



Contribution ID: 27

Type: poster

Kinetic and thermodynamic analysis for the absorption of U(VI) on the crosslinked polyester resin with acrylic acid from aqueous solutions

Thursday, 22 September 2011 17:30 (1h 30m)

Uranium and its compounds are highly toxic which causes progressive or irreversible renal injury and in acute cases may lead kidney failure and death (1-3). For this reason, many removal processes have been used for adsorption of radioactive metal ions such as uranium(VI), strontium(II) and cesium(I) ions from industrial waste waters and waste solutions (4-6). Organic and inorganic adsorbents have been used for removal processes of radioactive metal ions from wastes. In recent years, polymeric adsorbents have indicated an increase for the treatment of aqueous nuclear waste solutions due to controlling adsorption capacity and supplying selectivity in adsorption processes (7-9). For this purpose, 80 g of unsaturated polyester resin (Polipol 353, Poliya) were mixed with 20 g of acrylic acid. This mixture was copolymerized using cobalt octoate (0.5 mL of 1%Co in toluene)-methyl ethyl ketone peroxide((1 mL of Butanox M60) initiator system at room temperature.

In this study, the effects of the contact time, temperature and U(VI) concentration for the adsorption of U(VI) on the crosslinked polyester resin bearing acrylic acid functional groups have been investigated. The adsorption data have been well represented by the Freundlich, Langmuir and Dubinin-Radushkevich (D-R) isotherms. The adsorption capacity of the crosslinked copolymer and free energy change are calculated by using D-R isotherms. Thermodynamic parameters (ΔH_0 , ΔS_0 and ΔG_0) have been determined for the adsorption of U(VI) ions on the crosslinked copolymer bearing acrylic acid functional groups from aqueous solutions. Experimental adsorption data have been analyzed using sorption kinetic models such as the Elovich, fractional power, pseudo-first order and pseudo-second order kinetic models. It has been observed that pseudo-second order kinetic model provided a high degree of correlation with experimental data for the adsorption of U(VI) ions on the crosslinked copolymer bearing acrylic acid functional groups from aqueous solutions

References

1. Mellah A. Chegrouche S. and Barkat M., J. Colloid and Interface Sci. 296 434 (2006).
2. Rao T.P., Metilda P. and Gladis J.M., Talanta 68 1047 (2006).
3. Qadeer R. and Hanif J., Radiochim. Acta 65 259 (1994).
4. Özeroğlu C. ve Keçeli G., J. Radioanal. Nucl. Chem. 268(2) 211 (2006)
5. Singh B.N. and Maiti, B., Talanta, 69 393 (2006)
6. Özeroğlu C. ve Keçeli G., Radiochim. Acta 95 1 (2007).
7. Maheswari M. A. and Subramanian M.S. React. Funct. Polym. 62(1) 105 (2005)
8. Büyüktiryaki S., Say R., Ersöz A., Birlik E. and Denizli A., Talanta 67 640 (2005).
9. Özeroğlu C., Keçeli G., Radiochim. Acta 97 709 (2009).

Primary author: Dr OZEROGLU, Cemal (Istanbul University Faculty of Engineering Department of Chemistry 34320 Avcilar-Istanbul/TURKEY)

Co-author: Ms METİN, Nilüfer (Istanbul University Faculty of Engineering Department of Chemistry 34320 Avcilar Istanbul/TURKEY)

Presenter: Dr OZEROGLU, Cemal (Istanbul University Faculty of Engineering Department of Chemistry 34320 Avcilar-Istanbul/TURKEY)

Session Classification: Poster Section 2

Track Classification: Radioanalytical Chemistry and Nanoparticles