Occurrence of Uranium minerals from sandstone-type Uranium deposits, Ordos Basin

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Introduction

The breakthrough of sandstone-type uranium deposits in Ordos basin, northern China in recent years marks the great achievement in Chinese nuclear exploration. Sandstone-type uranium deposit is one of uranium deposits with important industrial value, which is regarded as one of the main target exploration in Chinese nuclear geology.

Results

We had reported the ore-forming condition in sandstone-type uranium deposits [1, 2] and their geochemical characteristics [3] in Ordos basin. This study focuses on occurrence of uranium minerals in these sandstone-type uranium deposits with high-resolution of SEM and EPMA. The results show that most of the uranium minerals are in micro-grained distributed in potassic feldspar, microcline, quartz, muscovite and cement in the form of very tiny grains (<1μm). The contents of UO_2 are ranging from 0 to several percentage. Generally, the high-U bearing minerals are also containing high-Th and REE in the rocks. This study is of significance to both understanding of uranium enriching processing as well as utilization and metallurgic technology of U resources in sedimentary basin.

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Rn concentration and estimation of annual effective dose in Xiazhuang Uranium Ore Field, Guangdong Province

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Xiazhuang granite-type uranium ore field is located in Ongyuan county, Guangdong province. In order to understand the radioactive environmental background in this area, the Rn concentration in soil was measured in field with FD-3017 RaA instrument. The result showed that average radon concentration in soil was 2019.42 $Bq\cdot m^{-3}$, in range of 35-70000 $Bq\cdot m^{-3}$.

And the radon concentration in the air 1m above ground surface was calculated using the earth-atmosphere radon exchange model.

$$C=\frac{\frac{A}{\lambda\eta}\cdot(\sqrt{v_1^2+4\lambda D_1\eta}-v_1)}{\sqrt{v_1^2+4\lambda D_1\eta}+v_1+\sqrt{v_2^2+4\lambda D_2}-v_2}\cdot\exp(\frac{\sqrt{v_2^2+4\lambda D_2}+v_2}{2D_2}\cdot X$$

In the formula:

$A=2.64\times10^{-4}\cdot\rho\cdot w(U)\cdot Kp\cdot\alpha$;

C is Rn concentration in air ($Bq\cdot m^{-3}$);

D_1 and v_1 are diffusion coefficient (cm^2/s) or convection speed (cm/s) of radon in rock or soil, respectively;

D_2 and v_2 are diffusion coefficient (cm^2/s) or convection speed (cm/s) of radon in air, respectively;

ρ is density of rock or soil (g/cm^3);

w(U) is uranium concentration in rock or soil (%);

λ is decay coefficient of radon (s^{-1});

Kp is balance coefficient between uranium and radium;

α is emanation coefficient of rock or soil;

η is porocity of rock or soil;

X is the height between ground surface and measuring point (cm).

The research indicated that, the mean values of radon concentration in air was 56.21 $Bq\cdot m^{-3}$, in range of 26.98-167.67 $Bq\cdot m^{-3}$. The annual effective dose caused by radon was 3.81mSv, about 3 times higher than that in our country which is 0.88 mSv.

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[1] Zuoyuan (2002) *International congress series* **1225**(2), 39-46.