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Preparation of Amino Functionalized Polymeric Resins for Selective Removal of Copper Ions

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Polymeric resins with different copolymeric matrices viz., acrylonitrile/divinylbenzene/vinylbenzyl chloride (AN/DVB/VBC), styrene/divinylbenzene/vinylbenzyl chloride (ST/DVB/VBC), vinylbenzyl chloride/divinylbenzene (VBC/DVB) have been prepared by suspension polymerization. The polymeric matrices were functionalized with ethylenediamine (ED) and were employed as sorbents for the removal of copper ions from aqueous solution by the batch sorption method. Synthesized resins were characterized using FTIR, elemental analysis, DSC, BET surface area and SEM with EDAX analysis. The influences of pH, effect of contact time, interfering of common ions, selectivity of other metal ions and temperature on the amount of copper sorption by the modified resins were studied. AN/DVB/VBC-ED resin was found to have excellent copper sorption capacity (CSC) than the other prepared resins. The experimental data fitted well to the Langmuir and Freundlich isotherms. Thermodynamic parameters such as ΔH° , ΔS° and ΔG° were calculated indicating that the sorption was a spontaneous and endothermic. The removal of copper by the resins was mainly governed by chelation mechanism. AN/DVB/VBC-ED resin was effectively regenerated using 0.1 M EDTA and reused for more than 5 cycles.

Key Words : Copper; Ethylenediamine; Chelating resin; Sorption; Isotherms