

The simulation experiment study on humic acid in the ore-forming process of sandstone-hosted uranium deposits in Northwest China

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Sandstone-hosted roll-front uranium deposits were recently discovered in Yili Basin, Tuha Basin and Ordos Basin, Northwest China. Uranium minerals in sandstone-hosted uranium deposits have frequently been reported to coexist with carbonaceous materials and sulfides. Thus precipitation of U(IV) was generally thought to form from U(VI) reduced by either sulfides or organic matters. There are many organic matters in uranium-bearing sandstone, including humic acid (HA) which is closely related to uranium precipitation and enrichment. It is found through the experiments which separated and extracted humic acid from rocks in different interlayered oxidation zones in uranium deposits in Northwest China that, the HF-HCl mixed acid can not only remove the silicate impurity from the humic acid, but also decrease the ash of the samples, thus better purifying the samples. The composition of humic acid in this area has been analyzed. The contents of C, O and H are high, and small amounts of N and S are also contained. Studied by infrared spectroscopy, the humic acid has a high aromatic degree, a big molecular weight and a low degree of humification. There are many acidic function groups in the humic acid, such as carboxyl, hydroxyl, phenolic hydroxyl, carbonyl and so on. Laboratory experiment studies have shown that acidic function groups help uranium precipitate and enrich through reduction, complexation and adsorption.

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