

Characteristics of Dolomitic Tight Oil Reservoirs of Permian Lucaogou Formation in Jimusar Sag, Junggar Basin

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Abstract

Dolomitic tight oil reservoir is widely distributed in Lucaogou Formation from Jimusar Sag, which has become an important exploration domain in the Junggar Basin in recent years. In this paper, based on a vast amount of data from core drilling, rock thin sections, scanning electron microscope, electron probe and geochemistry analysis, the characteristics and influencing factors of dolomitic tight reservoir of Lucaogou Formation has been studied in detail. The Lucaogou dolomitic rocks in a salty lake are jointly controlled by mechanical deposition, chemical deposition, local biogenic effects and volcanic actions. The lithologic composition is very complicated with most belonging to transitional rocks. It is showed that the Lucaogou reservoir rock types are mainly dolomitic siltstone, dolarenite and dolomicrite. Observations of casting thin sections and EMPA showed that reservoir space mainly consists of residual intergranular pores, dissolved pores, intercrystalline pores. Dolomitic reservoir is characterized by low porosity and low permeability, with the average value of 7.8% and 0.27 md, respectively. Pores radius and pore-throat radius mainly range from 2 to 50um and 50nm to 500nm, respectively, belonging to micro-pore and fine-throat type reservoir. The oiliness of dolomitic tight reservoir has a certain correlation with lithology and physical properties. The dolomitic tight reservoir from Lucaogou formation is now in the stage A of middle diagenesis, and the main digenesis of which mainly including mechanical compaction, cementation, dissolution, recrystallization and dolomitization. Dissolution can be divided into two stages, which has greatly improved physical properties of dolomitic reservoirs, while mechanical compaction and cementation result on the reducing of physical properties. Physical property of dolomitic reservoir is mainly influenced by sedimentary environment and diagenesis. Sedimentary environment plays a decisive role on the quality of dolomitic reservoir, while dissolution and dolomitization play an important role on the modification of reservoir space. The dolomitic flat and shore-beach sandstone facies are the favorable facies for the distribution of "sweet spots". Huge amount of dissolved pores is necessary to improve the physical properties and enhance the reservoir capability of dolomitic reservoir.