

Forward Analysis of the Sources and Relative Contributions of Marine Oil and Gas in the Tarim Basin

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Abstract

In recent years, more and more marine oil and gas have been found in the Tarim Basin. Due to the blend of multi-source oil and gas as well as multi-period tectonics in the superimposed basin, the origin and relative contribution of these marine oil and gas are not clear. The method of oil and gas-source correlation has been used to study this problem, however, the fact that the distribution of source rocks is quite different from the discovered oil and gas reflects its limitation. For this study, forward modelling method was used to simulate the processes of hydrocarbon generation and expulsion of source rocks in the Tazhong area, Tarim Basin. Amount of resources can be obtained by deducting the critical saturation of residual hydrocarbon, loss of diffusion phases, loss of hydrocarbon residue in the migration, and damaged by tectonic movements from the total amount of hydrocarbon expulsion. In these processes, the values of relative contribution of oil and gas in each accumulation period can also be calculated, which reflect the direct and indirect contributions of source rocks to the petroleum accumulation. From this study, different accumulation periods, different abundance of organic matter, different buried depth, different set of source rocks can make differences on contributions to the oil and gas accumulations in the Tazhong area. Firstly, marine oil and gas is mainly from source rocks in the Cambrian and Ordovician, the amount of accumulated resources formed by the Cambrian source rock is about 2.9 billion tons, 63.2% of the total resources. Secondly, both high (TOC > 0.5%) and low (TOC < 0.5%) abundance of organic matter are existed in the Cambrian and Ordovician source rocks. The amount of accumulated resources formed by source rock with low abundance is about 2.0 billion tons, 32.6% of the total resources. In the multi-source of oil and gas in the Tazhong area, the Cambrian source rocks may be dominant, in addition, low abundance have a certain contribution to the total resources and is worth attention in the future.