

## The Quantity and gas generating potential of liquid hydrocarbons retained in the source rock

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Expulsion oil rate of different organic matter abundance and lithology source rocks has been studied. Two core samples from Songliao basin (well Yu-24 and Xing-2), one samples from Dongpu depression (well Wei-20) and six samples of varying maturities from Huanghua depression (well Feng-29-19, Yan-14, Shen-6, Ganhshen-50, Qi-86 and Ban-59) of Bohai Bay basin, in addition to four outcrop samples from Yizhou, Maoming, Zhangjiakou and Tangshan, were employed in this study. The samples mainly contain type I as well as type II organic matter; the abundance of organic matter ranges from 0.62% to 10.08%, covering the 3 end-members of low abundance of organic matter, high abundance of organic matter, and oil shale; the degree of thermal evolution is 0.34%–0.68%.

Based on the pyrolysis experiments of above samples, the better the type of organic matter, the higher the efficiency of oil expulsion, and the higher the TOC content, the higher the efficiency of oil expulsion as well. Oil shale has the highest abundance of organic matter with the highest oil expulsion efficiency up to 80%. The high expulsion efficiency of oil shale occurs primarily in the high maturity stage with Ro greater than 1.4%. In the general source rocks with medium to low TOC content, the oil expulsion efficiency is relatively low, i.e., 40%–60% in the liquid-window stage, and the lowest oil expulsion efficiency is 20% only.

The marine strata in China is of old age and in high evolution period, these organic matters in marine strata undergo transform into liquid hydrocarbons, which further transform into a gaseous state. Associated volume expansion provides a driving force for expelling the gas from the parent matrix. The relative ratios of cycloalkanes to alkanes in the light hydrocarbon components of natural gas can be used as the indicator for identification of the cracked gas of retained hydrocarbons. The gas exploration of marine strata in Tarim basin has greatly effective with large gas fields constantly discovered.

[1] Zhao *et al* (2008) Science in China Series D, *Earth Sciences* **51**, 71-83.[2] Zhao *et al* (2011) *Petroleum Exploration and Development* **38**, 129-135.