

REY's content and fate in groundwaters within the Armenian region (Lesser Caucasus)

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The geology of the Caucasus are very complicated and mainly determined by its position between Eurasian and Africa-Arabian lithospheric plates. A typical feature of the region is a complex tectonic structure (the presence of deep faults, ophiolitic belts, seismicity, and volcanism). Here, there are many springs of mineral waters with different chemical composition, temperatures, TDS and the gas content.

We present new REY data for 57 mineral groundwater taken from boreholes and springs located inside the Lesser Caucasus (Armenia). The total REEs (excluding Y) vary from 0.151 to 6.09 $\mu\text{g/L}$, with an average value of 1.14 $\mu\text{g/L}$. Y contents range from 0.01 to 8.97 $\mu\text{g/L}$. We could not figure out the correlation the REE's content in water with the hydrochemical parameters. So, the main factor controlled the preferable extraction, and input REYs to aqua is possible the mineral composition of water-host rocks. There is a clear inverse correlation between the $(\text{Gd/Yb})_{\text{PAAS}}$ and $(\text{La/Sm})_{\text{PAAS}}$ which is likely due to the type of water-bearing rocks.

PAAS-normalized trends of REE distribution in the studied waters could be split into two groups: the great one is showing a sharp rise from LREE to HREE and the second group has an almost flat pattern. On our mind, such variation in the pattern is due to the difference in chemical composition of the dissolved gas phase. REY-patterns of pCO_2 rich springs show apparent positive Eu anomaly, small negative Ce and pronounced rise from La to Lu, although N_2 ($\text{N}_2\text{-NH}_4$) rich springs have no anomalies and almost flat.

The estimation of REY species in all simulated waters demonstrated that the main REY species is carbonate complexes ($\text{REE}[\text{CO}_3]^+$ and $\text{REE}[\text{HCO}_3]^{2+}$), the second most common species is REE^{3+} . Sulfate and chloride complexes are practically absent in these waters. Regularity was established in the increase of carbonate complexes when moving from LREE towards HREE. The number of the uncomplexed form decreases in the direction of heavier REE.

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