

Supergene karstification simulation and its research significance of the gypsum-salt-carbonate reservoir in the Majiagou Formation, Ordos Basin

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The Ordovician Majiagou formation in Ordos basin develops a very typical symbiotic gypsum-salt and carbonate system. The first, the third and the fifth member of Majiagou formation are mainly dominated by evaporates. The second, the fourth and the sixth member are mostly carbonates. Among the members, the fifth member is the most prolific natural gas-producing zone in the Lower Paleozoic. In order to quantitatively evaluate the influences caused by supergene karstification on the pores in gypsum-salt and carbonate reservoirs, the author selects four rock types including salt-bearing dolomite, dolomite-bearing gypsum, dolomitic gypsum and gypsum-bearing dolomite to carry out seven groups of supergene karstification experiments under real geological condition. ❶ According to the fact, conditions of the supergene experiment are set as normal pressure, CO₂-saturated water (15%-3%) and a temperature of 30°C. ❷ To accomplish the physical supergene dissolution simulation experiment, seven samples should be firstly weighed at 50 grams, respectively. Then deionized CO₂-saturated water is put in. Later, the containers should be put into an oven together, with a constant temperature at 30°C for continuous 120 hours. ❸ The pore characteristics before and after the dissolution of gypsum-salt and carbonate reservoir show that pore diameter increases from 2μm to 700~3000μm in salt-bearing dolomite, from 1μm to 6.6~21μm in dolomite-bearing gypsum and from 0.582μm to 23μm in gypsum-bearing dolomite. The supergene karstification experiment on Majiagou formation in Ordos basin shows that the porosity can be promoted by at most 6%-20% after supergene karstification. This further explains why the dolomitic flats facies in Majiagou formation develops large scales of good-quality reservoirs and lays the experimental foundation for illustrating the formation mechanism of karst reservoirs in symbiotic carbonate-evaporate systems and predicting their locations.