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Removal of Copper and Cadmium from industrial effluents using the mixed adsorbent in batch study

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Abstract : The present work researches the removal of Cu & Cd ions using mixed adsorbent prepared by blending activated charcoal and bone charcoal in 1: 1 ratio for batch and continuous flow operation. The adsorption mechanism follows a chemisorption process due to the synergistic effect associated by contribution of high surface area from the activated charcoal (1600 m^2/g) and negative charge from the bone charcoal. The potential capacity of the mixed adsorbent as a minimal effort material for the removal of Cu (II) and Cd (II) from the prepared synthetic metal ion solution was studied by optimizing various parameters in the batch study. The batch adsorption studies have been carried out for 2 hours considering all the 6 parameters by optimizing each of them. The effect of pH, temperature, initial metal concentration, agitation rate, adsorbent dose and contact time were studied with respect to reaction time until the achievement of equilibrium. The maximum removal for Cu (II) is 97.21% and Cd (II) is 78.76% obtained at 2 hrs for pH 6. The % removal for Cu varies from 87.16 to 99.74% at an adsorbent dosage of 5 g, pH 6, initial metal ion concentration of 50 mg/l, with an agitation rate of 180 rpm, and at a temperature of 25°C. Similarly for Cd (II) it varies from 70.23 to 88.4% at 5 g respectively at the same operating conditions.

Keywords: Activated charcoal, Bone charcoal, mixed adsorbent, Agitation rate, Metal ion Concentration, Contact time, adsorbent dosage.

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