

Natural gas genesis and sources in the Zizhou gas field, Ordos Basin, China

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The Zizhou gas field is a large, tight sandstone gas field in the Ordos Basin, China. In 2011, its proven gas reserves were booked to be 115.2×10^9 m³ and the gases are mainly reservoirized in lower Permian Shanxi Formation and the middle Permian Lower Shihezi Formation. Based on the analysis of the geological background, gas components, light hydrocarbon composition, carbon and hydrogen isotope values of alkane gases, and the geochemical correlation between gases of the Zizhou gas field and analogs from other fields in the basin, we conclude that: (a) most natural gases in the Zizhou gas field are dry with a small content of wet gas; (b) the gases have similar carbon isotopic and light hydrocarbon compositions to the analogs from other fields, as well as much more positive $\delta^{13}\text{C}$ values and high contents of C₅₋₇ i-alkanes and methylcyclohexanes, indicating typical coal-derived gas (Fig.1); (c) carbon isotopic reversal in some gas samples is due to mixing of coal-derived gases of different maturities; (d) the gases are sourced from mature to high-mature Carboniferous–Permian coal-measures; and (e) the gas reservoirs represent continuous accumulations.

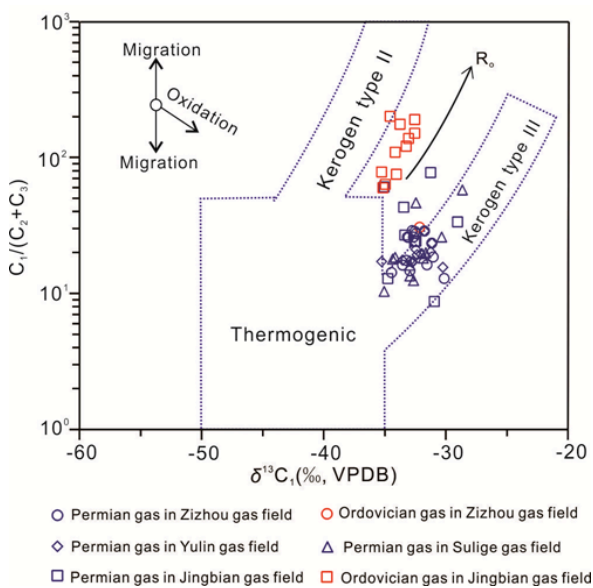


Fig. 1 $\delta^{13}\text{C}_1$ - $\text{C}_1/(\text{C}_2+\text{C}_3)$ correlation for alkane gases in Paleozoic gas fields, Ordos Basin (diagram after Whiticar, 1999)

REFERENCES:

Whiticar, M.J., 1999. Carbon and hydrogen isotope systematics of bacterial formation and oxidation of methane. *Chemical Geology* 161, 291–314.