

Effect of organic matter on pore structure of mature lacustrine organic-rich shale: a case study of the Triassic Yanchang shale, Ordos Basin, China

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The effect of extractable organic matter and solid organic matter on the pore structure of shale from Yangchang Formation in the Ordos Basin, China is investigated in this study. The shale samples were successively crushed, extracted by dichloromethane to remove extractable organic matter, treated by hydrogen peroxide to remove solid organic matter. The porosity, organic and mineralogical characteristic of original, extracted and H₂O₂ treated shale samples were analyzed via low pressure gas adsorption measurement, X-ray diffraction (XRD) and Rock-Eval pyrolysis. Results show that pores in the studied shale were occupied and blocked by extractable organic matter with varying degrees which seriously affect porosity. Pores with small diameter will be preferential occupied and blocked. The plentiful generation of hydrocarbon in organic-rich shale will lead to high fluid pressure in pore which protect pore from compaction during evolution and lead to a higher porosity. This protection mainly act on macropores. Pores in the studied shale were dominated by quartz-related and clay-related pores, and organic matter hosted pore is rare. Solid organic matter content act as a harmful factor to total porosity of studied shale. Firstly, high content of solid organic matter reduce the relative content of quartz and clay minerals then lead to a low total porosity. Secondly, solid organic matter occupied and blocked pores related to quartz and clay minerals.

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