

BIODEGRADATION IN CAINAN OIL FIELD: EVIDENCE ON THE CARBON ISOTOPE OF OIL FRACTIONS

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Introduction

The formation of most of the world's heavy oil are related to biodegradation, which is one of the most common secondary action leading to changes in the physical and chemical properties of crude oil (Head et al., 2003; Larter et al., 2003, 2006). Located in the eastern part of the Junggar basin, Cainan Oil field is a typical arid desert oil field in a inland basin. The Xishanyao and Sangonghe formation are two primary oil-producing layers in Cainan Oil field during the past 23 years. In this paper, the carbon isotope variation of each oil fractions of Cainan oilfield under the natural conditions was analyzed in order to indicate the biodegradation in 1988~1997, which could be a new attempt in this field.

Results

The carbon isotopes of saturated hydrocarbons (-28.6~-30) and aromatic hydrocarbons (-26.5~-28.9) in Cainan oilfield were gradually heavier from 1988 to 1997, and the carbon isotopes of nonhydrocarbons (-26.7~-28.8) and asphaltenes (-25.0~-28.0) remained basically unchanged (Fig.1). Biodegradation may be responsible for this result and it is the evidence of the interaction between microorganism and crude oil (Galimov, 2006). DNA was found both in the samples of formation waters and oils (Li et al., 2014). Furthermore, aerobic bacteria including *Pseudomonas*, *Acinetobacter* and *Bacillus*, and Anaerobic bacteria consist of *Desulfohalobium redbaense*, *Geosporobacter ferrireducens*, *Enterobacter hormaechei* and *Bacillus coagulans* from the Cainan oilfield have been separated by our research group. This undoubtedly add another evidence.

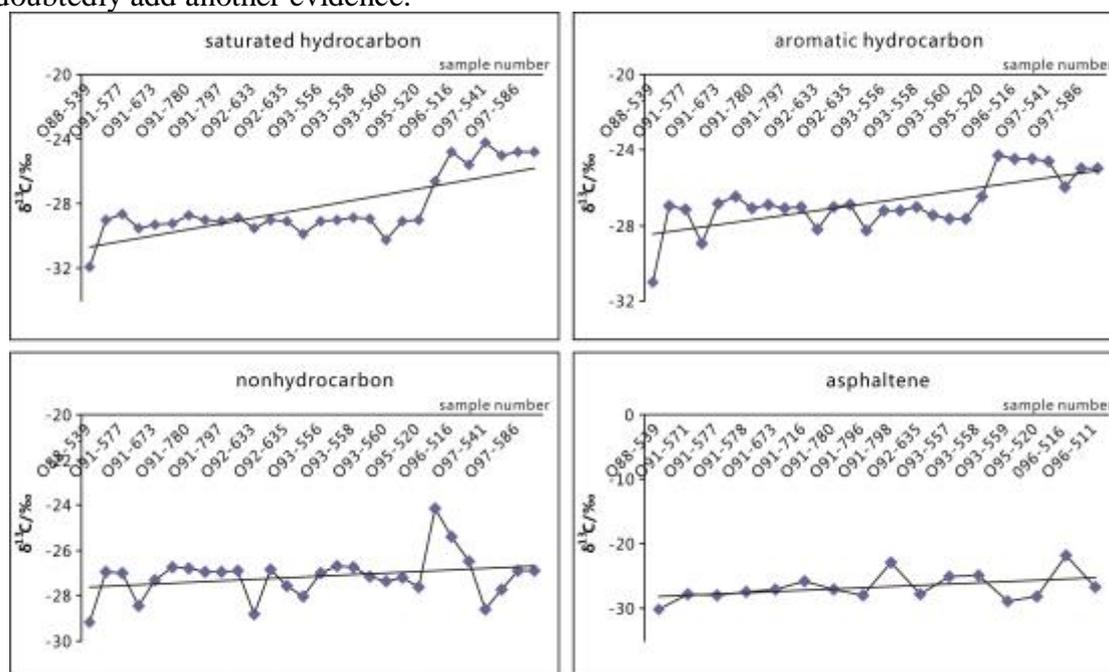


Figure 1 The carbon isotope of saturated hydrocarbon, arene, nonhydrocarbon and asphaltene changes with time (1988~1997)

Conclusions

To corroborate the biodegradation process of crude oils occurred in the reservoir, we plan to perform anaerobic and aerobic biodegradation simulations on Cainan crude oil samples. Then analyze the stable carbon isotopic compositions for both individual n-alkanes and oil fractions during the experimental biodegradation and compared with the natural biodegradation oil to investigate the biodegradation mechanism and the thickening process of crude oil.

References

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