

Adsorption Performance of Hydroxyapatite Powder in the Removal of Dyes in Wastewater

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Abstract : This study assessed the efficiency of Hydroxyapatite Powder (HAP) in the removal of dyes in wastewater in comparison with Commercial Activated Carbon (CAC). This was with a view to developing cost effective method that could be more environment friendly. The HAP and CAC were used as adsorbent while Indigo dye was used as the adsorbate. The batch adsorption experiment was carried out by varying initial concentrations of the indigo dye, contact time and adsorbent dosage. Adsorption efficiency was classified by adsorption Isotherms using Langmuir, Freundlich and D-R isotherm models. Physicochemical parameters of a textile industry wastewater were determined before and after treatment with the adsorbents. The results from the batch experiments showed that at initial concentration of 125 mg/L of adsorbate in simulated wastewater, 0.9276 ± 0.004618 mg/g and 3.121 ± 0.006928 mg/g of indigo adsorbed per unit time (qt) of HAP and CAC respectively. The ratio of HAP to CAC required for the removal of indigo dye in simulated wastewater was 2:1. The isotherm model of the simulated wastewater fitted well to Freundlich model, the adsorption intensity (1/n) presented 1.399 and 0.564 for HAP and CAC, respectively. This revealed that the HAP had weaker bond than the electrostatic interactions which were present in CAC. The values of some physicochemical parameters (acidity, COD, Cr, Cd) of textile wastewater when treated with HAP decreased. The study concluded that HAP, an environment-friendly adsorbent, could be effectively used to remove dye from textile industrial wastewater with added advantage of being regenerated.

Keywords : adsorption isotherm, commercial activated carbon, hydroxyapatite powder, indigo dye, textile wastewater

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