

A study on the source and accumulation period of the crude oil in the Permian of the Wangguantun Burial Hill in the Huanghua Depression, Bohai Bay Basin

JIA LIU¹, SUMEI LI¹, YOU LU JIANG² AND XUEYING LV²

¹China University of Petroleum(Beijing)

²China University of Petroleum (East China)

Presenting Author: 2972029398@qq.com

Some high-yield oil and gas wells have been drilled recently in the Permian of the Wangguantun Burial Hill in the Huanghua Depression, Bohai Bay Basin, indicating a new petroliferous horizon with great exploration potential. The physical and chemical properties of the burial hill oils are completely different from the surrounding Tertiary hydrocarbons sourced from the Paleogene Shahejie Formation in the depression. We investigated the origin and accumulation period of the crude oil by conventional geochemical approaches such as GC, GC/MS, combined with fluid inclusion microthermometry, to unravel the source rocks and the formation process of the buried hill oils, which would be helpful for the understanding of the hydrocarbons generation, formation mechanisms of the Wangguantun Buried Hill and indicative for the further petroleum exploration in the area and the similar regions in the basin.

Oil-oil and oil-rock correlation showed the buried hill oils were mainly derived from the second member of the Paleogene Kongdian Formation (Ek₂), with a little of them from the Paleozoic Carboniferous-Permian (C-P). The Pr/Ph ratios of the crude oil is ranged in 0.92-1.14, indicating weak reductive paleo-environment of the source rocks. Another obvious characteristic of the oils is the predominance of C₂₉ regular steranes with the shape of the relative abundance of the C₂₇₋₂₉ regular steranes displaying an obvious reverse "L" shape, suggesting a large amount of terrestrial higher plants input. Oil-source rock correlation showed that the crude oils have a good genetic relationship with the Ek₂ rather than the C-P and the Tertiary source rocks. The fluid inclusion analysis showed that there are two episodes of hydrocarbons charging: Late period of the Early Cretaceous and Neogene-Quaternary, respectively. Two type of fluorescence of the inclusions were observed: yellow-green and green-blue, respectively. The microscopic temperature of the brine inclusions accompanying the above inclusions were measured, and the peak temperature are 105-120°C and 125-140°C, respectively. Combined the burial and thermal evolution history, we proposed that accumulation periods of the crudes oils are the Early Cretaceous and Neogene-Quaternary.