Desalination and Water Treatment
www.deswater.com

38 (2012) 8–14
January

doi: 10/5004/dwt.2012.2282

Taylor & Francis
Taylor & Francis Group

Synthesis of crown ether functionalized polyacrylamide gel beads and their extraction behaviour for strontium ions

Murugaboopathi Sivanatham[a], Butchi Venkata Rao Tata[a,*], Chinthalacheruvu Anand Babu[b]

[a]*Condensed Matter Physics Division, Indira Gandhi Centre for Atomic Research, Kalpakkam 603 102, Tamil Nadu, India*
[b]*Separation Technology & Hydraulics Division, Indira Gandhi Centre for Atomic Research, Kalpakkam 603 102, Tamil Nadu, India*
Email: tata@igcar.gov.in

Received 9 December 2010; Accepted 30 June 2011

ABSTRACT

4-acrylamidobenzo-18-crown-6(ABCE) functionalized polyacrylamide (PAAm) gel beads have been synthesized using an indigenously developed sedimentation polymerization setup. The extraction of Sr^{2+} ions by ABCE functionalized PAAm gel beads was monitored by batch extraction experiments in different concentrations of nitric acid and sodium nitrate solutions. With the aid of atomic absorption spectroscopy (AAS), the concentration of Sr^{2+} ions in aqueous phase before and after extraction was measured. In nitric acid, the extraction efficiency is found to be high (> 80%) when the number of hydrogen ions in aqueous phase is less than that of ABCE molecules attached to hydrogel backbone. A sudden drop in extraction efficiency was observed when the number of hydrogen ions present in the aqueous phase is greater than that of ABCE molecules attached to hydrogel backbone. Our results indicate that the number of hydrogen ions present in the aqueous phase play an important role in deciding the extraction efficiency. Further, in sodium nitrate solution the extraction efficiency is found to decrease with increase in concentrations of $NaNO_3$. A plausible mechanism for the extraction behaviour is presented and the results are discussed.

Keywords: Polyacrylamide hydrogel beads; Fourier transform infrared (FTIR) spectroscopy measurements; Sedimentation polymerization; Crown ether; Extraction; Strontium ions;

*Corresponding author.

Proceedings of DAE-BRNS Biennial Symposium on Emerging Trends in Separation Science and Technology, Kalpakkam, India, March 1–4, 2010