

ABSTRACT:

Crosslinked polyethylene-graft-polystyrene sulfonic acid (PE-g-PSSA) adsorbent prepared by simultaneous radiation induced grafting of styrene/divinyl benzene (DVB) mixture onto low density polyethylene (PE) film followed by sulfonation was investigated for the adsorption of Co(II), Cu(II), Ni(II), Pb(II) and Ag(I) ions from aqueous solutions on batch process basis. The effects of treatment parameters such as contact time, initial metal ion concentration, pH and temperature of the solution, on the adsorption capacity of the membrane were studied. The adsorption capacity of metal ions were found to be strongly dependent on the initial metal ion concentration and pH of adsorption medium and increased in the order of Ni(II)>Co(II)>Cu(II)>Pb(II)>Ag(I). Langmuir isotherm model was found to be more fitting to the adsorption equilibrium data of all metal ions than Freundlich isotherm model. The adsorption kinetics of all tested metal ions was found to follow the pseudo-first order kinetic model. The membrane showed an interesting stability represented by five repeated adsorption/desorption cycles of heavy metal ions without any significant loss in its adsorption capacity. It can be suggested that crosslinked PE-g-PSSA membrane obtained in this work can be effectively used for the adsorption of heavy metal ions from aqueous solutions and the preference order is Ni(II)> Co(II)>Cu(II)>Pb(II)> Ag(I).