

Nanocomposites and nanomaterials

Nanocomposites based on biopolymer chitosan and carboxyl-containing silicas for removal and concentration of heavy metal ions

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Nanocomposites carboxyl-contained silica coated by chitosan have been obtained by treatment of mineral carrier with glutaric anhydride followed by adsorption modification with chitosan solution and partial crosslinking of amino groups of the polymer layer with glutaraldehyde. Anchorage of chitosan on the minerals surface and its concentration were confirmed and estimated by physical-chemical methods.

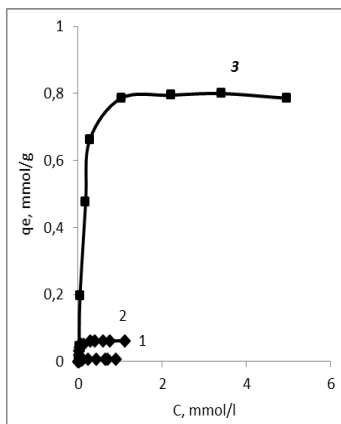


Fig. Adsorption isotherms of Mo(VI) oxoanions on the silica gel (1), aminosilica gel (2) and chitosan-silica composite (3) at pH 2.5.

The synthesized nanocomposite based on chitosan and carboxyl-contained silica gel was found to show better adsorption activity with respect to milligram amounts of toxic metal ions than synthesized nanocomposite based on chitosan and modified silica. In particular, at the pH 2.5 the nanocomposite chitosan-silica gel extracts V(V), Mo(VI) and Cr(VI) oxoanions from a solution composed of acetate ions with maximum adsorption capacity ($q_{\max}$) 0.43, 0.80 and 0.56 mmol/g, whereas the chitosan-silica composite extracts 0.20, 0.25 and 0.04 mmol/g respectively. In neutral medium chitosan-silica gel extracts Fe(III) ions with the $q_{\max}$ 0.17 mmol/g, and at the same conditions chitosan-silica adsorbs 0.13 mmol/g.

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