

Determination of Actinides in Bioassay Samples using Eichrom's Resin Columns

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In response to our industry needs for demonstrating separation of actinides in variety of matrices, we have developed a number of procedures using extraction chromatographic resins for bioassay samples. This presentation will focus on one separation scheme for U, Pu and Am and present the results for the tracer recoveries in real and synthetic urine samples.

Actinides are pre-concentrated from 1.2 liter urine samples using calcium phosphate precipitation. A wet digestion is carried out on the precipitate, until a white ash is achieved. The residue is then redissolved in a load solution of $3\text{M HNO}_3/ 1\text{M Al}(\text{NO}_3)_3$. The oxidation state of Pu is adjusted and the sample is loaded on to UTEVA/TRU columns in a tandem fashion. Uranium is selectively removed on UTEVA column with 0.01M HCl acid. Am is stripped with 9M HCl and 4M HCl solution, while Pu is removed with 0.1M ammonium bioxalate solution on TRU column. A cerium fluoride precipitation is performed on the separated actinide fractions and the samples are counted on alpha spectrometry.

The results indicate tracer recoveries ranging from 70% to 100%. The reproducibility of data obtained for actinides demonstrates that the method is effective for the analysis of actinides in urine samples.