

Simultaneous Analysis of Radium and Radon in Groundwater Sample by HPGe Detector

Bum Kyoung Seo, Kil Yong Lee, Yoon Yeol Yoon

*Korea Institute of Geoscience & Mineral Resources,
30 Gajung-dong Yuseong-gu Daejeon, Korea, 305-350*

Generally, radium in water sample is measured by α -ray spectrometer with LSC. But LSC methods require a complicated sample preparation. In this work, we developed direct and simultaneous measurement method which was performed by the HPGe detector in order to measure radium and radon in groundwater.

When samples contained a low level radium were analyzed by HPGe detector after reaching radioactive equilibrium with daughter nuclides, the most problem was the interference with airborne radon daughters and the escape of gaseous radon from container during radioactive equilibrium. In order to prevent escaping radon, a aluminum Marinelli beaker was manufactured. Gaseous radon was not released from the aluminum beaker, so radioactive equilibrium with radium and its daughter nuclides could be reached. In order to reduce airborne radon daughters, the detector chamber was purged with nitrogen gas. The background of airborne radon daughters, ^{214}Bi and ^{214}Pb , were certainly decreased by nitrogen purging.

For the determination of full-energy peak efficiency, NIST ^{226}Ra standard solution was used. Optimal measurement condition - counting time, sample volume, N_2 gas atmosphere etc. - was studied using the running standard solutions. The MCL proposed by EPA for ^{226}Ra (20 pCi/L) could be satisfied by the optimized standard solutions.