A Geochemical Study on Source of Radionuclides in Groundwater, South Korea

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South Korea is located at NE Asia and occupies the half of Korean peninsula. Recently, more than 4200 wells have been investigated for radionuclides concentration such as uranium and radon in groundwater. Rn and U concentration in groundwater for drinking water ranged from 0 to 7219 Bq/L (mean: 99 Bq/L) and 0 to 3607 μg/L (mean: 8 μg/L), respectively. The rate of Rn concentration exceeding US EPA guideline level limit of 148 Bq/L was 17% of the total well and the one of U exceeding that of 30 μg/L was 4% [1]. Close inspection on host rock geology and radionuclide content of groundwater has continuously conducted by South Korean government authority, it has been found that radionuclides such as uranium and radon are highest in groundwater in granite areas. However, the exact granitic rock types and minerals responsible for radionuclide groundwater have not yet been identified except for the possible cause of reaction between waters and the surrounding granitoid. This study is focused on identifying the host rock serving as radionuclide source of groundwater in South Korea. For this work, spatial distribution pattern of radionuclide groundwater according to host rock and whole rock geochemical data related with radioactive element is investigated based on the previous research data on groundwater and granite. The spatial distribution pattern of U and Rn groundwater show preferential localization to the Mesozoic granitic pluton and poor correlation between U and Rn. Mesozoic granite of South Korea are divided into Jurassic granite (JGR) and Cretaceous granite (CGR) which are the representative igneous rocks of South Korea. The majority of groundwater with high U and Rn concentration occur in JGR and CGR within northern tectonic province in South Korea, on the contrary, they do not occur in JGR and CGR within that of southern one. Compared with JGR and CGR within southern tectonic province, those of northern one were resulted from parental magma with higher ratio of crustal material and highly differentiated product of fractional crystallization. This petro-genetic contrast between JGR and CGR according to tectonic province may explain the spatial distribution pattern and source of U and Rn in groundwater of South Korea. Acknowledgement: This study was supported by the Korea Environmental Industry & Technology Institute (KEITI) through "Demand Responsive Water Supply Service Program", funded by the Korea Ministry of Environment (MOE) (#146523)

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