

## Rapid removal of Cu(II) ion by chemically modified rubber wood fiber.

### ABSTRACT

This article describes a study of the adsorption conditions of Cu(II) ions onto polyacrylamide-grafted rubberwood fiber. Preparation of the adsorbent was carried out via graft copolymerization of acrylamide (Am) onto rubberwood fiber (RWF), using ceric ammonium nitrate as an initiator. Fourier transform infrared spectroscopy was used to confirm the formation of PAm-g-RWF. Various variables affecting the adsorption capacity such as pH of the solution, adsorption time, initial metal ion concentration, and temperature were investigated. Cu(II) was removed by PAm-g-RWF up to 92% from an initial concentration of 10 mg/L at pH 6.0. Kinetic adsorption data can be described by the second-order equation. Equilibrium parameters for adsorption isotherms of the metal ions on the grafted fiber were obtained using the Langmuir and Freundlich models, and the Langmuir model was found to be in better correlation with the experimental data with a maximum adsorption capacity of 142.85 mg/g. Thermodynamic parameters such as enthalpy change ( $\Delta H^\circ$ ), free energy change ( $\Delta G^\circ$ ), and entropy change ( $\Delta S^\circ$ ) were calculated; the adsorption process was spontaneous and endothermic. The results showed that PAm-g-RWF developed in this study could be an economical and effective adsorbent for application in removal of copper ions from water and wastewater.

**Keyword:** Rubberwood fiber; Cu(II) adsorption; Kinetics; Isotherm; Thermodynamic.