found heavy metals were far above the maximum tolerable levels set by different guidelines. The findings suggest that the studied water sources are not safe for irrigation and drinking. The serious implications of dumping wastes on the health of inhabitants recall for an immediate employment of efficient waste management policies to resolve this problem.

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Potential threat of microplastics in a drinking water source of Chennai city, Southern India

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Plastics and plasticine products are rampantly used by us in everyday life, and the plastic waste is omnipresent everywhere on the land causing severe plastic pollution. It is one of the human-made defining legacies on the earth. Owing to the plastic pollution concern, we focused on the Red hills Lake located in Red Hill, Chennai, India as the waters from this lake serves as the main drinking water source for the Chennai metropolitan city. Red hills Lake is located in a highly urbanized and industrial corridor of Chennai city; we speculate that activities in residential, commercial and industrial areas would significantly result in higher levels of microplastics drained into the lake waters. This first study investigates microplastics contamination across an understudied region and, more broadly, the first such study for freshwater systems. 32 Lake Floor sediments and six water samples were collected covering the expanse of the lake August 2018. Extraction of microplastic from sieved sediment samples was done as per National Oceanic and Atmospheric Administration (NOAA) protocol. The mean concentration of microplastics in Red hills Lake was 5.9 n/m^3. Uppermost part of the lake which is from stations 19-32 found to have microplastic of range 1mm to be high followed by 2mm size. Different types of Microplastics were observed, including fibers (37.9%), fragments (27%), films (24%), and pellets (11.1%). Components of the selected microplastics mainly included High-Density polyethylene (HDPE), Low-Density Polyethylene (LDPE), polypropylene (PP) and polystyrene (PS). The surface elemental composition of microplastics collected from Red hills Lake was analyzed using SEM coupled with EDX. The EDX was performed to analysis adhering of heavy metals to the microplastics due to large surface area. The present study shows that plastic particles getting accumulated in water and sediment samples, especially more near the dam area from where water is supplied to the residents. Our results provide basic information on the status of microplastic pollution in Red hills Lake which supplies drinking water to Chennai city.

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Investigation of atmospheric synoptic patterns affecting Tehran's severe air pollution and 400 deaths due in mid-September 2016

Nader Parvin

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Air pollution is identified by the World Health Organization (WHO) as responsible for several million deaths per year (Crosignani et al., 2002; Abbey et al., 2005; Laden et al., 2006; Beelen et al., 2008; Pruss-Ustun et al., 2016). Air pollution is one of the most important environmental hazards of the present time in many metropolises of Iran. This phenomenon often causes a lot of damage during the cold season. In Tehran, in mid-September 2016, the severity of air pollution was so high that it killed 400 people and caused the closure of all schools in Tehran. The purpose of this study is to investigate atmospheric patterns of Tehran's air pollution at the sea level pressure (SLP) and the Middle Atmosphere (Hpa 500). For this purpose, data on air pollution in Tehran (Co and PM10) from the Air Pollution Control Center of Tehran were collected. High-weather and low-level weather maps from the NCEP / NCAR site were extracted and analyzed.The results of the study showed that a deep ridge was formed in Eastern Europe, and the Siberian range was integrated with the Western immigrant anti-cyclone. Since Tehran is located below the upper part of this pattern, its high atmospheric convergence causes divergence and extreme air sustainability on the ground and creates barotropic atmospheres. Such conditions have led to a decrease in air from the top to bottom, resulting in an increasing concentration of urban pollutants in the air near Earth's surface. This wave caused the continuing air pollution of Tehran for a week.

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Removal of crude oil from aqueous medium using modified activated carbon by phosphoric acid

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Petroleum products and their derivatives are considered as major source of pollution in the environment that causes harm not only to the atmosphere but as well as the wildlife. Due to exploration of oil, transportation as well as production of petroleum products, the oil spill is limitless. Meanwhile, history showed us that lack of safety measures and integrity can cause oil spills. For instance the Gulf of Mexico in 2010 is still the most catastrophic event of crude oil spill in the sea which took few days to remove the oil. Petroleum oil spills has a devastating affect towards the environment in terms of pollution on reefs, sand beaches and economy as well as the public health. In order to remove oil spills, methods such as mechanical, biological, chemical and adsorbents have been developed from previous researches. The objective of this study was to modify the activated carbon (AC) by impregnation method with 80% w/v phosphoric acid (H_3PO_4) solution. Fourier Transform Infrared Spectroscopy (FTIR) was used to find the functional groups in the modified and unmodified AC. After impregnation, this study aimed to study the effect of temperature, dosage of adsorbents and contact time towards the adsorption process as well as isotherm and kinetic studies. The results show that the modified activated carbon (MAC) oil sorption capacity is higher than unmodified AC in every parameter tested. The best fit to describe the kinetic study is the pseudo-first-order and meanwhile for adsorption isotherm is Freundlich most suited to describe the sorption equilibrium of crude oil on AC and MAC.

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Pesticides exposure and risk assessments in the drinking water of kadjebi district of Ghana

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The Kadjebi District is predominantly made of farming communities, hence, the major economic activities is crop productions. The extensive use of Organochlorines, Organophosphates and Synthetic Pyrethroids have raised concern about potential adverse effect on human health and environment. The study assessed the risk associated with pesticides contaminated water in the Kadjebi District of Volta Region, Ghana. Hundred and Nine (109) and Twenty Six (26) questionnaires were administered to farmers and agro chemical sellers respectively to assess the knowledge and awareness about the use of agrochemicals. Thirty Nine (39) water and Sediments samples were collected. Extractions of samples were done and GC-MS techniques were used to analyse the samples. Risk assessment was done using United States Environmental Protection Agency's Guidelines (USEPA, 1996). The study revealed that about 92.6% of farmers used one or more pesticides. Of these numbers, 62% admitted not having access to services of the extension officers on the use and application of pesticides, 68% of the respondents reported clinical symptoms of pesticide poisoning such as nausea, headache, blurred vision, eye irritation, dizziness, vomiting and skin irritation. About 51% of water samples analysed showed positive detections of pesticide residues while all sediments samples showed positive detections of pesticides residues varying from one to five different types of pesticides residues. The common pesticides residues found in the samples were Deltamethrine, Cyfluthrin, Cypermethrin, Dieldrin, Fenvaerate, Lambdacyhal, p,p' DDT. Synthetic pyrethroids (72%) were the dominant residues detected. Deltamethrine, Cyfluthrin, Cypermethrin, Dieldrin, Fenvaerate, were found in the sediments with concentration range of 0.001 mg/kg to 0.014 mg/kg. From the calculated hazard indices, there is no adverse health risk associated with the consumption of the water in both children and the adult. There should be advocacy and awareness creation on the safety and toxicity of pesticides and assessment of other consumable receptors of pesticides residues.

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Quality of Riyadh drainage water and its possible utilization

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Saudi Arabia has developed rapidly in the last few decades both in terms of population increase, as well as spatial expansion of irrigated agriculture, industrial and domestic land use. At the same time, water demand has increased rapidly. Such circumstances have had an impact on urban areas such as Riyadh, the capital city of Saudi Arabia. During the last few decades, the city of Riyadh has seen massive urbanization resulting in high population growth. According to statistics, the population of Riyadh has reached more than 6 million people, and the rate of the population growth reached 4% annually. This requires more than 2 million m3 of water per day; two-thirds of which is pumped from desalination plants from the Arabian Gulf in the industrial city of Jubail situated 500 km away. As a result of urbanization, significant hydrological changes have taken place resulting in increase of surface runoff. There are huge amounts of drainage water that flows into wadis south of the city. It is estimated that close to 500,000 m^3/d flows out of the city. There are many sources for this flow; the most important are leakage from water and wastewater networks, leakage from soakaway since not all parts of the city are connected to wastewater network, excess irrigation and natural ground water flow. The main objective of this paper is to present the result of an investigation related to estimation of present and future amounts of drainage water from the city of Riyadh. Another objective is to study the quality of this drainage water. Samples from different locations along the path of the major channel of flow were taken and analyzed. Depending on the results, recommendations will be made on the possible reuse of this water.

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Environmental coexistence of the overhead transmission lines in urban and rural areas

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The world is in a growing need for electric power and this is in direct relation with the technological progress. Considering only the uprising of the electrical cars or the need for more robots for the manufacturing industries and we will have a good image of the need for solutions to transport the energy from the producer to the consumers. Until the present days, the long distance transport of the electric power has been performed almost exclusively through the overhead transmission lines. However, awareness that human activities and increased built development can affect habitats and species, potentially endangering them, has led to environmental protection laws and measures in probably all countries, particularly in the last few decades. Questions of how new high voltage overhead lines (OHLs) are routed, and how closely they come to existing homes or built developments, or to precious landscapes and natural areas, are often issues not only for communities and citizens but also for electricity utilities themselves. Closely related to this, is the issue of how new homes or other built development is planned or sited near to existing OHLs. These issues can be contentious, with cases of citizens, environmental organizations and building developers lobbying electricity utilities, while municipalities and politicians, to seek to have OHLs located as far as possible away from buildings. Their motives may be fear of electric and magnetic field (EMF), belief that visual quality will be negatively affected, or loss of monetary value of buildings or land proposed for building development, national parks or other areas they wish to preserve for reasons of landscape beauty, historical importance or nature conservation. Therefore how new OHLs are routed through or near them can be challenging for the suppliers, authorities, (NGOs), people living close to the new OHLs and for the general public.

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Industrialists awareness and attitude towards carbon trading and its perception and impact on the environment in Tamil Nadu, India

P R Venkadesh and Ganapathi
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Today, there are many organizations that are actively involved in buying and selling of carbon credits to different third party companies. In fact, when trading within the carbon markets are carried out in are rapid rate today. Everyone is possibly aware of the harmful impact of greenhouse emission which in turn is creating a significant impact on the environment. This is the reason why buying and selling of different materials within the carbon market that are responsible for the development of carbon can significantly reduce the impact on the environment. In the recent times, these trading activities are considered to be one of the best ways through which the environment can be saved. This is a regulation that has been adopted by the government, and currently, there are also many private organizations that are actively involved into this trading. There are particular carbon developing companies within the carbon market where trading can be carried out. These trading are largely beneficial for any organization, because these organizations receive huge incentives for involvement in buying and selling of carbon credits. The concept of this kind of trading is huge but simple. Therefore, if this step can be implemented properly, it will definitely help to make a great move, and thereby save the world from the harmful consequences of emissions. Therefore, the different stakeholders are associated with an organization they can also get involved in buying and selling of carbon credits from different companies, which in turn, will increase the allowance for carbon emission. The process of trading in this case is quite similar to buying and selling of stocks in the share market. Therefore, it is very essential to select a very good company, whereby carbon credits can be traded. All the modern businesses are profit oriented rather than consumer oriented. Due to the industrial and technological development, people started to forget the safety of the environment. More volume of chemicals and ingredients are being used by almost all business which are heavily affecting the environment. Sometimes these materials may cause the death of many innocent people who are consuming bad smell and heavy volume of carbon dioxide gas evaporation from them. Due to the problems in the environment even the younger face problems from serious diseases. This is the serious issue faced by all the people in all parts of the country. The industrialist's awareness about carbon trading was analyzed and the results are presented.

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Effect of saponin and humic acid on the biodegradation of anthracene

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PAHs can be widely dispersed into the environment by atmospheric transport or through stream pathways, and eventually accumulate in soils and aquatic sediments. The existing levels of these compounds in the environment are taken into the special consideration and regulated by government agencies. It is well known that surfactants can increase the solubility of hydrophobic organic compounds by partitioning them into the hydrophobic cores of surfactant micelles, thus surfactant enhanced the solubility of PAHs has been suggested as a promising technology for the removal of PAHS from polluted soil. The influences of saponin (a biosurfactant) and humic acid (HA, a surfactant - like substance) on the biodegradation of anthracene were studied in comparison with the effects of Tween-80 (a chemical surfactant) in this study. About 7 days were needed for microorganisms to produce sufficient glycolipids to dissolve anthracene and to make anthracene bioavailable in the absence of humic acid and other surfactants. Humic acid, saponin and Tween-80 significantly accelerated the biodegradation of anthracene, but humic acid and saponin were much more effective than the chemical surfactant Tween-80 under the same conditions. Furthermore, humic acid and saponin dramatically shortened the onset time for anthracene biodegradation, and the biodegradation rate exceeded 98% within 2~4d. The biodegradation of anthracene is dependent on the added concentrations of humic acid and the initial concentrations of anthracene.

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A web-based analysis tool for wastewater treatment equalization volume

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The wastewater equalization process is always essential and necessary in the wastewater treatment system. This process is purposed to stabilize the influent flow characteristics to improve the overall performance of wastewater treatment plants. An equalization tank (usually a complete mix reactor) is employed to dampen the variation of the influent flow characteristics such as the concentration of the wastewater contaminants and its flowrate. On the current applications, portions of the treatment plants require a steady flow, while the other plants either require a relatively small variation on the concentration or both. Due to the existing different designs on the treatment plants, the purpose of the equalization tank varies which makes the calculation of the volume of the equalization tank difficult. A web-based Simulation and Optimization Techniques has been developed as an easier and quicker way for the wastewater treatment factory. The website calculates the most economical volume of the equalization tank which is the smallest volume while meeting the demands of the downstream plant. The algorithm behind the scene uses a numerical solution with central difference to ensure the result is accurately and precisely approximated. Depends on the needs, users can choose from one of the following three scenarios: equalize the flowrate only, equalize the concentration only, and equalize both flowrate and concentration. After data has been entered and submitted by the user, the minimum volume of the required equalization tank will be shown on the website, and graphs regarding the performance will be plotted and provided. The web-based application with the numerical technics provides the convenience, easy access service to the industries around the world.

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