Quantitative Characterization on The Densification Process of Sandstone Reservoirs

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ABSTRACT

The researches about densification process of sandstone reservoir is significant for hydrocarbon accumulation mechanism of tight sandstone, which is instructive and meaningful to tight oil and gas exploration. At present, the remaining resources amount of Dongpu sag which is located in the southwest Bohai Bay Basin, Eastern China mainly concentrated distributes in the unconventional reservoirs. Among them, the middle Sha 3 member of Paleogene Shahejie Formation is one of the main tight reservoir in the north area of Dongpu sag. Therefore, the research is mainly focus on the densification process of sandstone reservoirs, which is characterized quantitatively. It is convinced that the result can be guidable in tight oil and gas exploration.

The densification of sandstone reservoirs is mainly result from the combination of compaction and cementation, which can reduce the porosity, and dissolution which can increase the porosity. However, the phenomenon of overpressure and different types of clastic particles will have certain effects on compaction effect. In this project, the middle Sha 3 member of Shahejie Formation is selected as research object and the research methods which is the combination of macro analysis and micro observation are adopted. Then, we will obtain evolution characteristics of diagenesis at different depth by some experiment such as microscope observation, cathodoluminescence, SEM analysis and X-ray diffraction and so on and porosity data which is come from sonic-logging curve. Further synthesizing the data statistics of residual intergranular pore volume of microscopically thin section observation, the volume of cement, the volume of secondary dissolution pore, the experiment simulation of compaction and mathematical model derivation, respectively established the function between geological time and the effect on porosity which made by compaction, cementation and dissolution.

Prospectively, quantitative model can be established, which will be used to evaluate the reservoir quality and predict the distribution of tight oil and gas of the middle Sha-3 member in Dongpu Sag. It is believed that the quantitative model of the densification process possesses great significant in guiding exploration of tight sandstone oil and gas reservoir.

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