

Pu AND Am DETERMINATION IN THE ENVIRONMENT METHOD DEVELOPMENT

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Determination of plutonium at trace and ultratrace levels is of interest due to the extreme high toxicity and radiotoxicity of the element. The $^{240}\text{Pu}/^{239}\text{Pu}$ ratio determination estimation is of importance for the proliferation issues also. The fast and reliable analytical methods Pu determination development is in the list of the radioanalytical chemistry actual goals.

The measurement of the $^{240}\text{Pu}/^{239}\text{Pu}$ isotope ratio is of importance from the viewpoint of environmental monitoring to determine the origin of the contamination. The $^{240}\text{Pu}/^{239}\text{Pu}$ ratio is impossible to determine with conventional alpha spectrometry because the two alpha particle energies overlap in the spectra. The measuring time for plutonium determination with alpha counting is also very long in samples with low activity concentration due to the relatively low activity of these radionuclides. Due to the very low instrumental background and to the high ion transmission, ICP-MS has proved to be a useful and fast analytical technique for ultra-trace elemental determination in a variety of samples.

Last years a few articles have been published about using ICP MS HR to determine ultratrace Pu in the environment. In recent publications the Si removing was not used. It is well known from marine biology some microorganisms use in their metabolism Si derivatives. It means that important amount of Pu will not be dissolved and it will rest in the solid residue. In our work we have choose a combination of methods from Handbook EML-300: Pu-02-RC Plutonium in Soil Samples, Pu-03-RC Plutonium in Soil Residue - Total Dissolution Method, Pu-11-RC Plutonium Purification - Ion Exchange Technique, Pu-12-RC Plutonium and/or Americium in Soil or Sediments.

A high resolution inductively coupled plasma mass spectrometric (HR-ICP-MS) method for the determination of Am and the $^{240}\text{Pu}/^{239}\text{Pu}$ isotope ratio was developed. Total plutonium concentrations ($^{239+240}\text{Pu}$) measured in environmental samples by this HR-ICP-MS method were in good agreement with recommended data obtained from α -spectrometry. It was achieved the decreasing of the time to analyse the samples over than 33%.

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