Plutonium alpha emitting isotopes ($^{239+240}$Pu, ^{238}Pu and ^{242}Pu) and beta emitting ^{241}Pu

Solids

An aliquot of the solid sample is digested in a mixture of mineral acids. Plutonium is isolated from the resulting solution by anion exchange chromatography. The purified plutonium is electrodeposited onto a stainless steel disc then measured by alpha spectrometry. Plutonium-236 is used as an internal standard and yield monitor for the procedure.

^{241}Pu – This is an add-on to the Pu alpha method, and relies on alpha spectrometry for the yield determination. The fraction of purified plutonium from above is split into two fractions. One fraction is processed for electrodeposition onto a stainless steel disc, which is then measured by alpha spectrometry. The other fraction is processed for measurement by liquid scintillation counting to determine plutonium-241.
The plutonium-241 counting efficiency is determined using tritium of known activity concentration.

Liquids

Plutonium is preconcentrated by evaporation or coprecipitation. The resulting solid material is dissolved in a mineral acid. Plutonium is isolated from the resulting solution by anion exchange chromatography. The purified plutonium is electrodeposited onto a stainless steel disc then measured by alpha spectrometry. Plutonium-236 is used as an internal standard and yield monitor for the procedure.

^{241}Pu – This is an add-on to the Pu alpha method, and relies on alpha spectrometry for the yield determination. The fraction of purified plutonium from above is split into two fractions. One fraction is processed for electrodeposition onto a stainless steel disc, which is then measured by alpha spectrometry. The other fraction is processed for measurement by liquid scintillation counting to determine plutonium-241.
The plutonium-241 counting efficiency is determined using tritium of known activity concentration.