Geochemical reactivity of reservoir rocks on the Nagaoka CO_2-injection test site

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On the long-term stability assessment of CO_2 under-ground sequestration, the new method to compare the reaction potential of reservoir rocks quantita-tively was developed. In this method, we defined the reaction ratio of rocks based on detailed mineralogy considering also the difference of existence form (grain, rock fragments and matrix/cement). The reaction ratios estimated for sandstone core samples from the Nagaoka CO_2-injection test site varied significantly depending on rock facies even within the same Ic-formation. This means that our reactivity contributes not only to the prediction of a fate of injected CO_2, but also to future selection of target stratum for CO_2 underground sequestration.

On the other hand, the actual rate and reaction amount of reservoir rocks can be predicted from the dissolution process of feldspar, which is key mineral on CO_2 underground sequestration. In order to examine the effect of saturation index change of solution, feldspar dissolution experiments were performed under various water/mineral ratios. The results indicated that the steady-state dissolution rate drastically decreased as the solution approaches to equilibrium. In closed system, the increase rate of saturation index is controlled by a water/mineral ratio, and as a result, the dissolution amount of feldspar also changes with this ratio. In fact, the simple calculations using our dissolution rates revealed that the volume change of reservoir rocks is strongly dependent on saturation index of solution. For an improvement of reliability on the timescale of geochemical processes, we should prepare the dataset of dissolution rates of each mineral under various undersaturations.