

GEOCHEMISTRY OF THE CO₂-RICH WATER IN THE GRANITE TERRAIN, KOREA

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Chemical and isotopic compositions of CO₂-rich waters from springs or boreholes located in Kangwon Province were examined. The CO₂-rich waters (pH=5.5-6.3) emerge from Mesozoic granite in the range of 10 to 33°C. The CO₂-rich water (up to 1 atm, P_{CO2}) might be formed by CO₂ supplied at depth during groundwater circulation. This process leads to the dissolution of minerals along the flow path and the enrichment of Ca, Na, Mg and K. The water chemistry (mostly Ca-HCO₃ type) of the CO₂-rich water is shown to be the result of interaction between CO₂-rich waters and aluminosilicates. The CO₂-rich waters might undergo several processes, such as cooling and dilution while ascending to the surface. The higher tritium contents indicate mixing between deep CO₂-rich water and surface waters. The oxygen-18 and deuterium data indicate that the CO₂-rich waters are of meteoric water origin and has lighter isotope composition than younger waters (shallow groundwater). Carbon isotope shows a composition associated with mantle-derived CO₂. However, further study is necessary to identify CO₂ source. High sulfur isotope values of sulfates dissolved in some CO₂-rich water indicate that sulfate reduction occurred at depths. The strontium isotope ratios of the waters to granite show that the source of Ca is dominantly attributed to plagioclase of a host rock.