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RADIOCHEMICAL DETERMINATION OF STRONTIUM-90 IN SEAWATER. Ieda Irma Lamas Cunha, Casimiro Sepúlveda Munita, Rosemeire Petrauskas Paiva, Instituto de Pesquisas Energéticas e Nucleares - Comissão Nacional de Energia Nuclear - IPEN-CNEN/SP, Divisão de Radioquímica.

Nuclear weapons tests, discharges of effluents from nuclear reactors, dumping operations and nuclear accidents, have introduced artificial radionuclides into the environment. Among these are cesium-137 and strontium-90. The estimates of input of these radionuclides to the oceans are of 3.7×10^2 PBq. The inputs to the oceans in the southern hemisphere have been half of those in the northern hemisphere. The artificial radionuclides can affect marine organisms and man and their total activity is only a very rough guide to risks.

Considering the environmental pollution problems and their impact on man, we have developed a research programme on environmental radioactivity studies. The aim is to develop and to apply radiochemical methods for analysis of radionuclides in environment samples, such as marine samples, milk and rainwater. The data will be used to describe the radiological situation along the Brazilian coast in order to obtain reference levels of radionuclides.

Strontium-90, because of its long half-life, large fission yield and biological similarity to calcium, has been the fallout nuclide most carefully monitored in aerosols, precipitation, soils and food products. For these reasons great interest has attached to its analysis in seawater and in other marine products.

At present the levels of strontium-90 in seawater are such that the radiochemical methods require volumes of sample between 50 and 200 liters.

In the present work, we tested a method of analysis consisting in the preconcentration of strontium from a large volumes of seawater, separation of yttrium-90 from a radioactive equilibrium mixture and measurements of the absolute number of disintegrations due to yttrium-90. The various factors that could affect the analysis were studied. Based on the results obtained, we established the following method of analysis. To every 50 liters of seawater were added 2g strontium carrier. The sample was mixed for

three hours. The pH of the solution was adjusted to pH 8 by adding ammonium hydroxide. 250g ammonium carbonate powder were added to the solution. The solution was mixed for 3 hours. The precipitate was settled overnight.

The excess of supernatant was siphoned out. The precipitate was dissolved with 1:1 HNO_3 by heating, until CO_2 effervescence no more occurred. The strontium solution was stored for 2 weeks. Yttrium carrier was added and the pH was adjusted to pH 8 with ammonium hydroxide. After a 10 minutes digestion at 90°C , the precipitate was cooled down in an ice bath, then dissolved with concentrated HCl. The solution was diluted to 20 ml with water. Hold back carrier strontium was added and yttrium was precipitated again with ammonium hydroxide as mentioned above. After dissolution of yttrium hydroxide precipitate and dilution with water to 20 ml, 1 ml saturated oxalic acid was added. The pH was adjusted to pH 2.5 with ammonium hydroxide. The precipitate was digested for 10 minutes at 90°C , then cooled down in an ice bath. The precipitate was filtered through a chimney type sintered glass filter, using a weighed Whatman nº 42 filter, and mounted for counting.

The strontium recovery was determined by means of strontium-85 tracer and yttrium recovery was calculated by a gravimetric method.

The average recovery of strontium obtained for 6 experimental runs was 75% and for yttrium it was 82%.

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