Geophysical Research Abstracts
Vol. 12, EGU2010-360, 2010
EGU General Assembly 2010

Comparison Rare Eearth Hydroxocomplexes Stability as Degree of Effect on their Migration Capability in Natural Hydrothermal Systems

Sophia Stepanchikova and Raisa Biteikina
Institute of Geology and Mineralogy, Novosibirsk, Russia, step@uiggm.nsc.ru

Comparison Rare Eearth Hydroxocomplexes Stability as Degree of Effect on their Migration Capability in Natural Hydrothermal Systems

S.A. Stepanchikova, R.P. Biteikina
Institute of Geology and Mineralogy, Siberian Division, Russian Academy of Sciences, Novosibirsk, 630090, Russia
step@uiggm.nsc.ru

The present work is devoted to a study of hydroxide complex formation in alkaline and near neutral solutions of rare earth elements. A stability dependence of complex form REE on atomic number is considered here as one of the factors influences their transfer and fractionation from a mineral forming fluids. The information obtained on this base about their content in minerals with a different conditions of formation is of interest in particular for a treatment of observed by many researchers their relative impoverishing by different groups of REE the minerals (1.
The most frequently founded in literature date oh hydrolytic REE properties of including complete sets of their mono-hydroxide complexes stability constants fixate an essential (within of one log. unit) quite monotonous increase of stability during transition from "light" to "heavy" elements with insignificant "dip" on gadolinium. The successive increasing constant formation for hydroxide complexes is also observed in many theoretical papers.

In fact, a high nuclear charge and " lanthanoide compression" contribute of ionic polarization, that should be resulted in increase of REE complexes stability in solutions.
However, non-monotonous increase of log with atomic number has often been observed by Guillamot and coauthors (2), estimated their comparative values by extraction and radiochemical measurement. Experiments were highly sensitive to reagent concentration because were carried out at Cm $\sim$ 10-7. High values for Eu have been explained by nephelo-auxetic overlap effect with 4-f electron shells typical for OH- - ions.

The aim of present work was to study the hydrolytic equilibria in REE solutions with a possible participation, in additions to mono-hydroxides, hydroxide forms of a higher order. Moreover, to minimize errors caused by extrapolation to zero ionic strength, the authors suggested investigate hydrolysis at minimally (less than 0.001) ionic strength. For this a spectrophotometric technique was employed using pH indicators. The use was made of temperature stable, acide-alkaline indicators meta-cresol purple and 2-naphtol with the intensive specific absorption spectra in the visible and UV regions. That allowed to study the equilibria with a minor concentrations of reagents based on pH values measuring with a high accuracy in the interval from 6.2 to 10.10 without participating polymer forms, side reactions and hydroxides sediments.
Obtained data confirm, as a whole, the pattern of increasing REE hydroxide complexes stability from light to heavy ones. However, relatively high values for Eu with considerable "gadolinium break"stated earlier in paper (2), have been observed much more distinctly then that in theorethical papers or experiments with a significant ionic strengths.

The stated effect of essential stability constants stabilization allowed, as a whole, to explain the well known sharp decreasing the latest contain in monocytes located in deposits or carbonate type veins.

The work is supported by RFBR, grants № 07-05-00404.

References

1. Kolonin G.R., Shironosova G.P., Dokl. SB AS, 423 (2998) 375.
2. Guillaumont, B. Desiré, M. Galin, Radioanal. Lett. 8 (1971) 189.