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Sorption Characteristics of CO_2 on Rocks and Minerals in Storing CO_2 Processes

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Author(s)

Takashi Fujii, Satomi Nakagawa, Yoshiyuki Sato, Hiroshi Inomata, Toshiyuki Hashida

ABSTRACT

As CO_2 is injected into pore spaces of water-filled reservoir rocks, it displaces much of the pore fluids. In short terms (several to tens of years), the greater part of the injected CO_2 is predicted to stay as free CO_2, i.e. in a CO_2 rich dense phase that may contain some water. This paper investigates the sorption characteristics for rocks (quartzose arenite, greywacke, shale, granite and serpentine) and minerals (quartz and albite) in the CO_2 rich dense phase. The measurements were conducted at 50 °C and 100 °C, and pressures up to 20 MPa. Our results demonstrated that significant quantities of CO_2 were sorbed with all the samples. Particularly, at 50 °C and 100 °C, quartzose arenite showed largest sorption capacity among the other samples in higher pressures (>10 MPa). Furthermore, comparison with model prediction based on the pore filling model, which assumed that CO_2 acts as filling pore spaces of the rocks and minerals, suggested the importance of the sorption mechanism in the CO_2 geological storage in addition to the pore-filling mechanism. The present results should be pointed out that the sorption characteristics may have significant and meaningful effect on the assessment of CO_2 storage capacity in geological media.

KEYWORDS

Sorption Characteristics, Rocks, Minerals, Storing CO_2 Processes, CO_2 Geological Storage

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