Simplification of Radiochemical Analysis Method for Safe Disposal of Radioactive Wastes
— Effective Pretreatment for Radiochemical Analysis of Solidified Products with Microwave Heating Devices —

Low-level radioactive miscellaneous wastes have been generated from various research facilities. The disposal of solidified packages of the wastes is planned. The solidification of miscellaneous wastes by plasma melting yields high chemical stability and immobilizes radionuclides effectively. For the safe disposal of radioactive wastes, it is indispensable to verify that each waste package is prepared in accordance with requirements for disposal.

Fig.9-3 Disposal of low-level radioactive wastes
The disposal of low-level radioactive miscellaneous wastes generated from research facilities in packages solidified by plasma melting is planned. In order to dispose of radioactive wastes safely, it is indispensable to verify that each waste package is prepared in accordance with requirements for disposal.

Low-level radioactive miscellaneous wastes

- Concrete
- Insulating material
- Glass
- Carbon steel

Solidified products
- Vitreous materials
- Radionuclide immobility
- low solubility

Verification
- Performance
  - Mechanical strength
  - Chemical stability etc.

Radioactivity evaluation
- Radioactivity level

Fig.9-4 Microwave heating device
The mixture of sample and acids in a Teflon vessel is heated by microwave. a) External view of the device, b) Cross-sectional view of a vessel

The mixture of sample and acids in a Teflon vessel is heated by microwave. a) External view of the device, b) Cross-sectional view of a vessel.

In order to dissolve a sample of solidified products rapidly, a dissolution method using microwave heating devices was applied (Fig.9-4). In a conventional method involving only external heating with various mixtures of acids, a 0.1 g sample was dissolved with difficulty. However, upon applying the microwave-assisted dissolution method, a 1 g sample was completely dissolved in a shorter time. In this way the time for dissolution was shortened to less than one-tenth. In addition, the use of sealed vessels can prevent release of radionuclides. From the viewpoint of safety, the dissolution method with microwave heating devices is effective.

Reference