

Geochemical and Palynological Characteristics in Marginal Sag—— Implications on Hydrocarbon Potential, Depositional Environment and Controls on Organic Matter Enrichment

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The Northeastern Laizhouwan Sag is a marginal sag in the Bohai Bay Basin in China. Paleogene source rocks, i.e., the third to first member of the Shahejie Formation (Es₃, Es₂ and Es₁), and the third member of the Dongying Formation (Ed₃) were investigated for their petroleum potential and depositional environment using geochemical and palynological methods. The Es₃ and Es₁ member hold considerable hydrocarbon potential, while the rest are poor. Although varies through wells, the organic matter in the Es₃ member is primarily composed by immature-mature type I and III kerogen which is primarily contributed by lower aquatic organisms. A saline, stratified and anoxic bottom water prevailed during the Es₃ epoch in the K-a well, while a freshwater and weak reducing condition dominated that in the K-b well. The OM in the Es₁ member was contributed more by lower aquatic organisms than the Es₂ member, but both are primarily consisted by type II₁ and II₂ kerogen and, the Es₂ member is maturer than the Es₁ member. A saline and anoxic bottom water prevailed during the Es₂ and Es₁ epoch. The Ed₃ member was contributed more by terrigenous OM and is dominated by immature type II₂ kerogen. A lower salinity and weak reducing depositional condition occurred in the Ed₃ member. The OM enrichment of Es₃ member was mainly determined by primary productivity and that in the K-a well was also controlled by bottom water condition. The OM accumulation in the other members are speculated to be controlled by deposition rate.

Key Word: depositional environment; oil potential; organic geochemistry; palynology; Bohai Bay Basin; marginal sag.