

Clay mineral characteristics and quantitative effects on the reservoir properties: A case of Cretaceous Bashijiqike of Kuqa foreland thrust, Tarim basin, China

ZHANG RONGHU SR.

Petrochina Hangzhou Research Institute of Geology

Presenting Author: 51470955@qq.com

The ultra-deep reservoir in Kuqa foreland thrust belt with properties of ultra-low porosity, ultra-low-low permeability, fracture-pore spaces and high yield test is very important target for gas exploration and development at present. To elucidate the characteristics of clay minerals and its control functions on reservoir evolution and reservoir characteristics, this paper is based on lots of micro-experiment analysis X-ray diffraction, scanning electron microscope, confocal laser scanning microscope, casting thin sections, high pressure Hg injection . Results indicated that clay mineral content is 5% 12% composed by illite and illite-montmorillonite mixed-layer mainly and chlorite secondly. The clay minerals are generated by succession sedimentary water precipitation in early stage of diagenesis and feldspathic dissolution in middle and late stage of diagenesis. The early sedimentary clay mineral in the sandstone are mainly enriched in the edge of the delt front or near the top and bottom of the water channel, and its membrane can effectively inhibit overgrowth of quartz and feldspathic in the ultra-deep reservoir in early and middle stage of diagenesis and preserve matrix pores. The clay matrix of different stage can provide mineral intercrystal micropores with porosity of 1% 4% and the intercrystal micropore is one of the main gas reservoir spaces. Clay minerals are the main controlling factor for reducing reservoir permeability. The clay mineral content of 6% 9% especially illite and illite-montmorillonite mixed-layer can reduce the permeability of ultra-deep reservoir by 10 100 times, and result the overall permeability is $0.01 \times 10^{-3} \mu\text{m}^2$ - $0.1 \times 10^{-3} \mu\text{m}^2$. The content of clay mineral and its occurrence characteristics are the key factors for the well preservation of reservoir in the long time 130 23 Ma shallow buried < 3 000 m period, the dramatic decrease of matrix permeability in late 23 Ma deep buried > 3000 m period and reservoir overall densifying $< 0.1 \times 10^{-3} \mu\text{m}^2$. The characteristics and distribution