

Hydrogen isotopic compositions of individual n-alkanes from crude oil in the central region of Junggar Basin

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Hydrogen is an important component of organics. In recent years, there has been a renewed interest in the use of hydrogen isotope of individual n-alkanes ($\delta D_{n\text{-alkanes}}$) as correlation studies in marine and terrestrially sourced petroleum systems. In order to understand the causes of $\delta D_{n\text{-alkanes}}$ changes, oil samples were collected from central region in Junggar Basin, and analyzed the $\delta D_{n\text{-alkanes}}$ compositions using GC-MS, GC-TC-IRMS. The $\delta D_{n\text{-alkanes}}$ curve has four distribution characteristics: The distribution range of hydrogen isotopes is different in different regions, and there are different distribution ranges in the same region, there are curves with similar shape but different distribution ranges, the existence distribution range is the same but the curve shape is different. Therefore, there is a relationship between the distribution range and morphology of the $\delta D_{n\text{-alkanes}}$ curve. Different deposition environments determine the different distribution ranges of hydrogen isotopes. However, it was found that in the process of research the change of curve morphology in some regions broke the originally determined distribution range, changes were ignored in the morphology based only on the distribution range, the analysis may not be accurate enough. Combined with the actual geological conditions, it is found that the $\delta D_{n\text{-alkanes}}$ increased first and then decreased from west to east, and the slope of the curve in the eastern region was larger. The main reason for the formation of this planar distribution characteristic is the influence of different deposition environments on hydrogen isotopes. In addition to the sedimentary environment, organic types also affect $\delta D_{n\text{-alkanes}}$. At the same time, during the thermal evolutionary, $\delta D_{n\text{-alkanes}}$ also show different characteristics, such as high maturity crude oil hydrogen isotope heavier than low maturity crude oil.