
Utilization of Biochar Produced from Pomegranate Peels for the Effective Adsorption of Dyes in Water

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Abstract – In this work, a low-cost and efficient biochar was prepared from pomegranate peels (PP) and used adsorbent for cationic dyes, namely, Crystal Violet (CV) and Methylene Blue (MB). The Biochar (PP-biochar) was characterized using FTIR, XPS, BET, SEM and pH_{PZC} analysis, and the batch experiments were carried out for the both cationic dyes.

First of all, the results showed that PP-biochar with CV exhibits highly porous structure ($S_{BET}=508.9 \text{ m}^2/\text{g}$, $V_T=0.19 \text{ cm}^3/\text{g}$) with even distribution between micropore (50.8%) and mesopore (49.2 %) volume. The pH_{PZC} value of the prepared biochar was 6.42. In the other side, the adsorption kinetics data were well described by the pseudo-second order and Avrami models. The maximum adsorption capacity of Langmuir (Q_{max}^0) for the CV and MB dyes was found to be 201.2 and 320.6 mg/g, respectively (in the single system). The finding suggest that the developed biochar is of promising potential to be applied as eco-friendly material for removing dyes from wastewater.

Keywords: pomegranate peels, biochar, dyes, adsorption, water.