# Characterization of methane adsorption on mature marine shale and its isolated kerogen

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A series of methane adsorption isotherms were measured at 60°C, 100°C and 140°C at pressure up to 60 MPa for a mature organic rich marine shale ($R_o$ 1.79%, TOC 3.95%) from northeast Sichuan Basin, southwest China and its isolated kerogen. The absolute adsorption capacity of methane on kerogen range from 6.496 to 8.083 mg/g rock and are far larger than which of shale (0.882 to 1.547 mg/g). The Langmuir pressure of kerogen range from 2.426 to 6.546 MPa and are lower than which of shale (1.352-2.355 MPa).

The thermodynamic parameters for adsorption were also calculated in this study. The isosteric heat of adsorption of kerogen is 13.127 kJ/mol and higher than which of shale (8.173 kJ/mol), the standard entropy of kerogen is -46.684 J/(mol□K) and lower than which of shale (-27.088 J/(mol□K)).

The weight proportion of kerogen in the shale sample is 10.69% which was calculated by comparing the TOC values of kerogen and shale. Then proportion of methane adsorbed on kerogen in total methane adsorption of shale in the measurement was calculated. The proportion range from 47.8 to 72.2 % and show an increase trend with the increasing of temperature and pressure, which indicate that the proportion of methane adsorbed on kerogen in total methane adsorption of shale increase with the increasing of shale formation depth.

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