

## Behavior of Uranium Isotopes in the Ground Water on the Okchun Belt

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### Abstract

The ground water samples obtained from the Okchun Belt in Korea were separated into particulate and filtered fraction using filtration techniques with 0.45  $\mu$ m of membrane filter, and concentrations and activity ratios of uranium isotopes in the fractions were determined by the chemical separation and alpha spectrometric measurements. Most of the uranium isotopes in the ground water was found in the filtered water. Only less than 1 % of total uranium isotopes was detected in the particulate fraction. The concentrations and activity ratios of uranium isotopes in the ground water measured in this study were variable, depending upon its solubility in the ground water as well as the geological characteristics of the aquifer. The concentrations of  $^{238}\text{U}$  in the ground water at the hot spring area were found to be about four times higher than those at other sites in the Chungcheng area. The activity ratios of  $^{234}\text{U}/^{238}\text{U}$  in the ground water at the hot spring water were close to the equilibrium value (1.10  $\pm$  0.07), while in other sites in Chungcheng area, the activity ratios of  $^{234}\text{U}/^{238}\text{U}$  were variable with the range from 1.20 to 3.58.

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## A Study of Complexation of $\text{UO}_2(\text{II})$ by Fulvic Acid Using Synchronous Fluorescence Spectroscopy

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### Abstract

A fulvic acid isolated from a Korean volcanic soil was divided into three different molecular weight fractions ( $F_1$ : less than 200 daltons,  $F_2$ : 200 - 1,000 daltons, and  $F_3$ : 1,000 - 4,000 daltons) by gel filtration chromatography and the fractions were studied by synchronous fluorescence (SyF) spectroscopy. The information about their interaction with the  $\text{UO}_2(\text{II})$  ion in aqueous solution (100  $\text{mg L}^{-1}$  of FA, in 0.1 M  $\text{NaClO}_4$  at pH 3.5) was obtained from the measurement of SyF spectra at increasing concentrations of the metal ion. Principal component analysis of the quenching spectra provides two distinct emission peaks having maximum peak position of 390 nm (type I) and 498 nm (type II) for the fulvic acid samples. From the analysis of the fluorescence quenching profiles of the peaks by a non-linear method, the conditional stability constants ( $\log K$ ) were calculated for the two types of binding sites in the fulvic acid samples. They are  $F_1(5.33)$ ,  $F_2(4.83)$  and  $F_3(4.40)$  for type I sites, and  $F_1(4.82)$ ,  $F_2(4.49)$  and  $F_3(4.10)$  for type II sites, respectively.