Synthesis, characterization, morphology and adsorption performance towards Cu^{+2} ions of nano-sized copolymers of anthranilic acid and *o*-phenylenediamine poly(AA-co-*o*-PD)

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Abstract

Nanorodes, nanosheets, nanospheres and nano-amorphous shape with different particles size of copolymer of anthranilic acid with *o*-phenylenediamine poly(AA-co-*o*-PD) were synthesized by redox polymerization initiated by $FeSO_4.7H_2O$ as redox initiator and ammonium persulfate (APS) as 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 resulted showed that the morphology and average particle size of polymeric nano particles according to SEM and TEM analyses were different based upon the conditions of the copolymerization. The physico-chemical characterization of the prepared nanoparticles was carried out by Fourier transform infrared spectroscopy (FT-IR), X-ray powder diffraction (XRD). Which FT-IR confirmed the structure of poly(AA-co-*o*-PD) nanoparticles in emeraldine form. The molecular weight was determined by gel permeation chromatography (GPC). The surface area of nanocopolymer particles was determined also

by Brunauer-Emmett-Teller (BET). The competition of the prepared nano-sized copolymers particles towards the adsorption of copper ions from aqueous solutions was investigated. The results showed that the adsorption capacity based on particle size of nanocopolymers 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 copolymers of poly(AA-co-*o*-PD).

Keywords: Polymeric nanoparticles (PNPs), copolymerizetion, anthranilic acid, *o*-phenylenediamine, ammonium persulfate (APS), $FeSO_4.7H_2O$ and adsorption.