

## High pressure adsorption and desorption behaviors of methane on coal

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The recovery of coalbed methane can be enhanced by injecting carbon dioxide in the coal seam at supercritical conditions. In this context, The adsorption isotherms were measured at 318.15 K and 338.15 K over a pressure range from 0 to 120 atm on dry and wet coal (Kyungdong coal, South Korea) by a volumetric method, respectively. In addition, desorption isotherms were also investigated correspond to every adsorption situation. Desorption hysteresis phenomenon was observed. The excess adsorbed amounts of methane were fitted by Modified Dubinin–Radushkevich (DR) and M-DR+ k isotherm models. Though taking into consideration adsorbed phase volume, absolute adsorbed amount was introduced to display the true supercritical adsorption behavior. Furthermore, the comparison of excess and absolute adsorbed was represented. Moist coal had a significantly lower sorption capacity for methane than dry coal. The thermodynamic calculations of methane absorption and water vaporization were considered in order to explain and modify the wet coal isotherms.