

Geochemical Characteristics of Aromatic Hydrocarbons in the Crude Oils from the Chepaizi Area, Junggar Basin, China

Authors : Luofu Liu, Fei Xiao Jr., Fei Xiao

Abstract : Through the analysis technology of gas chromatography-mass spectrometry (GC-MS), the composition and distribution characteristics of aromatic hydrocarbons in the Chepaizi area of the Junggar Basin were analyzed in detail. Based on that, the biological input, maturity of crude oils and sedimentary environment of the corresponding source rocks were determined and the origin types of crude oils were divided. The results show that there are three types of crude oils in the study area including Type I, Type II and Type III oils. The crude oils from the 1st member of the Neogene Shawan Formation are the Type I oils; the crude oils from the 2nd member of the Neogene Shawan Formation are the Type II oils; the crude oils from the Cretaceous Qingshuihe and Jurassic Badaowan Formations are the Type III oils. For the Type I oils, they show a single model in the late retention time of the chromatogram of total aromatic hydrocarbons. The content of triaromatic steroid series is high, and the content of dibenzofuran is low. Maturity parameters related to alkyl naphthalene, methylphenanthrene and alkyl dibenzothiophene all indicate low maturity for the Type I oils. For the Type II oils, they have also a single model in the early retention time of the chromatogram of total aromatic hydrocarbons. The content of naphthalene and phenanthrene series is high, and the content of dibenzofuran is medium. The content of polycyclic aromatic hydrocarbon representing the terrestrial organic matter is high. The aromatic maturity parameters indicate high maturity for the Type II oils. For the Type III oils, they have a bi-model in the chromatogram of total aromatic hydrocarbons. The contents of naphthalene series, phenanthrene series, and dibenzofuran series are high. The aromatic maturity parameters indicate medium maturity for the Type III oils. The correlation results of triaromatic steroid series fingerprint show that the Type I and Type III oils have similar source and are both from the Permian Wuerhe source rocks. Because of the strong biodegradation and mixing from other source, the Type I oils are very different from the Type III oils in aromatic hydrocarbon characteristics. The Type II oils have the typical characteristics of terrestrial organic matter input under oxidative environment, and are the coal oil mainly generated by the mature Jurassic coal measure source rocks. However, the overprinting effect from the low maturity Cretaceous source rocks changed the original distribution characteristics of aromatic hydrocarbons to some degree.

Keywords : oil source, geochemistry, aromatic hydrocarbons, crude oils, chepaizi area, Junggar Basin

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