

## **Geochemistry and Genesis of CO<sub>2</sub>-rich Groundwater from Jurassic Granite and its Nearby Rocks in Korea**

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Several CO<sub>2</sub>-rich springs are found in Jurassic granite and its nearby rocks in Korea. The 44 soda waters are grouped into two different chemical types: Na-HCO<sub>3</sub> and Ca-HCO<sub>3</sub> types. The water is characterized by a high CO<sub>2</sub> concentration ( $P_{CO_2} = 0.51 \cdot 1.12$  atm), pH buffering (4.9•6.86) by H<sub>2</sub>CO<sub>3</sub>/HCO<sub>3</sub> couple, and electrical conductivity ranging from 120 to 3500 •S/cm. The occurrence of the soda water is mainly controlled by geologic structures such as the contact zone between Jurassic granite and Precambrian gneiss, and fault zone. The most of soda water is naturally discharged along fissures of the valley floor. Environmental isotopic data (<sup>2</sup>H/<sup>1</sup>H, <sup>18</sup>O/<sup>16</sup>O) indicates that the CO<sub>2</sub>-rich water is of meteoric origin. The high  $P_{CO_2}$  and carbon isotope data ( $\delta^{13}C = -17.2 \cdot -0.2$  ‰) suggest that carbon of carbonated water would be derived from following sources: (1) deep-seated CO<sub>2</sub> mixed with carbonate minerals of Precambrian gneiss and Cretaceous sedimentary rock intruded by granite, and (2) deep-seated CO<sub>2</sub> mixed with biogenic origin. The source of deep-seated CO<sub>2</sub> may be closely related to Jurassic granite. The chemistry of the soda water may be controlled by mineral assemblage of parent rocks, reacting along groundwater flowpath and amount of CO<sub>2</sub> supplied from deep-seated zone. The water has been long known as a medicinal water because of its unique therapeutic effect against calcium deficit, stomach and skin troubles, etc.. The therapeutic effect of the soda water may be due to the high contents of calcium and CO<sub>2</sub>. However, the quality of soda water from several springs is deteriorated by anthropogenic NO<sub>3</sub><sup>-</sup> and high content of natural origin As, F, Fe, Mn, etc..