

Photocatalytic Reduction of Nitrobenzene Over Silver Doped TiO₂ Under Solar Light

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The liquid-phase reduction of nitrobenzene is investigated under solar light in deaerated conditions at atmospheric pressure, room temperature in a batch reactor in acetonitrile as well as in aqueous medium. The effect of nitrobenzene concentration, metal content, amount of photo catalyst, sustainability and pH role have been investigated. The product analyzed showed aniline with a maximum yield of 65 %. The prepared catalysts are characterized by XRD, UV-DRS, TEM, SEM and SEM-EDAX.

Decolourisation Studies in Direct Dyes Effluent Using Fungi-*Phanerochaete chrysosporium* and *Aspergillus niger*

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Decolourisation studies in direct dyes effluent was carried out with fungi – *Phanerochaete chrysosporium* and *Aspergillus niger*. The lignolytic enzymes of *Phanerochaete chrysosporium*, due to their oxidative mechanism are responsible for the bio-degradation of unexhausted dyes molecules of the effluent into simple colourless moieties, whereas, *Aspergillus niger* probably decolourise the effluent due to biosorption and extra cellular fungal activity. The studies are made with three different coloured direct dyes, that is direct red 28, direct yellow 12 and direct blue 1.

Removal of Gentian Violet Dye With and Without Commercial Activated Carbon by Electro Coagulation Technique - A Comparison

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Present study deals with the comparison of electro coagulation treatment of colour and dye with and without commercial activated carbon (CAC) and determination of optimum conditions for the removal of gentian violet (GV) from water. This study has its own application in the removal of gentian violet (GV) from industrial effluents. Experimental results will be highly useful

in designing the effluent treatment plant, for the removal of dyes. Percentage of removal of gentian violet (GV) is found to increase with decrease in initial concentration and initial pH. Percentage removal of GV is found to increase with increase in electrolyte concentration, treatment time and voltage. Percentage removal of GV in presence of CAC is more than without CAC in this study. It is concluded from the results of present study, that the electro coagulation in presence of CAC could be used for the removal of gentian violet (GV) from wastewater. Electro coagulation in presence of CAC is useful for the treatment of textile effluent for the removal of colour and dye.

Wastewater Management in Textile Sector

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Water quality is an issue of major concern across many regions in India. Unsafe disposal of effluents generated from various industries aggravates the problem by further deteriorating the quality of water bodies. This paper describes a case study of wastewater management in a textile sector. Due to very high consumption of water and, therefore, generation of high quantities and of very poor quality effluents, textile sector is known for its high water polluting nature. The sector chosen for the study is Balotra in Barmer district of Rajasthan where there are nearly 800 units involved in textile dyeing, printing, washing, etc. The untreated wastewater is getting disposed in the river Luni and degrading its quality. After the preliminary study of the area, it has been decided to install 3 common effluent treatment plants (CETPs) in the region to treat different types of wastewater generated from different sub-pockets in the region. The feasibility analysis for the treatment plant has been carried out and estimation of expected environmental benefits has been made. Participation of industrial community was ensured by conducting waste minimization workshops. This overall assessment of the wastewater management issues for Balotra, can provide useful insights in the development of the wastewater management plan for the other textile clusters as well.

Acclimatization of Microbial Consortia for Biosorption/ Bioaccumulation of Some Metallic Contaminants in a Soil Perfusion System

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Soil and water samples were collected from disposal site of an electroplating industry in grab mode for adaptation/ acclimatization of mixed microbial population for removal of some metallic contaminants. Actual wastewater was diluted with settled sterilized sewage effluent in different proportion (10 to 100%, v/v) for perfusing the soil column for various experimental runs. Metallic ions, that is Fe, Cu, Co, Cr (total), Cd, Zn, biomass and microbial counts were monitored in various samples of different experimental runs. Removal of

metallic ions of interest was observed in the range between 33.66 to 70.33% (\bar{x} 50.87%, $s=10.76$). Removal of individual metal was observed in following manner: 53.84% of Fe^{3+} (mean value $\bar{x}=67.57\%$ and standard deviation $s=14.08$), 31.74% of Cu^{2+} ($\bar{x}=46.28\%$, $s=15.78$), 17.65% of Co^{2+} ($\bar{x}=45.4\%$, $s=21.55$), 15.65% of Cr (total) ($\bar{x}=45.7\%$, $s=16.8$), 15.85% of Cd^{2+} ($\bar{x}=52.57\%$ $s=25.05$) and 30.75% for Zn^{2+} ($\bar{x}=47.71\%$, $s=15.41$). In all the experimental runs, biomass production was ranged between 188-1439 mg/L ($\bar{x}=561.71$ mg/L dry weight basis, $s=439.64$). Pattern of biomass production exhibits decreasing trend as the concentration of industrial effluent increases in the perfusion system. Existence of developing/acclimatizing microflora in perfusion column was estimated qualitatively as well as quantitatively. Due to increasing concentration of industrial effluent, microbial count was reduced to 186 CFU/mL from initial 4299 CFU/mL (average of PDA and NA count). Mixed microflora was further screened for obtaining pure isolates. Morphological, biochemical and microscopic examinations indicate the presence of *Candida tropicalis*, *Rhizopus stolonifer*, *Aspergillus nidulans*, *Trichoderma viridae*, *Phoma gardinicola*, *Pseudomonas putida* and *Bacillus licheniformis*, etc., as predominant isolates in the acclimatized mixed microbial consortia.

Hexavalent Chromium Removal Using A Low-Cost Activated Carbon Adsorbent From *Areca catechu*

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Removal of heavy metals from industrial wastewater is of primary importance because they are not only causing contamination of water bodies and are also toxic to many life forms. In recent years various heavy metals are removed from solution using natural low cost adsorbents which are economically viable. The present study is aimed at removing hexavalent chromium from aqueous solution using activated carbon from *Areca catechu*. The effect of variation of initial concentration of Cr (VI) solution, variation of pH and dosage of adsorbent on the adsorption potential of Cr(VI) have been studied. The results of the study have been interpreted in terms of Langmuir adsorption isotherm and Freundlich adsorption isotherm. The adsorption of Cr (VI) onto activated carbon from *Areca catechu* was found to be concentration dependent. The maximum removal of Cr (VI) was observed at pH 2. The adsorption Cr(VI) using activated carbon prepared from the *Areca catechu* shell followed Langmuir and Freundlich adsorption isotherms.

Acute Toxicity of Pulp-Paper Mill Effluent to Zebrafish

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Toxicity assessment is an important aspect in wastewater quality monitoring, as it provides complete response of test organism to all component of wastewater. Toxicity of the effluent from 5 pulp-paper mill (Pp1–Pp5) was evaluated in an acute toxicity study using zebrafish (*Danio rerio*) bioassay. Toxicity test results revealed 48 hr LC₅₀ values >100 for Pp1 and Pp5. For Pp3 and Pp4 it was 70.71%. Pulp-paper mill effluent (Pp2) showed varying acute toxicity (LC₅₀), namely 70.71, >100 and 35.35% for 1st, 2nd and 3rd round of sampling. The linear regression analysis reflected statistical significance between exposure concentration and mortality of fish (≥ 0.89 to 0.99) for pulp-paper mill effluents (Pp2, Pp3, Pp4). The linear correlation (R²) was high (≥ 0.99) except for the effluent sample (Pp1 and Pp5) having no toxicity. General criteria of toxicity classification revealed that out of 5 paper mill effluents tested 3 were minor acutely toxic having 48 hr LC₅₀ in between >35.35–70.71% and 2 was not acutely toxic (>100%). The toxicity classification based on toxic unit (TU) also showed similar result. Of the 15 effluent samples tested 7 were toxic and 8 were non-toxic. Thus 46.6% samples were toxic and 53.4% as non-toxic. Result of this study also suggested that zebrafish bioassay is a sensitive method for evaluating the aquatic toxicity of pulp-paper mill effluents.

Performance Evaluation of Delawas Sewage Treatment Plant at Jaipur, Rajasthan

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The paper presents the results of performance evaluation study of Delawas sewage treatment plant (DSTP), Jaipur which is designed to treat the sewage flow of 62.5 MLD. The sewage collection and conveyance is done under gravitational flow. The plant consists of screens, grit chamber, primary clarifier, activated sludge process, secondary clarifier, sludge digester and gas collection units. Also the salient features of the plant and characteristics of sewage and effluent after treatment are presented along with discussion and conclusion. The quality of the effluent from the plant is of much higher quality than prescribed for agriculture. The total gas generated from the plant if utilized for power generation, it is expected to generate 500 Kw electric power also 80 tonne manure from sludge can be produced daily in the plant once fully operated.

Water Quality Modeling and Management of Seer Stream in Lower Himalayas

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This paper deals with water quality status in Seer stream over a stretch of 5 km for variable, like biochemical oxygen demand (BOD) and dissolved oxygen (DO), etc. One dimensional water quality model stream – I was used in the study. The study shown that summer season is the most critical period when stream is having very less discharge. The various management options to treat wastewater of the stream have been discussed to maintain the water quality in the stream is within the prescribed standards.
