High pressure adsorption behaviors of carbon dioxide on clay minerals

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CO2 storage in geological formations has been focused as a promising method to reduce anthropogenic CO2 emission. Possible sites for sequestration are saline aquifers, depleted gas and oil reservoirs or unminable coal seams. The common aspects of all these storage options are the sealing integrity of cap rocks above CO2 storage reservoirs and its changes due to the interactions with CO2. Clay mineral is one of major constituents of cap rock and coal mineral matter. In this study, sorption experiments on clay minerals were conducted to get information about the sealing integrity and additional storage potential of cap rock.

CO2 adsorption characteristics on a few kinds of clay minerals were measured by gravimetric method. Considering reservoir conditions, the experimental temperature and pressure were set from subcritical to supercritical condition for CO2. The structural and textural changes of clay minerals due to CO2 sorption were observed from comparison of BET analysis result of raw material with sample exposed to CO2. Based on the result, the additional storage potential of CO2 seems to be provided through immobilization in cap rock due to sorption.