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四川盆地西部天然气碳同位素组成分析及应用

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摘要 测定了 14种四川盆地西部南段平落坝气田和中段新场气田天然气样品的甲、乙烷碳同位素组成。这些样品的 $\delta^{13}C_1 > -3.92\%$, $C_2 + \Sigma C_n > 0.8\%$, 结果表明这两处气田的烃类气体是由沉积物有机质经热解作用生成的。由此两处气田的 $\delta^{13}C_1$ 、 $\delta^{13}C_2$ 相对分馏值, 计算出气田的烃源岩生烃温度分别为 $51 \sim 81^\circ C$ 、 $100 \sim 111^\circ C$; 并从两处气田各气藏的 $\delta^{13}C_1$ 、 $\delta^{13}C_2$ 值同气藏深度的良好函数关系及其同位素分馏机理, 认识到平落坝气田和新场气田的烃类是从下伏烃源岩垂直向上迁移而聚集成藏的

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Analysis and Application of Carbon Isotopic Composition of Natural Gases in the Western Sichuan Basin

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Abstract The carbon isotopic compositions of methane and ethane have been determined in 14 gas samples taken from the Pingluoba and Xinchang gas fields in the Western Sichuan Basin. The $\delta^{13}C_1$ and $C_2 + \Sigma C_n$ values of the samples are higher than -3.92% and 0.8% , respectively. The results indicate that hydrocarbons of the both gas-fields entirely are generated from sedimentary organic matter during thermal cracking. The calculated hydrocarbon formation temperatures based on the fractionation values between $\delta^{13}C_2$ and $\delta^{13}C_1$ of the gas fields are $51 \sim 81^\circ C$ and $100 \sim 118^\circ C$, respectively. All $\delta^{13}C_1$ and $\delta^{13}C_2$ values of these gas fields display as a well function of depth, and results suggest that the hydrocarbons of Pingluoba and Xinchang gas fields have migrated vertically from deeply buried source rocks through sedimentary layers, and entered into overlying reservoirs.

Key words [mass spectrometry](#) [analysis of carbon isotope compositions](#) [natural gases](#) [western Sichuan Basin](#) [hydrocarbon](#)

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