ORGANIC GEOCHEMISTRY SIGNIFICANCE OF THE CHANG 7 MEMBER OF THE TRIASSIC YANCHANG FORMATION IN THE MID-WEST OF ORDOS BASIN, CHINA

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The Ordos Basin, the second largest basin in China, is a prominent under-explored onshore area. The exploration history in this region dates back to 1983 when a Triassic hydrocarbon accumulation was discovered (Pan et al., 2017). It is generally accepted that the most hydrocarbons in the Ordos Basin are derived from the Chang 7 Member of the Triassic Yanchang Formation (Hanson et al., 2007). The 60 to 120 m thick Chang 7 comprising mainly of mudstone, shale and siltstone is an important marker in the Yanchang Formation which corresponds to the Maximum Flooding Surface. Despite the importance of this formation there are still ambiguities concerning the origin and type of the organic matter and depositional environment, e.g. redox condition and salinity. The major hydrocarbon exploitation area in the Yishan Slope located in the center of the Ordos Basin was selected to obtain information on the depositional environment and organic matter characteristics of the Chang 7 member.

19 samples were collected from different wells covering the main Yishan Slope (Fig. 1). These samples were studied by performing a comprehensive set of analyses including total organic and inorganic carbon (TOC and TIC) as well as total sulphur (TS), Rock-Eval pyrolysis, organic petrography and molecular geochemistry, i.e. GC-FID and GC-MS.

The studied samples are characterized by high TOC contents which range from 0.33 to more than 24% (mean value of 3%) and total sulphur contents of 0.06 to 6.5%. S1 and S2 values range from 0.13 to 3.61 and 0.65 to 25.64 mg HC/g rock, respectively, implying very good to excellent hydrocarbon potential for most of the samples. Hydrogen index (HI) values vary between less than 100 to 373 mg HC/g TOC indicating type II to type III kerogen. N-alkane distributions show various mono modal to bimodal distributions. Different parameters such as TOC/TS, tricyclic and pentacyclic terpane ratios as well as steranes distribution and low values of dibenzothiophene/phenanthrene imply that Chang 7 was deposited in a sulfate-poor lacustrine to fluvio-deltaic environment under oxic to sub-oxic conditions with minor terrigenous input. Low values of gammacerane indicate low water salinity of the depositional environment. Average Tmax of 444°C, vitrinite reflectance value of 0.76%Ro and molecular markers, such as C29 ααα 20S/(20S + 20R) sterane, C29 ββ/(ββ+αα) sterane and CPI, indicate thermal maturity within the main oil window for the studied samples.
Figure 1 Schematic map showing the location of the Ordos Basin (a), the study area and the facies boundaries of Upper Triassic strata (b, after Chen et al., 2017), sample wells (c), and cross section (d, after Hanson et al., 2007).

References