

Rapid Method for Low Level ⁹⁰Sr Determination in Seawater by Liquid Extraction Technique

Authors : S. Visetpotjanakit, N. Nakkaew

Abstract : Determination of low level ⁹⁰Sr in seawater has been widely developed for the purpose of environmental monitoring and radiological research because ⁹⁰Sr is one of the most hazardous radionuclides released from atmospheric during the testing of nuclear weapons, waste discharge from the generation nuclear energy and nuclear accident occurring at power plants. A liquid extraction technique using bis-2-ethylhexyl-phosphoric acid to separate and purify yttrium followed by Cherenkov counting using a liquid scintillation counter to determine ⁹⁰Y in secular equilibrium to ⁹⁰Sr was developed to monitor ⁹⁰Sr in the Asia Pacific Ocean. The analytical performance was validated for the accuracy, precision, and trueness criteria. Sr-90 determination in seawater using various low concentrations in a range of 0.01 – 1 Bq/L of 30 liters spiked seawater samples and 0.5 liters of IAEA-RML-2015-01 proficiency test sample was performed for statistical evaluation. The results had a relative bias in the range from 3.41% to 12.28%, which is below accepted relative bias of \pm 25% and passed the criteria confirming that our analytical approach for determination of low levels of ⁹⁰Sr in seawater was acceptable. Moreover, the approach is economical, non-laborious and fast.

Keywords : proficiency test, radiation monitoring, seawater, strontium determination

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