Desalination and Water Treatment
www.deswater.com

38 (2012) 121–125
January

doi: 10/5004/dwt.2012.2546

Taylor & Francis
Taylor & Francis Group

Development of radio analytical method for in-vitro monitoring of Pu in urine matrix

Kalaiselvan Subramanian*, Meenakshisundaram Venkata Subramanian

Radiological Safety Division, Radiological Safety and Environmental Group, Indira Gandhi Centre for Atomic Research, Kalpakkam 603102, India
Tel. +91 44 27480062; Fax: +91 44 27480235; email: kalai@igcar.gov.in

Received 9 December 2010; Accepted 19 June 2011

ABSTRACT

A relatively less expensive and less time consuming radioanalytical technique for quantitative determination of Pu in urine at the mBq level was developed. In this new method, Pu in urine is co-precipitated with $Ca_2C_2O_4$ from wet oxidized urine matrix and oxalate ions is destroyed with $HClO_4$· Pu in +4 state is extracted into 0.01M PC-88A (2-ethyl hexyl phosphonic acid mono-2-ethylhexyl ester)dissolved in toluene from optimized 2M HCl aqueous phase. Pu is stripped into 5% oxalic acid solution and is evaporated with HNO_3–$HClO_4$ mixture to destroy oxalate ions. Finally, Pu is electro deposited in ammonium oxalate medium and counted in an alpha spectrometer. The detailed study of the work is presented in this paper. An interference study on elements that are normally present in urine and other actinides (if present) was performed and is also given.

Keywords: Bioassay; Plutonium; Solvent Extraction; PC-88A; Electrodeposition; Alphaspectrometry

*Corresponding author.

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