

Geochemical Characteristics of Jurassic Coal-Formed Gas in Northwest China

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Jurassic coal-measure strata are widely developed in Northwest China, mainly distributed in the Tarim Basin, Junggar Basin, Qaidam Basin and Turpan-Hami Basin. The oil-generating components (sapropelic and exinite etc.) of Jurassic coal-measure source rocks in Northwest China are as high as 11–19%, which is much higher than those of other coal-measure source rocks in other areas of China (1–5%). Therefore, the analysis and summary of the geochemical characteristics of coal-formed gas in Jurassic petroleum systems in different basins is of great significance for searching for different types of coal-formed gases.

Based on the data of hydrocarbon generation characteristics, gas composition and carbon isotope of Jurassic source rocks, the geochemical characteristics of Jurassic coal-formed gas in Northwest China are comprehensively compared and analyzed in this paper. The drying coefficient of Jurassic coal-formed gas in Western China shows different types: the main type of Jurassic coal-formed gas in the Turpan-Hami Basin is wet gas, being "unimodal type of wet gas"; that in the Qaidam Basin is mainly dry gas, being "unimodal type of dry gas"; that in the Kuqa Depression of the Tarim Basin and the Junggar Basin has wide range of drying coefficient, being "bimodal type of dry gas and wet gas". Carbon isotope values of Jurassic coal-formed methane in Northwest China have wider range: that in the Turpan-Hami Basin is low (mainly -45‰ to -36.4‰), that in the Junggar Basin has wide range (mainly between -48.4‰ to -25.6‰); that in the Qaidam Basin is heavy (mainly -38.5‰ to -26‰); that in the Kuqa Depression is heavy (mainly -38.9‰ to -28‰). Carbon isotope of coal-formed gas in Northwest China is positively correlated with carbon isotope of methane; $\delta^{13}\text{C}_2$ - $\delta^{13}\text{C}_1$ has big variation scope, and is negatively correlated with carbon isotope of methane. The carbon isotope of coal-formed gas in Northwest China is generally a positive carbon isotope series, partly with C2-C3 inversion. Maturity is the main reason for the great difference of Jurassic coal-formed gas in Northwest China, and mixture of gases is also another important factor.