Standardization of sequential separation of naturally occurring radionuclides in drinking water

Madhu G. Nair, D.D. Rao*, R.S. Sathyapriya, P.K. Sarkar

Internal Dosimetry Section, Health Physics Division, Bhabha Atomic Research Centre, Trombay, Mumbai 400094, India
Tel. +91 22 25598288; Fax: +91 22 25505151; email: ddrao217@gmail.com

Received 12 April 2012; Accepted 30 September 2013

ABSTRACT

A procedure for sequential determination of isotopes of polonium, radium, and uranium from the same aliquot of a water sample has been standardized. The important step in the procedure is coprecipitation of radionuclides of interest with calcium phosphate followed by auto deposition of polonium on a silver planchette. Radium is precipitated with barium nitrate under ice cold condition. Uranium isotopes are separated using ion exchange resin. $^{133}$Ba was used for estimating the chemical yield of radium assuming that these elements have similar chemical behavior. $^{232}$U and $^{209}$Po were used for estimating the chemical yield of $^{234}$ U, $^{238}$ U, and $^{210}$ Po, respectively. Seven water samples were analyzed and the average chemical yield for polonium, barium, and uranium were obtained at 71.8, 65, and 51.6%, respectively. The standardized procedure is being used in the analysis of these natural radionuclides in packaged drinking water.

Keywords: Sequential separation; Natural radionuclides; Alpha spectrometry; Tracers; Bottled drinking water

*Corresponding author.


1944-3994/1944-3986 © 2013 Balaban Desalination Publications. All rights reserved.