Experimental study for the dissolution of rare earth elements in water-rock interaction

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Introduction

REE dissolve hardly in interaction between water and rock. It is difficult to determine quantitatively the REE dissolution in water by conventional batch dissolution system. We have developed a new flow leaching system, and examined the behavior of REE in interaction between distilled water and basaltic rock.

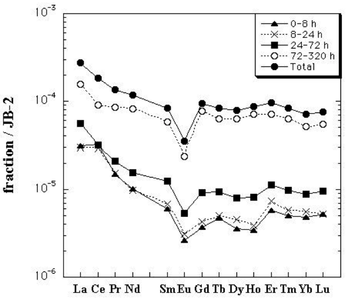
Method of catching REE

The experimental water-rock interaction with the flow leaching system was proceeded for 2 weeks under filtered air bubbling condition at about 45 ˚C. The rock used in this study is an Izu-Oshima basaltic rock (reference rock of the Geological Survey Japan). The interacted water was continuously filtered with a 0.20 µm membrane filter, and dropped into a cation exchange column with AG50W-X8 resin by peristaltic pump. All trapped cations in the column were eluted with 6.0 M HCl at once. REE and major elements were separated by cation exchange column, and analyzed by ICP-MS and AAS, respectively.

Results and discussion

In order to estimate the *release ratio* of REE from source rock into distilled water, the REE abundances were normalized by JB-2. The obtained REE patterns have negative Eu anomaly and clear W-type tetrad effects. Some of the results is shown in the figure below.

Figure 1: REE patterns of each leaching fraction.



The increase of REE *release ratio* by leaching has little correlation with that of major elements. However, closer trend can be observed between *release ratio* of Eu and major elements. These results suggest that REE extraction on water-rock interaction is larger from other phases than from major mineral phases, which contain major elements and most of Eu in JB-2.

Mobility of rare earth elements and major elements during chemical weathering of volcanic soil profile in Kanto area, Japan

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Compositional variation of major, and rare earth elements (REE) contents , and mineralogical change in weathered basaltic ash soil (Andisol and Kanto-loam) mainly derived mainly from Mt. Fuji were studied. These studies revealed that chemical composition, elemental mobility, and mineralogical variations with depth in Andisol and Kanto-loam are distinctly different. Generally, elemental dissolution occurred in Andisol overlying Kanto-loam, while elemental accumulation occurred in Kanto-loam . Due to the transformation of allophane to halloysite and precipitation of iron_hydroxide the abundances of iron hydroxide and clay mineral (halloysite) becomes larger in Kanto-loam than in Andisol. This implies that larger amounts of REE are adsorbed by iron hydroxide and clay mineral in Kanto-loam than in Andisol. The mineralogical change and effective adsorption by iron hydroxide and clay mineral can explain accumulation of REE in Kanto-loam.

References

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