

A Study on U-Ra equilibrium coefficient of Xiazhuang Uranium ore field and its application

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Xiazhuang uranium ore field is an important uranium resource base in China where exploration and mining have been conducted more than 50 years. In order to choose the effective nuclear measurement method "Expanding the horizontal scope of ore deposits", it is necessary to study the U-Ra equilibrium coefficient.

The U-Ra equilibrium coefficient is, in the radioactive uranium series, the ratio between the ratio of the U and Ra quantities in rock or in soil and those in the state of equilibrium. It can be calculated with formula (2):

$$k_a = 2.9 \times 10^6 C_{Ra} / C_u \quad (2)$$

In the formula (2), k_a is the U-Ra equilibrium coefficient; C_{Ra} is the activity concentration of radium; C_u is the activity concentration of uranium.

When $k_a = 1$, U and Ra is in the state of equilibrium in research area; when $k_a > 1$, the radium is more than uranium, named rich radium; when $k_a < 1$, the radium is less than uranium, named rich uranium.

The U-Ra equilibrium coefficient (k_a) is determined approximately equal to 1. Based upon 125 soil samples from five different districts of Xiazhuang uranium ore field, $k_a \approx 1$ was found, which showed the equilibrium state between U and Ra. It means: the results measured by α and γ ray emitted from the radio-nuclides of U series can be applied to evaluate the uranium distribution in this region and both α measuring technique and γ measuring technique are applicable.

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The distribution of salinity and pH in the coastal estuarine mangrove wetland soil

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Study Site and Materials

The study was conducted on the mangrove wetland soil in Quanzhou Bay, East China. Five types of plots (new alluvial without plants (NA), with *Aegiceras corniculatum* (AC), with *Kandelia candel* (KC), with *Avicennia marina* (AM), and with *Spartina alterniflora* (SA)) were selected. Soil samples were taken from upstream, midstream and downstream of Luoyang River, respectively.

Results and Discussion

The difference of the influence on the salinity and pH is significant among the mangrove plants. In the soil of NA, the salinity and pH were highest, and coefficients of variance (CVs) of salinity and pH were smallest among plots. The salinity and pH in the soil from downstream were significant higher than those in the soil from other reaches of Luoyang River, the highest value occurred in AC and AM, and the lowest value in SA. CVs of salinity and pH in the soil from downstream were less than those in the soil from other reaches of Luoyang River (except in SA), and those in the soil from upstream were highest (except in SA). It suggested that the heterogeneity of the soil in the coastal estuarine mangrove wetland resulted from the living plants, the adaptability to salinity and desalinization varied plant species, and the desalinization of *K. candel* was the strongest among the mangrove plants in Quanzhou Bay (*S. alterniflora* is alien invasive species). These findings offer a theoretical foundation for the selection of plant species during ecological restoration of the coastal soil salinity.

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