

Reaction mechanism between sedimentary rocks and groundwater: a case study in Chiba, Southeastern Japan

Hirohiko Kashiwagi[1], Naotatsu Shikazono[1]

[1] Keio

A kind of the aquifer, for instance, type of minerals and chemical composition, is a critical problem to consider CO₂ sequestration in the aquifer. Some simulation studies have been performed to predict the reactions among the aquifer, carbon dioxide, and solution after sequestration (e.g., Gunter et al., 2000), and from these results, it is generally believed that sedimental basin is preferable to the sequestration in aspects of the trapping ability of carbon dioxide.

Consequently, we have collected and analyzed the rocks and groundwaters in Chiba Prefecture, where the stratigraphy is relatively revealed and uniform, and discussed the mechanism between the solid and aqueous phases as a sort of natural analogue study.

As a result, the followings have been revealed. The property of groundwater is quite different from the western to eastern areas in the center of the Chiba Prefecture. Especially in the eastern areas, many water samples are found to be derived from brine water. On the other hand, the compositions of the rocks do not differ from place to place.

Moreover, it is indicated that, in the western areas, property of water is possibly largely influenced by the dissolution of the parent rocks, but that in the eastern areas it is difficult to explain the water quality by rock dissolution. In this case, we could consider the possibility that the water property is resulted from ion exchanges and absorption by the secondary minerals.

It has been concluded that we should consider that the water quality varies from one locality to another even in the narrow areas when we consider the influence on the geological formation and groundwater quality in the vicinity of the sequestration spot of CO₂. Also, we should take into account the ion exchange and absorption which are not assumed in the numerical models as mentioned above.