Contribution from the cracking of dispersed liquid hydrocarbons for deep gas

ZHAOYUN WANG[1], DONGLIANG WANG[2], GUOYI HU[3] AND YONGXIN LI[4]

[1]Research Institute of Petroleum Exploration and Development, Petrochina, Beijing, China, wzy@petrochina.com.cn
[2]Langfang Branch, CNPC Key Laboratory of Gas Reservoir Formation and Development, Hebei Langfang, China, wdl69@petrochina.com.cn
[3]Research Institute of Petroleum Exploration and Development, Petrochina, Beijing, China, huguoyi69@petrochina.com.cn
[4]Research Institute of Petroleum Exploration and Development, Petrochina, Beijing, China, lyx@petrochina.com.cn

Simulation experiments of hydrocarbons generation and expulsion from various source rocks, statistics of oil expulsion rate in different source-reservoir associations in Bohai Bay Basin, Songlian Basin in particular, as well as the analysis of thermogenic bitumen in Tarim and Sichuan basin were systematically conducted in this study. The results show that a considerable amount of liquid hydrocarbons were detained in source rocks and the oil expulsion rate decreases with the reducing of TOC. The expulsion rates for source rocks with low TOC (usually less than 2%) are below 50% during the liquid-window stage, while those in the thick source rock beds and source-reservoir association with TOC ranging in 2%-4% vary from 30% to 70% respectively. In addition, the expelled liquid hydrocarbons with different abundance stayed in both carried beds and the midway of accumulation process where dominantly occured in the landform. The above dispersive and half-dispersed-half-accumulated liquid hydrocarbons are generally called dispersive hydrocarbons. Natural gas can be cracked from both dispersed liquid hydrocarbons inside and outside of the source kitchens to form conventional and unconventional gas accumulations with large scale, when the kitchens and carried beds where containing dispersed liquid hydrocarbons were furtherly buried. Exploration practices in Sichuan and Tarim basins have proven that both the dispersed liquid hydrocarbons remained in source kitchens and carried beds, half-accumulate and fully-accumulated reservoirs can performed as the major source kitchen for conventional and unconventional natural gas accumulations. Therefore, the contribution of natural gas accumulation for both conventional and unconventional gas resources in the deep section of superimposed basins in China are important.

[1] Zhao et al (2011) *Petroleum Exploration and Development* **38**, 129-135. [2] Zhao et al (2005) *Petroleum Exploration and Development* **32**, 1-7.