Experiment of precipitation of salt for dry-out condition caused by CO_2 storage in saline aquifer

*Hayato Morigaki[1,2], Masaatsu Aichi[1]

1. University of Tokyo, 2. Toshiba Energy Systems & Solution Corporation

Since CO_2 is transported in dry condition to prevent corrosion of the press-in pipe, CO_2 injected into the saline aquifer may evaporate water and dry the formation. In this case, there is concern that the porosity and permeability of the reservoir will decrease due to salt precipitation and clogging. On the other hand, the influence of cap rock on the sealing ability has not been considered sufficiently.
In this study, in order to observe the state of salt precipitation while controlling the degree of drying, the experiment was carried out with humidity control to generate a suction of about 100 MPa using a thermo-hygrostat. In the experiment, the core sample with the side sealed and the brine reservoir attached at the bottom was placed in the humidity control space, and the water evaporation from the top of the core sample was measured and the precipitation of salt was observed. In addition, in the comparison between before and after this experiment, we also tried to evaluate the influence of semipermeable membrane performance of mudstone on the presence or absence of precipitation and change in salt concentration of brine in the reservoir. The salt concentration of the reservoir, which was assumed to be the saline aquifer, was set at 0.6 mol / L as seawater, and when experiments were conducted assuming that the brine saturated rock was exposed to dryness, it was confirmed that the flux of moisture did not change remarkably before and after salt precipitation on the muddy sandstone of the Otadai Formation, the mudstone of the Otadai Formation and the mudstone of Wakkanai Formation. Also, the salt transport inhibition due to the semipermeable membrane effect was not noticeable. This suggests it is not necessarily expected that the precipitation of salt by drying improves CO_2 shielding performance of cap rock.

Keywords: saline aquifer, salt precipitation, reflection coefficient

