Study of the Processes of Purification of Aqueous Media From Arsenic Ions Using Membrane Sorbents

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In this work, a comparative study of chemical template synthesis of Cu microtubules in PET template was carried out using environmentally friendly non-toxic reducing agents, namely ascorbic acid, glyoxylic acid and dimethylaminborane. Two plating solutions with pH values of 12.65 and 13.49 were used for copper plating using Gly. It was shown that the specific copper deposition rate increased 15-fold by increasing the pH of the solution. After 45 seconds of deposition, tubular copper nanostructures with wall thicknesses of 31.6 and 103.9 nm were formed. X-ray diffraction analysis of the crystalline structure and phase composition of the samples showed that when DMAB was used as the copper reducing agent, two phases were formed, the crystalline copper and Cu2O-courite phases. When Asc is used as a reducing agent, 10-15 nm monolayer of copper nanoparticles is formed in the template structure. The sorption removal of arsenic ions from aqueous solutions by different types of composites (Cu_CHOH@PET, Cu_DMAB@PET, Cu_Gly@PET, Cu_Asc@PET) was studied. In all sorption experiments, the pH effect on the removal efficiency of As (III) was investigated and the values of the equilibrium sorption capacities of the sorbents were calculated. It was determined that adsorption followed pseudo-second-order kinetics, and the adsorption rate constants were calculated. Obtained results show that copper plating solutions based on environmentally friendly reducing agents, especially ascorbic acid, can be as effective as, or even more than, conventional formaldehyde reducing agent, as well as provide a greener and more sustainable way to remove toxic arsenic (III) ions from water.

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