Removal of Cu$^{2+}$ from the aqueous solution by tartrate-intercalated layered double hydroxide

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Received 25 April 2014; Accepted 24 October 2014

ABSTRACT

The tartrate-intercalated MgAl layered double hydroxide (MgAl-TA LDH) was prepared by ion-exchange method at the acid solution using MgAl-CO$_3$ LDH as the precursor. The adsorption of Cu$^{2+}$ on MgAl-TA LDH was studied and some influence factors such as contact time, initial Cu$^{2+}$ concentration, adsorbent dosage, solution pH, and adsorption temperature were investigated. Three kinds of adsorption isotherms (Langmuir model, Freundlich model, and Redlich–Peterson model) were investigated; the results indicated that equilibrium was well described by Langmuir isotherm, predicting the adsorption of Cu$^{2+}$ on MgAl-TA adsorbents was a monolayer adsorption. The equilibrium kinetic adsorption data were fitted to the pseudo-second order kinetic equation. Furthermore, the adsorption of Cu$^{2+}$ was controlled mainly by chemical process combined with intra-particle diffusion. Parameters of adsorption thermodynamic suggested that the interaction of Cu$^{2+}$ adsorbed by MgAl-TA LDH adsorbents was spontaneous and endothermic.

Keywords: Layered double hydroxide; Hydrotalcite; Adsorption; Heavy metal ion; Regeneration

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