Effect of highly alkaline solutions on swelling pressure of compacted Gyeongju Ca-bentonite

JI HOON LEE[1*], AND HO YOUNG JO[1]

[1]Korea University, Earth and Environmnetal Sciences, Seoul, Republic of Korea, lzh9008@korea.ac.kr ([*]presenting author)

Bentonite is considered as a buffer materal of multi-barrier engineered systems in deep geological high-level radioactive wastes (HLRW) repositories. The alkaline groundwater contacted to cement materials may affect properties of bentonite buffer. In South Korea, Ca-bentonite produced from Gyeongju of South Korea is considered as a buffer material. The purpose of this study was to evaluate swelling pressure of compacted Gyeongju Ca-bentonite in contacted with highly alkaline solutions for various contact times. Highly alkaline solutions ($Ca(OH)_2$) and deionized (DI) water were used as liquids for saturation and permeation. Gyeongju Ca-bentonite mixed with highly alkaline solutions at various water contents were compacted (dry desity: 1.4–1.8 g/cm^3) and cured in different temperature conditions for various periods. The temporal changes in the swelling pressure of the compacted Gyeongju Ca-bentontie were measured using a swelling pressure measuring equipment by circulating a highly alkaline solution or DI water. The effluent solution composition and bentonite properties (e.g., mineralogy, mophology, cation exchange capacity) were determined after completion of the tests. The dry density of the compacted Ca-bentonite affected significantly the swelling pressure. The effect of the highly alkaline solution on the swelling pressure was less significant, but was improved when the specimen was reacted at elevated temperatue for a long time. Theses results suggest that the combined thermal and chemical processes can affect physical properties of Ca-bentontie buffer.