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Characteristics of Hydrocarbon Migration in the Slope of Superimposed Foreland Basin of South Junggar, NW China

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Superimposed foreland basin, as the special type of foreland basin in China, has been defined that the foreland basin with complete structure in the Himalayan period superimposed on the foreland basin in the Indo-China period and the superimposed degree is fine. The superimposed foreland basins in China are mainly distributed on both sides of the Tianshan Mountain and the north side of the Kunlun Mountain, such as foreland basin of South Junggar, foreland basin of Kuqa and foreland basin of Southwest Tarim. The slope of superimposed foreland basin of South Junggar has advantageous hydrocarbon accumulation conditions, which has been proved that it has good exploration potential in the production practice.

In this study, we take the slope of superimposed foreland basin of South Junggar for case. On the basis of sufficient collection and application of geological data in the study area, we collect core samples, conduct geochemical experiments and analyze the data, combining with the methods of sedimentary, organic geochemistry and accumulation dynamics. The pathways, powers, directions, and episodes and times of hydrocarbon migration have been analyzed in detail, and the hydrocarbon migration model in the slope of superimposed foreland basin of South Junggar has been ascertained. The conclusions are as follows.

- Multi-stage faults of different types, multi-stage sandbodies of different origins and multi-stage regional unconformities have formed the composite migration pathway like the letter “Z” or step. Sandbodies and unconformities are mostly as the lateral migration pathways and faults are mostly as the vertical migration pathways.

- The difference of oil potential is the main migration power. Hydrocarbon migrates from the high oil potential area of foredeep depression belt to the low oil potential area of slope belt. In the process of migration, several dominant migration pathways have been developed, which become the guidance to predict the favorable exploration areas.

- Owing to the superimposition of two period foreland basins, hydrocarbon migration in the slope of superimposed foreland basin has the characters of multi-stage migration and multi-stage adjustment in time and composite migration like the letter “Z” or step in space. It forms the characters of multi-type reservoirs and multi oil-bearing layers in the slope of superimposed foreland basin.

Key words: Hydrocarbon migration; Superimposed foreland basin; Slope belt; South Junggar foreland basin

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