The Assessment of Polyethyleneimine Assisted Composite Cryogels for Arsenic [As(III), As(IV)] Removal as Major Groundwater Pollutant

Şahin AKPINAR¹ Ömür ACET² Samet ÖZCAN¹ Fatma GÜRBÜZ¹ Mehmet ODABAŞI²
¹Department of Environmental Engineering/ Aksaray University/Aksaray/Turkey
²Chemistry Department/Faculty of Arts and Science/Aksaray University/Aksaray/Turkey

fatma_gurbuz@yahoo.com
modabasi@aksaray.edu.tr

Aim of the study: Arsenic, one of the common constituents of earth crust, is a carcinogenic and toxic contaminant of groundwater and surface water resources. Especially, groundwater contamination by arsenic remains as a major problem due to adverse health effects around the World. Herein, we have developed polyethyleneimine (PEI) assisted-poly(hydroxyethyl methacrylate-glycidyl methacrylate) [poly(HEMA-GMA)] cryogel composites for removal of arsenic (III and V).

Material and Methods: For this aim, PEI was immobilised onto the cryogels via epoxy groups of GMA, and Fe²⁺ ions lately were attached onto composite cryogels by imine functional groups. Swelling behaviours and scanning electron microscopy (SEM) were performed for characterization of composite cryogels.

Results: For the optimization of experimental conditions, the effects of pH and initial arsenic concentrations on adsorption were studied by synthetic solutions of arsenic. Afterwards arsenic removal tests were carried out with natural groundwater samples which obtained from Anatolia region, prior to column test the arsenic levels were recorded via ICP-QES. The regeneration of arsenic loaded columns was carried out by NaCl solution, adsorption-desorption cycles was performed 15-times successfully only with a loss of %5 in adsorption capacity.

Keywords: Arsenic Removal, Groundwater, PEI Cryogel Composite Column, Regeneration