



Contribution ID: 218

Type: Poster

Rapid determination of radiostrontium in milk using automated radionuclides separator and liquid scintillation counter

Monday, 12 May 2014 17:15 (1h 30m)

Milk is one of the special important matrices to be rapidly assessed its radioactive contamination in emergency situations such as a nuclear plant accident. Because of its chemical and biological similarities to calcium in milk, radiostrontium can be incorporated into human organism, preferentially in bone tissue, by milk ingestion. Development of rapid analytical methods for radiostrontium in milk is essential for emergency situations. Both ^{89}Sr and ^{90}Sr , produced by the fission reaction of nuclear fuel in a nuclear reactor, are beta emitters which require radiochemical separation for radiometric analysis. The conventional methods for the determination of radiostrontium in milk using time consuming sample preparations and manual chemical separations are usually too slow to take measures for emergency situations.

A modular automated radionuclide separator for $^{89/90}\text{Sr}$ (MARS Sr-90) has been developed for the rapid and reproducible isolation of radiostrontium. MARS Sr-90, designed and built in our laboratory, was successfully applied to the isolation of radiostrontium in milk samples. MARS Sr-90 consists of four parts; a control module, a pump module, a valve module and a column module. Control software developed on the LabView platform is a virtual instrument to control MARS Sr-90 by means of manipulating the most important input parameters through the graphical user interface on the computer screen. The automated radiochemical procedures for separation and purification of $^{89/90}\text{Sr}$ in milk are developed. MARS Sr-90 uses cation exchange resin for pre-concentration of $^{89/90}\text{Sr}$ from a milk matrix and Sr-Spec resin for purification of $^{89/90}\text{Sr}$ from interfering radioactive nuclides. By using MARS Sr-90 with rapid flow rates, sample preparation time is minimized. The activities of purified $^{89/90}\text{Sr}$ are simultaneously determined by the measurement of the Cherenkov radiation of ^{89}Sr and liquid scintillation radiation of ^{90}Sr using 1220 Quantulus liquid scintillation counter.

The developed automated radiochemical procedures provide a rapid, safe and reproducible separation of $^{89/90}\text{Sr}$ from milk samples. Compared to conventional $^{89/90}\text{Sr}$ separation methods carried out manually, MARS Sr-90 is faster, less labor intensive and expected to be widely used as a powerful and convenient tool for the chemical separation and purification of $^{89/90}\text{Sr}$ found in various foodstuffs for an emergency situation.

Primary author: Dr CHUNG, Kun Ho (Korea Atomic Energy Research Institute, Environmental Radioactivity Assessment Team)

Co-authors: Mr CHOI, Geun-Sik (Korea Atomic Energy Research Institute, Environmental Radioactivity Assessment Team); Dr KIM, Hyuncheol (Korea Atomic Energy Research Institute, Environmental Radioactivity Assessment Team); Dr LIM, Jong Myoung (Korea Atomic Energy Research Institute, Environmental Radioactivity Assessment Team); Dr KANG, Mun Ja (Korea Atomic Energy Research Institute, Environmental Radioactivity Assessment Team); Mr JI, Young-Yong (Korea Atomic Energy Research Institute, Environmental Radioactivity Assessment Team)

Presenters: Dr KIM, Hyuncheol (Korea Atomic Energy Research Institute, Environmental Radioactivity Assessment Team); Dr LIM, Jong Myoung (Korea Atomic Energy Research Institute, Environmental Radioactivity Assessment Team)

Assessment Team); Dr CHUNG, Kun Ho (Korea Atomic Energy Research Institute, Environmental Radioactivity Assessment Team)

Session Classification: Poster Session - Separation Methods, Speciation

Track Classification: Separation Methods, Speciation