

9-1 Determination of ^{90}Sr in Radioactive Waste –Development of Rapid and Simple Method for Evaluation of Radioactivity Inventories in Waste–

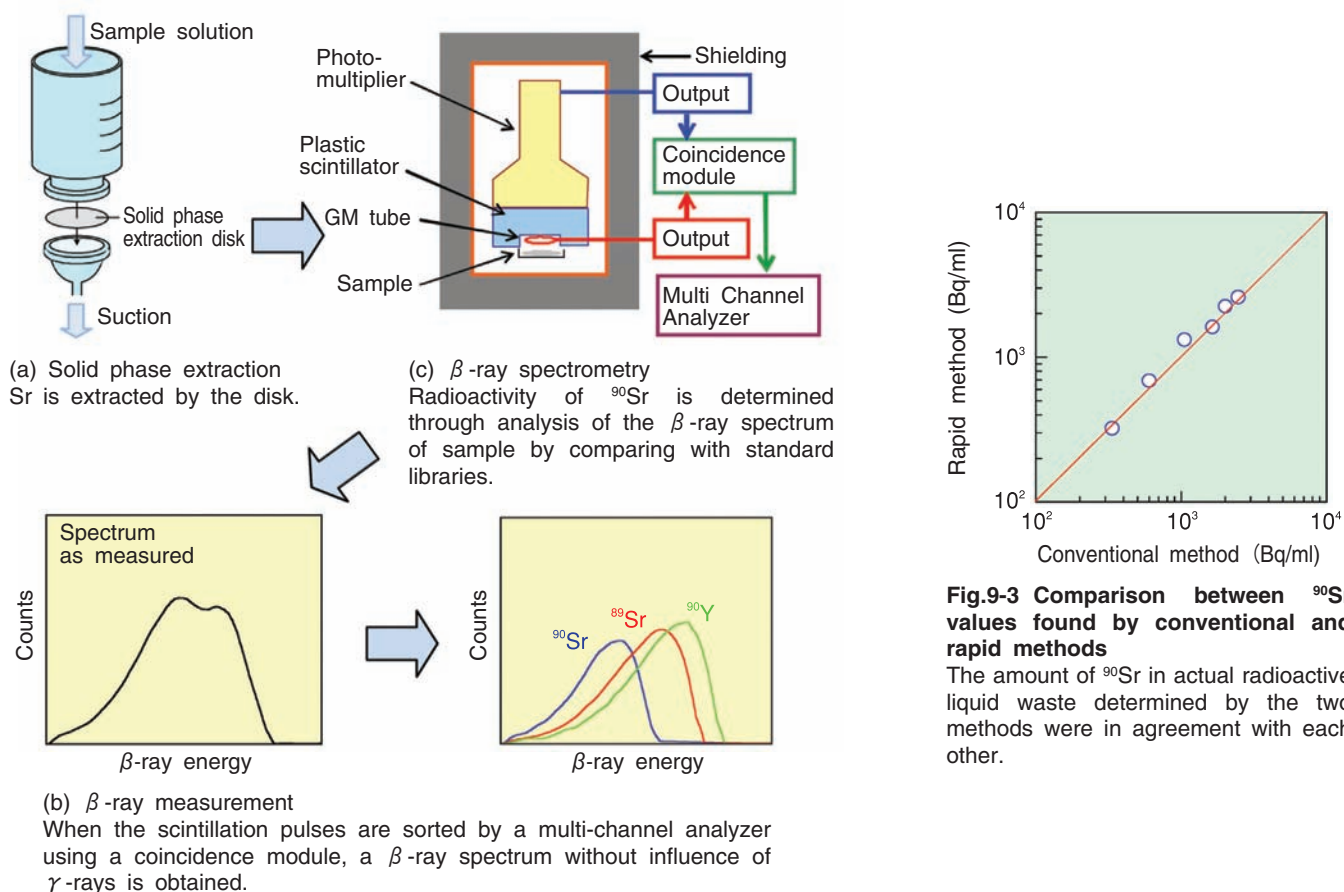


Fig.9-2 Rapid and simple ^{90}Sr determination method

For proper disposal of radioactive waste packages generated from various research facilities, an evaluation of radioactivity inventories in the waste packages is indispensable. In order to establish a practical and reliable verification method, we are currently collecting data concerning radioactivity concentrations in radioactive wastes before processing.

^{90}Sr is one of the most important nuclides from the viewpoint of safety assessment of the radioactive waste disposal process. Since ^{90}Sr emits only β -rays when it decays, nondestructive measurement cannot be done. In a conventional method, Sr is separated by ion-exchange chromatography or a precipitation method. After the Sr fraction reaches radioactive equilibrium with ^{90}Y , the daughter nuclide of ^{90}Sr , the ^{90}Sr is separated and quantified. The tedious and time-consuming chemical separation in this method is a major problem.

Therefore, we developed a new rapid and simple

determination method for ^{90}Sr in radioactive wastes. In this method, ^{90}Sr in the waste sample solution is quickly separated by a solid phase extraction disk (Fig.9-2(a)). After the extraction, radioactivity of ^{90}Sr is also quickly determined through analysis of the β -ray spectrum of the sample by comparing with predetermined standard libraries (Fig.9-2(b),(c)). This method was successfully applied to the determination of ^{90}Sr in liquid waste from nuclear research facilities.

The values of ^{90}Sr determined by the rapid method were compared with the results of the conventional method, and they were in agreement with each other (Fig.9-3). As a result of our development work, separation of ^{90}Y after reaching radioactive equilibrium was no longer needed. The time for the ^{90}Sr determination was shortened to be less than one-third to one-fifth of the conventional method.

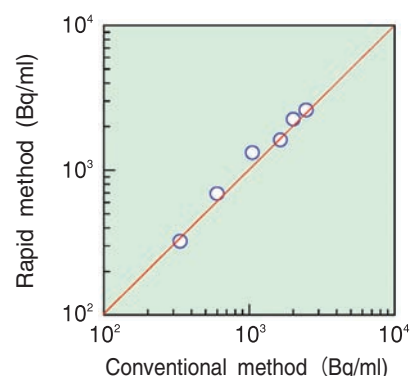


Fig.9-3 Comparison between ^{90}Sr values found by conventional and rapid methods

The amount of ^{90}Sr in actual radioactive liquid waste determined by the two methods were in agreement with each other.

Reference

Kameo, Y. et al., Rapid Determination of ^{89}Sr and ^{90}Sr in Radioactive Waste Using Sr Extraction Disk and Beta-ray Spectrometer, Journal of Radioanalytical and Nuclear Chemistry, vol. 274, no.1, 2007, p.71-78.