

SEQUENTIAL ANALYSIS OF URANIUM AND PLUTONIUM FROM BIOASSAY SAMPLES

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Recent developments in extraction chromatography resins have allowed faster, sequential separation of many radionuclides from a single sample. These developments have been applied to the separation of low level uranium and plutonium in urine using UTEVA and TEVA resins by Eichrom™. The combination of these two resins allows firstly uranium separation from plutonium, and secondly plutonium separation from interfering species, by forming complexes with U^{VI} and Pu^{IV} respectively.

Methodologies have been carried out with varying front end dissolution chemistry, altering volumes of nitric acid (HNO_3) hydrochloric acid (HCl) and hydrogen peroxide (H_2O_2) with 1-octanol. Valence adjustment with sodium nitrite ($NaNO_2$) and nitric acid was required to achieve the correct oxidation states for extraction from the bulk. The selective separation achieved by UTEVA/TEVA resins was utilised to remove potential interferences for detection by alpha spectrometry. The results received were reported in terms of the recovery of U^{232}/Pu^{242} tracer added for each sample. Recoveries varied from spoilt samples to 97% recovery, with overall recoveries in the range of 40-60%.

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