Synthesis, characterization, morphology and adsorption performance towards Cu^{+2} ions of nano-sized homopolymers of *o*-aminophenol poly(*o*-AP)

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Abstract

Nanostructures with different particles size of homopolymer o-aminophenol poly(OAP) were synthesized by redox polymerization initiated by $FeSO_4.7H_2O$ as redox initiator and ammonium peroxydisulfate (APS) as an oxidant in different concentrations of aqueous solutions of hydrochloric acid. The influence of synthetic parameters such as acid concentration and the presence of redox initiator were investigated. The morphology and particles size were studied by transmission electron microscope (TEM) and scanning electron microscope (SEM). The results showed that the morphology and average particle size of polymeric nanoparticles according to SEM and TEM analyses were different based upon the conditions of the polymerization. The physico-chemical characterization of the prepared nanoparticles was carried out by Fourier transform infrared spectroscopy (FT-IR) and X-ray powder diffraction (XRD). Which FT-IR confirmed the structure of poly(OAP) nanoparticles in emeraldine form. The molecular weight was determined by gel permeation chromatography (GPC). The surface area of nanopolymer particles was determined also by Brunauer-Emmett-Teller (BET). The competition of the prepared nano-sized homopolymers particles towards the adsorption of copper

ions from aqueous solutions was investigated. The results showed that the adsorption capacity was based on particle size of nanopolymers and their surface area. The adsorption capacity increased with decreasing the particle size. On the other hand the adsorption capacity increased with increasing the surface area of the prepared nano-sized homopolymers of poly(OAP).

Keywords: Polymeric nanoparticles (PNPs), homopolymerizetion, o-aminophenol, ammonium peroxydisulfate (APS), $FeSO_4.H_2O$, adsorption.