

Mechanism of water–rock interaction of alkaline leaching uranium in Shihongtan deposit

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The saturation index of sulphate and carbonate in groundwater of Shihongtan uranium deposit in Xinjiang has been calculated by geochemical model PHREEQC (table 1).

Calcite	Dolomite	Anhydrite	Gypsum	Uraninite
0.75	1.44	0.04	0.30	-6.34
-1.30	-2.76	-0.81	-0.60	-2.76
0.00	-0.17	-0.77	-0.56	-3.71
-0.23	-0.49	-1.56	-1.35	-5.69
-0.51	-0.37	-0.97	-0.66	-3.15

Table 1: The calculated results of saturation index of mineral.

The results indicate that mining of the deposit is a difficult task by traditional acid or alkaline *in situ* leaching. Experimental researches of laboratory and field show that mining the uranium deposit is possible because of avoidance of precipitation of calcium sulphate and calcium carbonate in the aquifer, if the total dissolved solids of groundwater were diluted less than 3.45 g/L[1]. The uranium leaching is controlled by species of uranium mineral with study of electron probe. The uranium associated with kaolin or in between the grains of minerals is easier to be leached out than those associated pyrite or encompassed by the minerals[2]. Experimental researches show that more time of leaching, higher content of Ca²⁺ in recovery solution because of calcic mineral dissolution in uranium ore and wall rock. The precipitation jam of calcium carbonate during *in situ* leaching will come into being because of reducing the liminal value of HCO₃⁻ content.

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Geochemical characteristics of trace elements of sandstone-type uranium deposits in the Ordos Basin

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The Ordos basin is the second largest sedimentary basins in China, as called Shan-Gan-Ning basin, and its main body area is 2.5×10⁵ square kilometers. The Yimeng Uplift in the north, the Weibei Uplift in the south, the West Fold and Fault Belt in the west, and the Western Shanxi Flexure Belt in the east form a particular structure pattern. The Ordos basin is enriched with many energy resources and deposits [1-3], therefore, it has profound scientific sense and industrial value. Recent exploitation indicates that the sandstone-type uranium mineralization has economic value in this basin [4], it becomes the hotspot in the uranium exploration in China.

High precision ICP-MS was hired to study trace elements and REE from sandstone-type uranium deposit in the Ordos Basin, Northwestern China. We focus on the mechanism of uranium enrichments so that to present basis for further exploration. Results of total REE ranges from 30.3 to 713.4μg/g, REE distribution patterns of the sandstone-type uranium samples is light REE enriched and high REE depleted. Our study shows that high Y abundance and abnormality of Eu between 0.70~1.92. results show that U abundances are 0.73~150μg/g showing strong correlation between U enrichments and the related elements such as Ti, V, Zr, Mo and Au. In addition, thorium enrichments in most samples are correlated with ΣREE with some accordance of former study [5,6].

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