

Radiation synthesis of 2-aminomethyl pyridine functionalized adsorbent and its application for perrhenate removal

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Perrhenate (ReO_4^-) is the natural analogue of TcO_4^- , which has been widely used to evaluate the adsorption behaviors of radioactive TcO_4^- [1, 2]. Therefore, removal of ReO_4^- has attracted wide attention. Among the separation methods, adsorption is an economic and effective method for ReO_4^- removal. Radiation grafting technology is one of the important means to develop adsorbent. In current work, 2-amino methyl pyridine-based adsorbent (2-AMPR) were synthesized by radiation grafting of glycidyl methacrylate (GMA) onto microcrystalline cellulose microsphere, followed by ring-opening processes with 2-amino methyl pyridine. The prepared 2-AMPR was characterized by micro-FTIR spectra, TGA, XPS analysis and SEM. The adsorption performance of 2-AMPR toward ReO_4^- was investigated. The adsorption of ReO_4^- has been investigated as a function of pH, contact time, metal ion and co-existed ion concentration. 2-AMPR exhibits good selectivity toward ReO_4^- and relative adsorption capacity of 178.57mg/g following a Langmuir model. The results suggested that 2-AMPR is an excellent candidate for radionuclide removal.

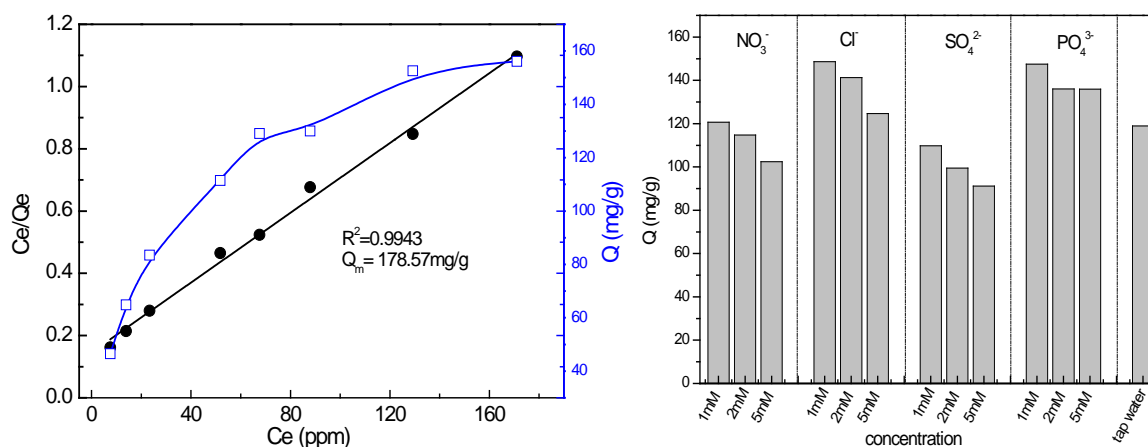


Fig. 1 Adsorption isotherms of ReO_4^- (left) and effect of co-existed anions on adsorption capacity of 2-AMPR (ReO_4^- concentration = 1 mM) (Right).

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[2] A. Milutinovic-Nikolic, D. Maksin, N. Jovic-Jovicic, M. Mirkovic, D. Stankovic, Z. Mojovic, P. Bankovic, , Applied Clay Science, 95, 294-302 (2014).