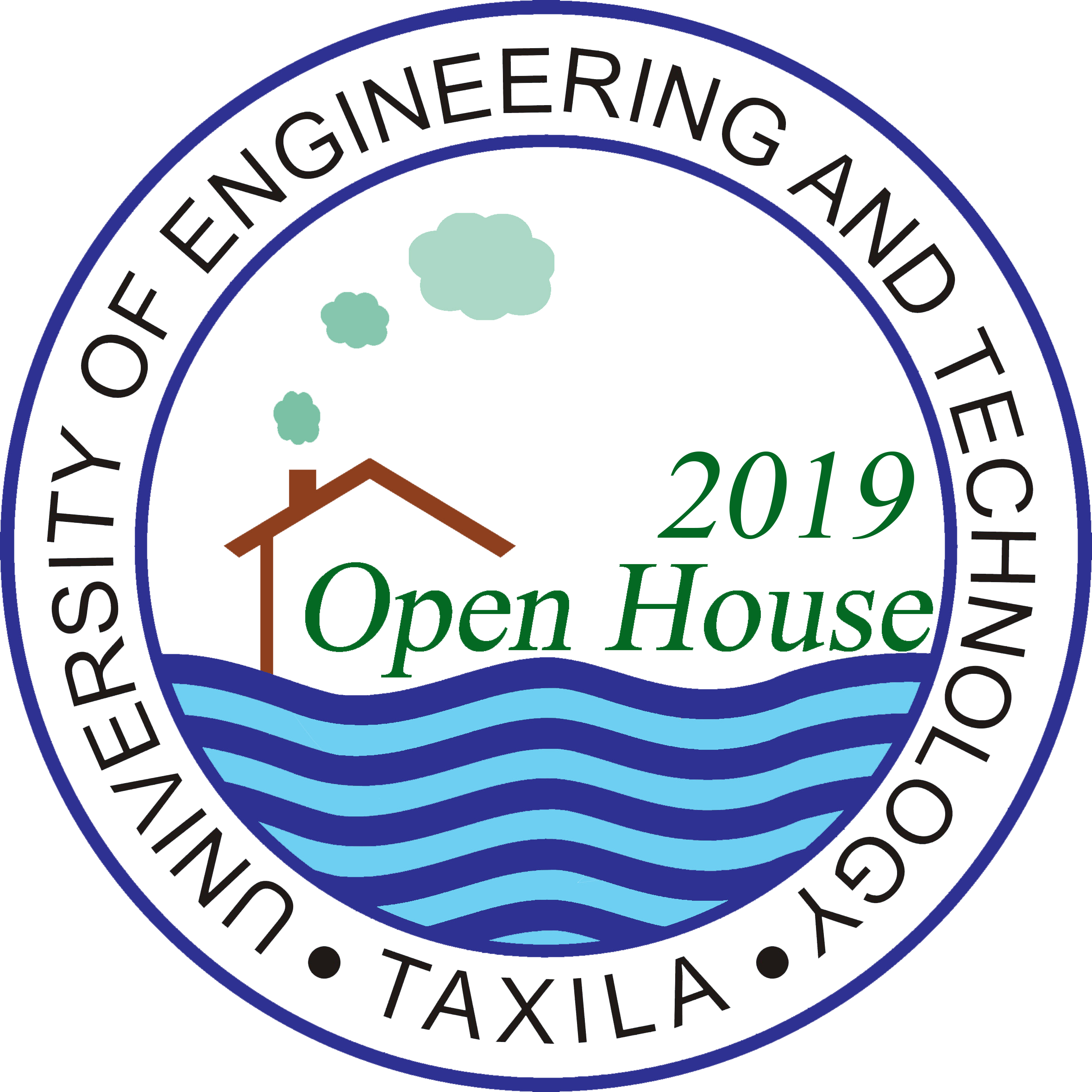
**OPEN HOUSE & JOB FAIR 2019**



16th JULY 2019

**FACULTY OF CIVIL AND ENVIRONMENTAL ENGINEERING**

ABSTRACTS

ENVIRONMENTAL

ENGINEERING DEPARTMENT

# ENVIRONMENTAL ENGINEERING DEPARTMENT

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| **Project Title:** | **Comparative Analysis of Different Techniques for Dyes Degradation for Textile Wastewater** |
| **Students:** | Akash Arshad (15-ENV-01), Muhammad Mudassir Riaz (15-ENV-36) & Muhammad Wasim(15-ENV-54) |
| **Supervisor:** | Dr. Naeem Ejaz, Professor (CED & ENV Department) |
| **Email:** | [naeem.ejaz@uettaxila.edu.pk](mailto:naeem.ejaz@uettaxila.edu.pk) |
| **Abstract:** | The research study was conducted to evaluate the potential applicability of biological trickling filter system and ultrasonic electrolytic process for the treatment of textile wastewater which contains strong color, high temperature, suspended and dissolved solids, biological oxygen demand (BOD), high Chemical Oxygen Demand (COD) which causes damage to the environment and human health. The percentage removal efficiency for the treatment of textile wastewater by using Sono-electrolytic reactor was found to be higher than 95% at temperature level of 25’C and a pH of 8.9. While for trickling filter having adsorbent as a filter medium, Further, the optimum conditions obtained were applied for the treatment of different dyes sample. |

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| **Project Title:** | **Ultrasonic Assisted Application of Organoclay as a Sorbent for Treatment of Textile Wastewater** |
| **Students:** | Rubi Bibi (15-ENV-39), Waliha Noor -us- Subha (15-ENV-48) & Huma Naeem Abbasi (15-ENV-60) |
| **Supervisor:** | Dr. Sadia Nasreen, Assistant Professor |
| **Email:** | [sadia.nasreen@uettaxila.edu.pk](mailto:sadia.nasreen@uettaxila.edu.pk) |
| **Abstract:** | Wastewaters from textile industries contain a variety of dyes that are of high concern for human and aquatic life and they need to be removed before their discharge into waterways. In this research organoclay was used along with ultrasonic bath for the degradation and decolorization of dyes and comparison of sono-electric reactor (SER) and ultrasonic assisted application of organoclay was done. Efficiency of organoclay along with electrochemical and ultrasonic bath was also compared individually. Research results show that the most efficient method for the removal of dyes from textile wastewater is the use of organoclay along with ultrasonic bath. The removal efficiency of organoclay with ultrasonic bath was found to be almost 99% at pH 4 and the removal efficiencies of SER, ultrasonic bath, electrochemical reactor and organoclay are 87.75%, 93%, 92% and 98.38% respectively. It was also concluded that these both methods were dependent on pH of the wastewater. |

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| **Project Title:** | **Energy Recovery and Treatment Of Slaughter House Wastewater Using Anaerobic Digestion Coupled with Combined Chemical Electro Coagulation Technique** |
| **Students:** | Jalwa Nawaz (15-ENV-33). Saba Shahid (15-ENV-38). Aleena Naeem (15-ENV-58) |
| **Supervisor:** | Dr. Sadia Nasreen, Assistant Professor |
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| **Abstract:** | The objective of this investigation was to optimize and evaluate the bioenergy production potential and COD removal efficiency of residual matter in anaerobic digester from slaughterhouse wastewater by using the combined chemical coagulation (using polyaluminum chloride (PACl) as coagulant) electro-coagulation technique (using aluminum electrodes). The performance of the lab scale anaerobic digester was evaluated at organic loading rate under mesophilic environmental conditions (29oC ± 1.40oC). Experimentation showed the COD removal efficiencies and methane yield of lab scale anaerobic digester in the ranges of 58.92 to 94.54% with the maximum volumetric production of 0.158 ±0.17m3/day. The proposed system is efficient enough to cater not only the high strength slaughterhouse wastewater, but it will also act as a source of generating bioenergy. Consequently, combined processes are inferred to be superior to electro-coagulation alone, for the removal of both organic and inorganic compounds from slaughterhouse wastewater. |

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| **Project Title:** | **Assessment of biogas energy potential of Refinery Sludge, Rice Husk and Cow Dung through Anaerobic Digestion** |
| **Students:** | Khuram Shoukat (15-ENV-20), Adil Shahzad (15-ENV-43) & Faisal Hussain Shah (15-ENV-62) |
| **Supervisor:** | Engr. Bilal Asif, Lecturer |
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| **Abstract:** | The increasing amount of refinery sludge and agriculture waste are the major contributor towards environmental degradation. The purpose of this study was to assess the energy potential of biogas through anaerobic digestion of refinery sludge, cow dung and rice husk by a batch experiment. The substrate was Refinery sludge which was collected from oil refinery. The inoculum (Rice Husk and Cow Dung) were mixed in the ratio of 60% and 40% respectively. The biogas production increased with the increase in temperature. During this experiment higher biogas production was observed on daily basis from the reactors due to the synergistic effect. Highest biogas yield of 9.4kg was observed from substrate to inoculum ratio 1:1 at 45°C. Overall it may be concluded that refinery sludge and rice husk were the major issues in environment and can be utilized as renewable energy resource. The digestate obtained after anaerobic digestion offers fertilizer material, also reduces odor and pathogens. |

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| **Project Title:** | **Treatment of Pharmaceutical wastewater by using Activated Sludge Process followed by Fenton Process – A Hybrid Treatment Strategy** |
| **Students:** | Muhammad Umair (15-Env-07)  Hafiz Faisal Ameen (14R/15-Env-15)  Shahzaib Tabassum (14R/15-Env-82) |
| **Supervisor:** | Engr. Abaid Ullah, Lecturer |
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| **Abstract:** | Pharmaceuticals refer to a large and diverse group of compounds, which are used to prevent and cure diseases, and ultimately improve human health. However, their existence not only disturbs aquatic biota but also have indirect impacts on human health. Therefore, the removal of these recalcitrant pharmaceutical compounds from industrial wastewaters has been a great concern worldwide.  Micropollutants present in such wastewater contribute majorly towards Chemical Oxygen Demand (COD). This study aims to treat pharmaceutical wastewater by using hybrid treatment strategy involving Activated Sludge Process followed by Fenton process. Results highlighted that the proposed treatment strategy is efficient and reliable for safe disposal of pharmaceutical wastewater. Chemical Oxygen Demand (COD) was found to be a major contributor  This study would be of great interest for upcoming researchers, wastewater treatment practitioners and designers.  **Keywords**- Pharmaceutical Wastewater Treatment; Biological Treatment; Chemical Treatment; Activated Sludge Process; Fenton Process. |

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| **Project Title** | **Removal of Biodegradable & Non-biodegradable Dyes from Textile Wastewater by Integrated Rotating Biological Contactor and Fenton Process.** |
| **Students** | Talha Saleem (15-ENV-35), Ridha Batool (15-ENV-55), Maria Yasmeen (15-ENV-61) |
| **Supervisor** | Engr. Sadia Fida |
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| **Abstract** | Textile wastewater contains substantial pollution loads in terms of color, COD, BOD, TSS and heavy metals. Color removal, especially from textile wastewaters has been a big challenge. To address these problems, a lab scale integrated biochemical system (Rotating Biological Contactor and Fenton Process) was designed. The synthetic textile wastewater was simulated with known concentration of nutrients and a mixture of three commercially available reactive dyes for various treatment parameters (BOD, COD, and color). A microscopic study was conducted to observe the development of biofilm on RBC discs at optimized HRT and organic loading. A 35% solution of Hydrogen Peroxide (H2O2) and Ferrous Sulphate (FeSO4) were used as reagents in the Fenton Process. The removal efficiencies of color, BOD and COD obtained from integrated biochemical system were 92.69%, 96.06%, 85.46% respectively.  **Keywords:** Textile Wastewater, Dye Removal, Rotating Biological Contactor, Biofilm Development, Hydraulic Retention Time |

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| **Project Title:** | **Optimization of Thermo-Catalytic Depolymerization Of Plastic Waste to Increase the Derived Fuel Yield** |
| **Students:** | Nadeem Malik (15-ENV-09), Sidra Parveen (15-ENV-24), Hassaan Bin Fazal Hussain(15-ENV-52) |
| **Supervisor:** | Engr. Sadia Fida (Lecturer) |
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| **Abstract:** | The increase in plastic production leads to serious threats to the environment. Due to its non-biodegradable nature it cannot be easily disposed off. Recently new technologies are being used to treat the waste plastic, one is pyrolysis. This research involves study of process optimization to produce liquid fuel by the thermo-catalytic pyrolysis of different plastics waste such as (PP), (PE), (PS) and PET bottles using zeolite and slica alumina as catalyst in a laboratory batch reactor. The key parameters which were optimized included temperature, residence time, catalysts to feed ratio and heating rate. Through optimization it was found that maximum oil yield is at 450℃, heating rate of 20℃/min, residence time of 75 min and catalyst to feed ratio of 4:1.Under these conditions 85% of the feed plastic was converted into liquid fuel, which after distillation can be used as petrol or diesel.  **Key words:** Solid waste**,** Non-biodegradability, Pyrolysis, Optimization. |

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| **Project Title:** | **Production of Hydrochar through Hydrothermal Carbonization of Biomass.** |
| **Students:** | Safeer ul Islam Hashmi (15-ENV-29), Zainab Abbasi (15-ENV-46), Sohail Akram Basra (15-ENV-56) |
| **Supervisor:** | Engr. Babar Abbas, Lecturer |
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| **Abstract:** | An estimated 1.3 billion tons of food, or roughly 30 percent of global production, is lost or wasted annually, according to the UN Food and Agricultural Organization (FAO). Out of this global food waste statistics, 40% is wasted only in Pakistan. 36 million tons of food waste is generated in Pakistan, every year. Moreover, there is no proper disposal and recycling plan for the generated food waste throughout the country.  Different techniques are used to convert the organic waste into reusable end products or completely degrade them. Some of these technologies include composting, incineration, pyrolysis, fermentation etc.  Apart from these techniques, hydrothermal carbonization **(HTC)** is a thermal conversion technique that converts food wastes to a valuable, energy-rich resource. During Hydrothermal Carbonization, the biomass undergoes different reactions and is converted into hydrochar, which can be used for many applications such as fuel in existing coal-handling infrastructure, soil remediation, fertilizer, adsorbent etc. |

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| **Project Title:** | **Study of Membrane Fouling in Membrane Bio**  **Reactor** |
| **Students:** | Muhammad Asim (15-Env-03)  Ali Raza (15-Env-59) |
| **Supervisor:** | Engr. Babar Abbas |
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| **Abstract:** | Water is a valuable reserve for the endurance of mankind, but we are losing it every day. We can conserve or recharge our ground water by using treated wastewater as an alternative water resource or recharging the ground water respectively. The conventional methods to treat the wastewater are not meeting the recent discharge standards. Eliminating the process of sedimentation, the membrane bioreactor (MBR) is well organized way of treating wastewater by the combination of biological processes and membrane technology. However, there are limitations which restricts its applicability i.e. membrane fouling and energy consumption etc. current study focuses on investigating the fouling behavior which us mainly due to increasing flux demand and lack of backwashing and proper relaxation modes in MBR. Therefore, optimization of these parameters was studied: (1) Flux (2) Backwashing (3) Relaxation patterns and (4) operational energy analysis. |

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| **Project Title:** | **Characterization and Physicochemical Treatment of Pharmaceutical Wastewater – A Case Study of Medicine Manufacturing Sector** |
| **Students:** | Aliza Qayyum (15-ENV-41) , Sonia Abid Bhatti (15-ENV-47) & M. Mamoon (15R/14-ENV-80) |
| **Supervisor:** | Engr. Abaid Ullah, Lecturer |
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| **Abstract:** | Recalcitrant compounds present in pharmaceutical wastewater are hazardous in nature, which pose detrimental effects on environment and human health. Current research aims to remove these compounds through sustainable and cost-effective physicochemical treatment process. For this purpose, adsorption column has been installed followed by coagulation-flocculation. Natural bio-adsorbents and bio-coagulants have been used in respective treatment units. Results inferred that among adsorbents natural clay, Potato-Peel Activated Carbon, Rice-Husk Activated Carbon and Commercially available Activated Carbon gave best results in the form of composite adsorbents with 72% COD removal, and among coagulants Chickpea, Peanut-shell, Sago Starch gave best results in the form of composite coagulants with 85.8% COD removal. The overall COD removal achieved by the proposed treatment assembly came out to be 95% after both treatment units. The proposed treatment mechanism has a tremendous potential for its practical application in low-resource countries, where expertise and finance bearing capacity is usually limited. |

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| **Project Title:** | **Designing and Performance Optimization of Lab Scale Wet Flue Gas Desulfurization Unit** |
| **Students:** | Fatima Zahid (15-Env-08), Saman Malik (15-ENV-28), Ayesha Bibi (15-ENV-37) |
| **Supervisor:** | Engr. Bilal Asif, Lecturer |
| **Email:** | [Bilal.asif@uettaxila.edu.pk](mailto:Bilal.asif@uettaxila.edu.pk) |
| **Abstract:** | Emission of sulfur dioxide from both natural and anthropogenic sources strongly influences the chemistry of atmosphere. The wet limestone flue gas desulfurization in coal-fired plants has been the most widely used because of its high SO2 removal efficiency, reliable and low utility consumption. Keeping in mind the stack emissions having higher concentrations of sulfur dioxide in the flue gas, a more efficient lab scale desulfurization unit was proposed. The SO2 was removed by absorption and during reaction with limestone slurry. All the physical and chemical processes like limestone dissolution, crystallization of calcium sulfite and gypsum have been taken into account for the development of working model while gas absorption by liquid droplets was based on nozzle diameter. The optimum residence time of 16 hours was provided for attaining gypsum as by-product. The model is preferred for its optimized removal efficiencies and lower cost than the previously existing plants.  **Key Words:**  Flue Gas Desulphurization, SO2 Emissions, Lime stone Slurry |

*THE END*