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Determination of strontium-90 in foodstuff

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The Nuclear and Technological Institute (ITN) has the legal responsibility to carry out the environmental radiological monitoring at a national level. This survey was planned to provide relevant information on radioactivity levels in different components of the ecosystem (atmosphere, aquatic and terrestrial environments). In what concerns the terrestrial environment the evaluation of the strontium-90 (^{90}Sr) concentrations in food samples has been performed through analyses of milk, completed meals, meat and vegetables. Strontium-90 (^{90}Sr) is a radioactive isotope of strontium, with a long half life (28.8 years) that could be taken by man through food chain transfer due to its biochemical similarity with calcium. A method based on the separation of ^{90}Sr by extraction chromatography and beta determination by Liquid Scintillation Counting technique was used for strontium analysis in food samples. The trials were carried out using 7g of ash samples, and then dissolved in concentrated nitric acid. Following additional precipitation steps the sample is loaded onto a column with 3 grams of commercial Sr-resin. This resin is specific to Sr ions and enables a rapid and simple separation of strontium from calcium, potassium and many other elements. The column is rinsed with 8M HNO_3 and 3M HNO_3 and after this two washing steps, the strontium retained in the column, is stripped at the end with 0.05M HNO_3 . The strontium solution eluted is collected in a beaker and the chemical yield was determined by gravimetric method. The strontium precipitate is dissolved with 8 mL of 0.1M HCl and added to 12 mL of the Ultima Gold LLT scintillation cocktail. The ^{90}Sr activity was determined after ^{90}Y ingrowths in the channel region 250-800 keV using a counting time of 120 minutes. Validation trials to evaluate the accuracy and the precision of the method were performed using ^{90}Sr spiked samples. The method has been applied to the ^{90}Sr determination of completed meals, meat and vegetables. Results of validation trials and food analysis will be presented and discussed in this paper.

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