Optimization and Characterization of a Sulfate Based Electrodeposition Method for Alpha Spectroscopy of Actinide Elements Using Chemometric Analysis

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Alpha spectrometric measurements using Si detectors is the standard method for the determination of alpha emitting actinide elements. This method requires the preparation of sources for analysis, which do not degrade the energy spectrum of the emitted alpha particles via sample self-absorption. A variety of methods for the electrodeposition of actinides have been reported in the literature, many of which require long deposition times and lack reproducibility. A sulfate based method has been evaluated for the preparation of these sources using chemometric analysis to optimize the method and evaluate several variables and their interactions with the goal to achieve high yield source preparation in a1 hour or less. Typical resolution for this method is 30 keV or less with recoveries approaching unity.

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