Experimental Study on Formation Mechanism of Sand Lens Reservoirs

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Sand lens reservoir is gradually becoming an important exploration target in rift basins in eastern China that are relatively mature in terms of exploration. The formation mechanism of sand lens reservoirs and the corresponding controlling factors are still not clear. In order to understand the mechanism better, based on the results of sedimentary-facies analysis, burial depth, fluid pressure, and the stress states during oil and gas migration of actual sand lens reservoirs, a series of geological models have been constructed. Ten groups of comparative experiments have been planned to carry out in a hollow, transparent Plexiglas pipe with I.D. 22cm and O.D. 24cm and length of 30cm. Inside the pipe, a sand lens, filled by water-wet quartz sand with different permeability, is surrounded by argillaceous rock with different oil saturation. The temperature and pressure will be changed according to different experimental model; the oil distribution in the sand lens will be scanned by using NMR imaging technique. Based on the above experiments, we shall make use of numerical simulation to confirm the experimental results and to determine the threshold for oil accumulating in sand lens. Finally we shall try to establish the quantitative relationship between the degree of filling of sand lens and the temperature, pressure, burial depth, and other geological factors.

This experimental study not only can provide quantitative criteria for prediction of the degree of oil filling of sand lens reservoir under different geological conditions but also can help raise the exploration efficiency for subtle trap reservoirs in rift basins of eastern China.