Removal of copper ions from aqueous solutions by a new sorbent: Polyethyleneiminemethylene phosphonic acid

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Abstract :

The sorption of copper(II) from sulphate medium on an extractant polymer containing phosphonic acid has been studied in batch mode. Since the extraction kinetics were fast, with a mixture of 0.01 g of extractant and 5 mL of copper(II) 31.75 mg/L solution, extraction equilibrium was reached within 20 min of mixing. The sorption process follows a pseudo-second-order kinetics. The influence of some parameters such as initial copper(II) ion concentration, initial pH of aqueous solution, ion strength and copper salt nature on the amounts of Cu(II) sorbed with the phosphonic acid polymer have been studied at fixed temperature (25 ± 2 °C). The optimum pH value level for quantitative sorption was between 4.5 and 5.9. The sorption capacity of the phosphonic acid polymer is 85.69 mg/g. Adsorption equilibrium data were calculated for Langmuir and Freundlich isotherms. It was found that the sorption of Cu(II) was better suited to the Langmuir adsorption model than the Freundlich adsorption model. The effects of anions on Cu(II) sorption were dependent on anion types and were apparently related to the altered surface properties caused by anion adsorption and/or the formation of anion Copper(II) complexes. Regeneration of the new extractant was realized by washing in medium acidic media.

Keywords : Phosphonic acid; Copper(II); Adsorption; Removal; Isotherms.

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