

Reservoir characteristics of volcanic rocks in the Northeast of Junggar Basin, China

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The Junggar basin is a part of central Asia orogenic belt and the Carboniferous is an important transition period of ocean to continent in the basin. Based on the comprehensive analysis of petroleum geology and exploration practice, it is proved that Carboniferous is a primary petroleum exploration domain of this basin, and volcanic rocks are the main reservoir. This paper studied reserved space type and controlling factors of volcanic reservoir, it is basic research for further study of favorable reservoir distribution.

The reservoir characteristics including lithologic characteristics, lithofacies characteristics, pore type, reservoir physical property of the Carboniferous volcanic rocks in the northeast of Junggar basin were analyzed by observing core and thin slice with microscope and scanning electron microscope. The reservoir accumulation type and the main affecting factors of reservoir physical property were also analyzed.

Volcanic cone and weathering crust are two important factors of the distribution of favorable volcanic reservoir. Volcanic reservoirs have three types reservoir space of primary porosity, secondary porosity and fracture in Junggar basin. The reservoir property is controlled by volcanic rock lithology and lithofacies as well as post-reformation function, weathering leaching and structural stress are all beneficial for reservoir property. The cone volcanic mechanism has controlled function to lithology, lithofacies, weathering leaching and corrosion reformation, besides, fracture is well developed in the center of volcanic mechanism.

The cone volcanic mechanism has significant controlling effect for the favorable volcanic reservoir distribution. This conclusion has been confirmed by the gas & oil exploration findings in the Junggar basin. So the cone volcanic mechanism is the important direction for research of the volcanic gas & oil reservoir in this basin.

Tight oil in the continuous sandbody in the A'er Sag of the Erlian Basin, China

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Since the discovery of the A'er sag with the area of 650 km² in the Erlian Basin of Inner Mongolia in 2006, more than one billion barrels of oil reserves has been found. In the central part of this sag, there is a large syncline without well-developed fault systems except areas along the sag margins. The largest oil pool was discovered in this syncline, within a continuous tight sandbody at the top of the lower part in the first member of the Cretaceous Tengg'e'er Formation (K₁bt^{1L}). In the early stage of exploration, two wells revealed this sandbody with an average porosity of 11.2% and permeability of 40.3 mD in the east slope of this sag. Compaction and carbonate cementation are the main factors reducing porosity and permeability of the sandbody. The sedimentary facies study based on core, logging and seismic data indicated that the sandbody at the top of K₁bt^{1L} is continuous in the main parts of the sag. This continuous sandbody with the buried depths of 1300-2300 m and dip angles of 0-11° is sandwiched by two sets of petroleum source beds. Oil-source correlation of biomarkers illustrates that the oil came mainly from the underlain source bed. We inferred that the porosity, permeability and dip angle of the sandbody decrease from the east slope to the center of the sag and there is a relatively large oil pool without downdip water in the sag-centered area. Twelve wells were then drilled step by step in the sag-centered area. All of them have produced commercial oil after acid-fracturing and revealed a continuous oil pool. This work demonstrated that economically viable oil exists in continuous tight sandbodies with low dip angles even in central areas of small faulted basins if there are source kitchens.