The compositions of gas and origin from serpentinized peridotite in the Wenduermiao in Inner Mongolia

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Serpentinization may be the driving force of hydrothermal system and can produce methane and hydrogen, the molecular hydrogen formed may be used as an energy and electrons source by microbial communities. Study serpentinization gas, which provide the evidence of abiotic methane formation, also has favorable organic compound synthesis condition, and by studying the serpentinization ultrabasic rock system to explore the origins of life on earth. The chemical and carbon isotopic compositions of gas from serpentinized peridotite in the Wenduermiao in Inner Mongolia have been determined by stepwise heating mass spectrometer to reveal gas sources. The results showed that CO₂ as the dominant component with N₂, H₂ and CH₄-C₂H₆ (400°C-600°C) as major ones in the gas of the Wenduermiao serpentinized peridotite.

The δ¹³C values of CO₂ were in ranges between -18.6 ~ 2.6‰ and the δ¹³C values of CH₄ were -8.1 ~ -51.8‰. The δ¹³C values of CH₄, C₂H₆, C₃H₈ and C₄H₁₀ show inverse carbon isotopic trend, a normal carbon isotopic distribution pattern among CH₄ to C₄H₁₀ with partial reversal. Which show the δ¹³C feature of abiotic and biotic origin. Organic compounds in serpentinized peridotite may have two sources from the Wenduermiao in Inner Mongolia. One is Abiogenic organic compounds which may be generated through the FTT type reaction under reducing and high hydrogen concentration condition during serpentinization. Other is biogenic organic compounds which may originate from Thermal degradation of oceanic organic matter and microbial activity.