Evolution and controlling factors of shale pores

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Low mature shale samples selected from Ordos Basin are performed diagenetic physical simulation experiment. The simulated samples thereafter are obtained porosity by mercury intrusion and gas adsorption. Combing residual hydrocarbon measurement results, we come to delineate the coupling relationship of pore evolution and residual hydrocarbon. Following results are listed below:

1) Mercury intrusion and CO_2 and N_2 gas adsorption can make characterization of shale pore available, which could be recognized as the key technique for quantitative description.

2) Pores do have exist in shale and diagenetic physical simulation experiment show that specific pore volume of macropores increases firstly and decreases then, while mesopores and micropores decreases firstly and increases then, which provides theoretical supports for shale gas exploration in high-over mature stage.

3) Pore evolution in shale is concerned with mineral transition and hydrocarbon generation. Macro pore distribution is directly proportional with the content of pyrite. Mesopore distribution is directly proportional with the content of clay mineral and micro pore is affected by TOC inversely.

4) Residual hydrocarbon has three occurrences situations, such as oil film, hemisphere-sphere, and filamentous. Organic pore are mainly controlled by maturity, abundant organic pore developed in 380°C(Ro%=1.2%).