

Geochemical characteristics of nitrogen isotopic composition of crude oils and organic matter in different depositional environments from China

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Nitrogen is an important element in crude oil. Due to the low nitrogen content and high C / N ratio of crude oils, the isotope samples are difficult to be prepared and so as to make them seldom studied and taken to the application. In this work, a series of crude oil samples from several typical sedimentary basins (marine carbonate, saline water-salt lake, brackish water lake, fresh water lake sedimentary basin) in China were determined to reveal the distribution characteristic and main influence factors of nitrogen isotope in different sedimentary environments. And the research uses an elemental analyzer (EA) coupled directly to an isotope ratio mass spectrometer (IRMS) to measure the carbon and nitrogen isotope values of crude oil samples based on Dumas combustion method.

The results show that there are obvious differences between nitrogen isotopic composition of crude oil and organic matter in different sedimentary environments. The values of marine sedimentary environment are significantly lighter than continental sedimentary environment (see Fig.1). In continental sedimentary environment, the composition characteristics of nitrogen isotope in crude oil are related to the salinity and redox condition of sedimentary environment, and the effect of salinity is more obvious than redox conditions. The higher nitrogen isotope values appeared in suboxic / dysoxic and slightly brackish water column conditions (see Fig.2), which is beneficial to denitrification and thus resulting in heavy nitrogen isotope values in oil.

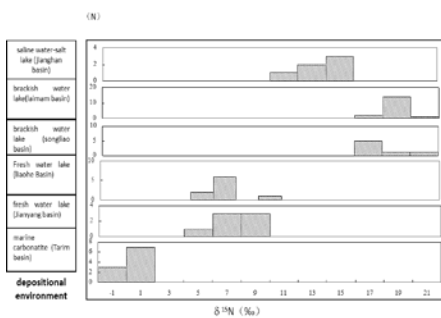


Fig. 1. The diagram of nitrogen isotopic composition of crude oils in different depositional environment,

Fig. 1 shows the nitrogen isotopic composition oil from different depositional environments is obvious different. The oil from marine carbonate in Tarim basin have lighter.