

Compound-specific C- and H-isotope compositions from Carboniferous and Permian source rocks in the Junggar Basin

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Carboniferous and Permian rocks are important petroleum-generated source rocks in the Junggar basin of northwestern China. In this study, biomarkers, carbon isotope of total organic matter, and stable carbon and hydrogen isotope of n-alkanes from Carboniferous and Permian source rocks were measured in order to obtain information for their sedimentary environment and search potential features for oil-rock correlation.

High Pr/Ph ratios 1-3 and ¹³C enrichment of total organic carbon (>-25‰) for Carboniferous source rocks in the northwestern and eastern region of the basin shows the depositional environment are partial oxidation of freshwater lake. Carbon isotopic values of individual alkanes (C₁₃-C₃₀) vary from -21.6 to -32.4‰, and difference between stable carbon isotopic of individual alkanes and total organic matter is about 5-8.5‰. δD values of n-alkanes from these source rocks range from -112‰ to -83‰ and from -156‰ to -120‰.

Organic carbon isotopic values are lighter than -26‰, Pr/Ph ratio range from 0.7 to 1.9, and β-carotane and gammacerane are present in most Permian source rocks. Whereas δ¹³C values of n-alkanes range from -27‰ to -37‰, Difference between stable carbon isotopic of individual alkanes and total organic matter is 3.7-7.7‰. δD values of n-alkanes from Permian are depleted relative to Carboniferous source rocks. Phytane has δD values similar to the pristane in two kinds of source rocks and they are depleted in D relative to the n-alkanes. The differences in δD and δ¹³C of individual compounds of these two kind of source rock can be used for oil-oil and oil-rock correlation.

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