



Influence of Nd, Eu and Ho Hydroxide Complexes Stability on their Migration Capability in Natural Hydrothermal Systems

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Published data on the hydrolytic properties of trivalent rare earth elements (REE) with a full set of their monohydroxocomplexes stability constants (K1) represent the essential (at about 1 log. unit) increasing of K1 from “light” to “heavy” REE (HREE). It theoretically means that impoverishing of minerals crystallizing from solutions by more complexing HREE and Y takes place. However, according to, for example, published recently review of Klungness and Byrne [1], measurements done even at room temperature are scattered; data obtained under various experimental conditions are often incompatible with each other.

The contribution presents the results from our reliable experimental data concerning of REE hydroxocomplexes stability at minimal ionic strengths. The coordination equilibria of Nd, Eu and Ho in alkaline solutions have been studied at temperatures 25-100°C. In this work indicator spectrophotometric technique was used to carry out the pH-measurement with a high precision at ionic strengths no more than 0.0005 without participation of polymer forms, side reactions and hydroxides sediments. Nd and Eu exist essentially as mono- and dihydroxide complexes M(OH) and M(OH)₂ in the fresh prepared solutions at room temperatures over the pH range from 7 to 10. Ho is presented furthermore by species Ho(OH)₃ and Ho(OH)₄. Values of hydroxide complexes constants have been extrapolated to zero ionic strength.

Obtained data confirm, as a whole, increasing of REE hydroxide complexes stability from Nd to Ho. Some exception presents relatively high values for Eu, stated also in papers of many authors. Guillaumont et al. [2] explain this phenomenon by effects of destabilization in series of REE due to changing of interelectronic repulsion.

The stated essential stabilization effect of HREE allows to explain well known sharp decrease of their content in monocyte located in deposits or carbonate type veins [3].

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References

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- [2] R. Guillaumont, B. Desire, M. Galine Radiochem. Radioanal. Letters, 1971, 8, p.189.
- [3] G.R. Kolonin, G.P. Shironosova Doklady Earth Sciences, 2008, 423, No 3, p. 375.