Optimization of Adsorption Performance of Lignocellulosic Waste Pretreatment and Chemical Modification

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Abstract : In this work, we studied the effectiveness of a lignocellulosic waste (wood sawdust) for the removal of cadmium Cd (II) in aqueous solution. The adsorbent material SBO-CH2-CO2Na has been prepared by alkaline pretreatment of wood sawdust followed by a chemical modification with sodium salt of chloroacetic acid. The characterization of the as-prepared material by FTIR has proven that the grafting of acetate spacer took actually place in the lignocellulosic backbone by the appearance of characteristic band of carboxylic groups in the IR spectrum. The removal study of Cd2+ by SBO-CH2-CO2Na material at the solid-liquid interface was carried out by kinetics, sorption isotherms, effect of temperature and thermodynamic parameters were evaluated. The last part of this work was dedicated to assess the regenerability of the adsorbent material after three reuse cycles. The results indicate that SBO-CH2-CO2Na matrix possesses a high effectiveness in removing Cd (II) with an adsorption capacity of 222.22 mg/g, yet a better value that those of many low-cost adsorbents so far reported in the literature. The results found in the course of this study suggest that ionic exchange is the most appropriate mechanism involved in the removal of cadmium ions.

Keywords : adsorption, cadmium, isotherms, lignocellulosic, regenerability
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