

Sequential Analysis of Plutonium and Americium in Water, Stephanie Woolf, U.S.
Department of Energy, Radiological and Environmental Sciences Laboratory

A test method has been developed which covers the quantitative determination of plutonium and americium isotopes in water by chemical separations and high resolution alpha spectrometry. Initial results indicate that the method produces high chemical yields and good peak resolution. The elements of plutonium and americium are sequentially separated from a 100-mL water sample by coprecipitation on barium sulfate. The barium sulfate is dissolved in a small amount of ethyldiaminetriacetic acid, and the plutonium and americium are separated with selective oxidation techniques. The isolated elements are coprecipitated with neodymium fluoride. The elements are filtered and the isotopic concentrations determined by alpha-particle spectrometry. Although this method applies to water samples, because of the total sample dissolution, it is applicable to other aqueous matrices with suspended particulate matter and refractory oxide compounds containing plutonium and americium. The detection limits for these actinides based on a 100-mL sample is 0.05 pCi/L. Recoveries range between 85%-93%. The resolution for full width at half maximum (FWHM) is from 40 to 70 kiloelectron volts (keV). This chemical procedure requires 4-5 hours or less to process six samples.