Geophysical Research Abstracts
Vol. 14, EGU2012-1416, 2012
EGU General Assembly 2012

Hydrochemistry and origin of CO_2 gas and noble gas of carbonated mineral water in the Gyeongbuk-Gangwon Province, South Korea

C. H. Jeong and S.W. Yoo

Daejeon University, Geological Engineering, Daejeon, Democratic People's Republic Of Korea (chjeong@dju.ac.kr)

Hydrochemical, carbon isotopic (δ13CDIC) analyses of 11 samples, and noble gas isotopic analyses of 8 samples collected in the Gangwon and the Gyeongbuk area of South Korea were carried out to elucidate hydrochemical characteristics and to interpret the source of noble gases and CO_2 gas.

The carbonated mineral waters show a weak acidic pH between 5.59 and 6.04. An electrical conductivity of carbonated mineral waters ranges from 302 to 864 μS/cm. The chemical composition of all carbonated mineral waters can be grouped into only one type such as Ca-HCO_3. A high content of Fe and Mn in carbonated mineral waters exceeds a regulation limit of drinking water.

The δ13CDIC values of carbonated mineral waters show the range of -5.30[U+FF5E]-2.84 ‰This range indicates that the carbon of carbonated mineral waters is mainly supplied from a deep-seated source and partly from an inorganic carbonate source. The 3He/4He ratios of the carbonated mineral waters show the range of 1.51×10-6 to 6.45×10-6.

The carbonated mineral waters on the 3He/4He and 4He/20Ne diagram are plotted into three groups: deep seated area such as mantle source, atmospheric area, and air-mantle mixing area. A wide range of 4He/20Ne ratios is observed (0.036×10-6 to 1.76×10-6), showing evidence that while radiogenic 4He is dominant in these water samples, He of mantle-origin is also supplied to these waters. It is estimated that supply of CO_2 gas and noble gas of a deep-seated source into carbonated waters is closely related to geologic structures such as fault and geologic boundary.

Key words: carbonated mineral waters, hydrochemical composition, carbon isotope, 3He/4He, deep-seated origin