Turpan-Hami Basin heavy oil mainly distributed in Tainan Sag Lukeqin structure belt. It has so far proven geological reserves of nearly hundred million tons. Heavy oil is a potential hydrocarbon resources, it is limited by the techniques and benefits level, mining is still a certain difficulty, but as unconventional reservoirs in the basin, it is essential to ascertain the geochemical characteristics and thickening reason of heavy oil for further exploration of Jurassic crude oil. Thus, we divided thickening sequence of the pre-jurassic heavy oil in Tainan sag of Tuha basin in base of utilizing crude oil property, group component, biomarker and other geochemical file with combining with seismic and geological data, and analyzed distribution feature of different thickening degree oil on the plane and vertical. Finally, we attempt to provide an interpretation of the heavy oil thickening in study area with combining basin hydrogeological features, and delimited the scope and influence of different factors on the plane.

There are mainly three different thickening levels of crude oil distribution at Turpan-Hami Basin Tainan sag pre-Jurassic: Conventional heavy oil (0.9-0.93 g/cm³), extra-heavy oil (0.93-0.98 g/cm³) and super heavy oil (Larger than 0.98 g/cm³). And its family components of crude oil is consistent with the thickening degree, from west to east three kands of oils are distributed in Tuyuke, Lukeqin and Yingyeer region. Heavy oil plane distribution is well matched with the structural features. For heavy oil thickening reasons, including the following aspects:

(1) Biodegradation: The pre-jurassic crude in Lukeqin and Yingyier region has low content of saturated hydrocarbons, non-hydrocarbon and high asphaltene content, so the crude oil has a high density and viscosity, thickening is more serious. Crude oil in these areas have been destroyed by the presence of microorganisms. With the help of the oil saturated hydrocarbons chromatography mass spectra, we observe that there are hardly any n-alkanes and isoprenoid hydrocarbons in the crude, and even partial disappearance of Sterane. Crude oil suffered a moderate-intense biodegradation and thickened because of the damage of the light components (Li Minghua, 2010; Wang Zhiyong, 2007).

(2) Water washing: Water washing have a certain impact on oil thickening. Tuyuke, Yuxi and Yubei area is full of conventional heavy oil, these crude oil only partial degradation of n-alkanes, Isoparaffin has not been destroyed, and the total ion flow chart shows the former peak shape. Crude oil suffered minor biodegradation, but these areas have more water layer in the pre-jurassic formation, oil-water contact is obvious, and according to the content of dibenzothiophene which has the strong water solubility in crude oil can determine the strength of washing water (Zhang min.2006). The results show that the dibenzothiophene of crude oil has completely disappeared in these area, and crude oil has suffered a serious water washing. Lukeqin area have the same phenomenon. Since there are many dry layers in Yingyer region, the water washing effect is not obvious. The water wash is gradually weakened from west to east in the plane.

From the above results, it can be seen, pre-jurassic crude oil in Tainan sag of Tuha basin mainly occurred two secondary changes inside the reservoir (Wang Zhiyong, 2007), and the main part is biodegradation. General heavy oil is widely distributed in Tuyuke, Yuxi and Yubei area. There are many water layer, and has low salinity of formation water and poor preservation conditions, slight biodegradation and strong water washing destroy the saturated and aromatic hydrocarbon of the crude oil, cause the crude oil to lose the light component and become heavy. And the extra heavy oil distributed in Lukeqin area,
although there are obvious water washing, but compared with medium intensity biodegradation the effect is not obvious, biodegradation is the main controlling factor for the thickening of crude oil in this district. Finally, for Yingyee region, it has the worst condition of preservation compared with the other two, super heavy oil concentrate distribution, salinity of formation water is low, reservoir water and atmospheric water frequently exchange with each other, microbial activity, super heavy oil is formed by the strong biodegradation of crude oil. Overall, from west to east, the intensity of biodegradation is gradually increased, and the water washing effect is gradually weakened. As the main controlling factors, Biodegradation effect is the main reason for the heavy oil from the west to the east gradually thickening characteristics of formation.

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