

Synthesis and characterization of radiation grafted films for removal of arsenic and some heavy metals from contaminated water

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Abstract

Grafting of styrene/maleic anhydride and methyl methacrylate/maleic anhydride binary monomers onto the low density polyethylene film was performed using the γ -ray irradiation technique. Then, the synthesized grafted films were treated with different ammonia derivatives for developing chelating functionalization. These chelating products were characterized by the gravimetric method as well as by the Fourier transformed infrared spectroscopic method, and were used for removal of arsenic and some heavy metals from aqueous solutions. The optimum absorbed dose of 30kGy reveals the graft yielding of about 325% in the films. Up take of arsenic and some heavy-metalions (Cr(III), Mn(II), Fe(III), Ni(II), Cu(II) and Pb(II)) from contaminated water by the chelating functionalized films (CFF) was examined by an atomic absorption spectrophotometer. The maximum arsenic removal capacity of 5062mg/kg has been observed for the film treated with hydroxylamine hydrochloride. The CFF prepared by semi- carbazide and thiol analogs show affinity toward the metal ions with an order: Cu(II) > Fe(III) > Mn(II) etc. The results obtained from this study indicate that the functionalized films show good chelating and ion-exchange property for metal ions.

Keywords: γ -Ray, Grafted membranes, Maleic anhydride, Heavy metal, Chelating property