Desalination and Water Treatment
www.deswater.com

38 (2012) 179–183
January

doi: 10/5004/dwt.2012.2301

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Separation of plutonium(IV) from uranium(VI) using phosphonate-based task-specific ionic liquid

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Received 9 December 2010; Accepted 6 September 2011

ABSTRACT

The extraction behavior of plutonium(IV) and uranium(VI) from nitric acid medium by a solution of diethyl-2-(3-methylimidazolium)ethylphosphonate bis(trifluoromethanesulfonyl)imide ($ImPNTf_2$) ionic liquid in the room temperature ionic liquid (RTIL), 1-alkyl-3-methylimidazolium bis(trifluoromethanesulfonyl)imide (alkyl = butyl, hexyl or octyl) was studied. The distribution ratio of Pu(IV) in $ImPNTf_2$/$amimNTf_2$ increased with increase in the concentration of nitric acid reached a maximum at 0.5 M in nitric acid followed by decrease. The $D_{Pu(IV)}$ values, then, reached a minimum at 4–5 M and thereafter increase. The distribution ratio of U(VI) was insignificant as compared to the distribution ratio of Pu(IV) that led to the unusual separation of plutonium (IV) from uranium(VI).

Keywords: Extraction; Room temperature ionic liquid; Plutonium; Uranium; Distribution ratio; Separation Factor

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