# A Thermodynamic Analysis on Effect of Sodium Hydroxide on Swelling Stress of Na-Bentonite

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**Thermodynamic Analysis**

Na-bentonite which is one of the natural clays is used as a buffer material and a backfill material for the radioactive waste disposal system. Bentonite has the nature of swelling by contacting with water and it is important for sealing function.

In this study, the effect of sodium hydroxide (NaOH) on swelling stress of Na-bentonite was analyzed based on the thermodynamic approach [1, 2]. Figure 1 shows the calculated results of bentonite as a function of montmorillonaite partial density and NaOH concentration.

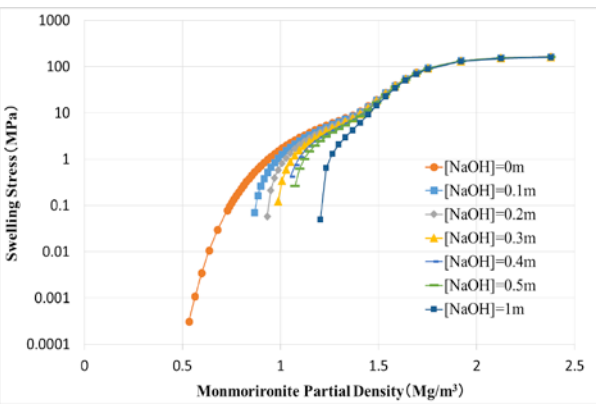


**Figure 1:** Comparison between calculated swelling stresses and measured values for each NaOH concentration.

**Discussion of results**

The calculated swelling stress decreased with increasing NaOH concentration. However, although the experimental data were obtained in the condition of high ionic strength, those were approximately the same as results calculated in the condition of distilled water. Considering the experimental period was several tens of hours, there is a possibility that power water dose not reach equilibrium state.

[1] H. Sato (2007) ICONE15, ICONE15-10207, 7 pages.
[2] H. Sato (2008) Phys. and Chem. of the Earth **33**, S538-S543.