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Abstract

Effluent stream containing dye can be considered to be one of the prime sources of water pollution. Adsorption technique, using activated carbon (AC) as an adsorbent can effectively remediate this pollution. Renewable precursors such as agro-waste and carbon rich industrial waste are aspiring alternatives for preparation of the carbon. In this research work, three abundantly available agro-wastes, millet cob husk, empty cotton boll, mustard husk were selected for the preparation of AC by single step chemical activation method. The preparation parameters such as activation temperature, impregnation ratio and holding time were optimized by Response Surface Methodology (RSM). The prepared ACs from all three agro-wastes at optimum condition were used for batch and column adsorption study for the removal of methylene blue and reactive orange 84 dyes. Experimental results showed that all three prepared ACs exhibited adequate adsorption capacity as well as regenerative nature. The techno-economic assessment was carried out for a chemical plant producing AC from selected agro-waste. Thus, ACs obtained from agro-wastes have a high potential to be used as an adsorbent for treatment of dye containing wastewater. This PhD Thesis would be useful for readers working in the area of industrial waste remediation.

List of Publications:

- [1]. **Samir Charola**, Himanshu Patel, Shivam Chandna, Subarna Maiti, Optimization to prepare porous carbon from mustard husk using response surface methodology adopted with central composite design. **Journal of Cleaner Production**, (Elsevier), 223, (2019), 969-979, doi.org/10.1016/j.jclepro.2019.03.169, (IF - 6.395).
- [2]. **Samir Charola**, Rahul Yadav, Prasanta Das, Subarna Maiti, Fixed-bed adsorption of Reactive Orange 84 dye onto activated carbon prepared from empty cotton flower agro-waste. **Sustainable Environment Research**, (Elsevier), 28(6), (2018), 298-308, doi.org/10.1016/j.serj.2018.09.003, (IF - 1.152).
- [3]. **Samir Charola**, Prasanta Das, Subarna Maiti Dye adsorption using low cost carbon adsorbent from agrowaste-pearl millet cob husk. **Indian Journal of Chemical Technology**, (CSIR), 26, (2019), 35-43, (IF – 0.641).