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Rare-earth element fractionation in uranium ore and its U(VI) alteration minerals

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2 **minerals**

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18 **Abstract**

19 A cation exchange chromatography method employing sulfonated polystyrene
20 cation resin (DOWEX AG50-X8) was developed in order to separate rare-earth
21 elements (REEs) from uranium-rich materials. The chemical separation scheme is
22 designed to reduce matrix effects and consequently yield enhanced ionization
23 efficiencies for concentration determinations of REEs without significant
24 fractionation using solution mode- inductively coupled plasma mass spectrometry
25 (ICP-MS) analysis. The method was applied to determine REE abundances in four
26 uraninite (ideally UO₂) samples and their associated U(VI) alteration minerals. In
27 three of the samples analyzed, the concentration of REEs for primary uraninite are
28 higher than those for their corresponding secondary uranium alteration phases. The
29 results for U(VI) alteration minerals of two samples indicate enrichment of the light
30 REEs (LREEs) over the heavy REEs (HREEs). This differential mobilization is
31 attributed to differences in the mineralogical composition of the U(VI) alteration.

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