

## **Recycled uranium isotopes ( $^{238}\text{U}$ , $^{235}\text{U}$ , $^{234}\text{U}$ , $^{236}\text{U}$ , $^{233}\text{U}$ and $^{232}\text{U}$ )**

### **Solids**

Solids are dissolved using a mixture of mineral acids, including hydrofluoric acid.

The determination of recycled uranium isotopes is carried out on duplicate sample fractions: one fraction is spiked with a uranium-232 internal standard; the other fraction is not spiked.

Uranium in the duplicate fractions is isolated by anion-exchange chromatography followed by extraction chromatography. Uranium in the purified non-spiked fraction is electrodeposited onto a stainless-steel disc, which is then measured by alpha spectrometry. The purified spiked fraction is split into two: one part is processed for measurement by alpha spectrometry; the other part is analysed by inductively coupled plasma mass spectrometry (ICP-MS) to determine uranium isotope ratios.

The uranium-238 and uranium-232 are determined from the two alpha spectrometry measurements; the other uranium isotopes are determined from the ICP-MS isotope ratio measurements relative to uranium-238.