Diagenetic History and Gas Entrapment of the Yulin Gas Field in the Basin-Center Area of the Ordos Basin, Central China

Zhang, Liuping[1], Guoping Bai[2], Xiaorong Luo[1], Xinhua Ma[3], Mengjin Chen[3] (1) Institute of Geology and Geophysics, Chinese Academy of Sciences, Beijing, China (2) University of Petroleum, Beijing, China (3) Research Institute of Petroleum Exploration and Development, PetroChina, Beijing, China

The Ordos Basin in China is a large craton basin with an area of 250000km2. The Upper Paleozoic coal and shale sediments serve as gas source rocks with a peak generation and migration at the end of the early Cretaceous. Huge gas potential has been proved by exploration in the "basin-centered gas accumulation system". However, the mechanism for the gas accumulation is still not well understood. By using petrography, UV fluorescence microscopy, microthermometry, Raman microspectrometry, scanning electron microscopy, and X-ray diffractometry, we studied the diagenetic history of the Yunlin Gas Field in the basin-centered area, where stratigraphic and/or lithologic seals have not been found in the updip portion of this field. It was revealed that three phases of diagenesis and hydrocarbon charge occurred in the late Triassic, late Jurassic and the end of early Cretaceous.

During the first two phases, geo-fluid entered into the reservoirs causing dissolution and cementation and enhancing porosity. However, subsequent subsidence and diagenesis, including compaction and cementation, reduced the pore space markedly. By the end of the early Cretaceous, bulk gas migrated into the tight reservoirs. Cementation continued to occur at the updip portion of this field due to low gas saturation and has formed effective seals to retain gas for a prolonged period. The existence of diagenesis-induced seals at the updip portion of the sand and gravel bodies may indicate a huge gas exploration potential to the downdip direction of the Yulin Gas Field, even though there are no structural and sedimentary lithologic traps present.