

# Controls on the hydrogen isotopic signatures of individual hydrocarbons in crude oils from the Tarim Basin, northwest China

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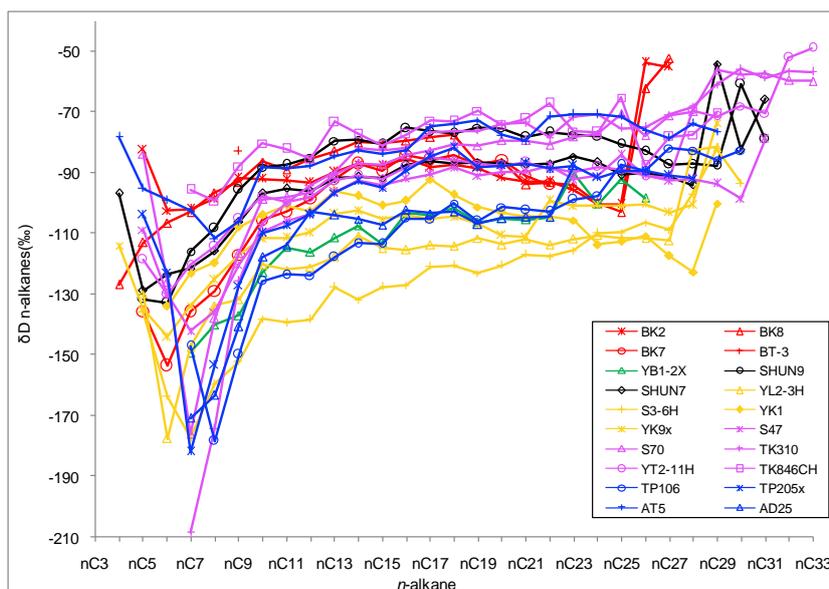
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## Introduction

The Tarim basin is one of most petroliferous basin in China. However, its oil source is still debating owing to the multiple sources, oil mixing and alteration. Recently, the compound specific hydrogen isotope compositions were believed to provide the further information on the oil genesis, such as source rock, depositional environments, maturity and alteration. Thus, to improve the understanding on the Tarim oil origins, we carried out the analysis of compound-specific carbon and hydrogen isotopic compositions and the molecular compounds for the twenty oil samples from the Tarim basin. By integrating the data for isotopic compositions and molecular compounds, we want to discuss the controls on the hydrogen isotopic signatures of individual hydrocarbons in the Tarim oils and then get more information on the oil genesis.

## Results

The  $\delta D$  values of individual hydrocarbon for the oil samples show some significant variations for the Tarim oils (Figure 1). Compared with the values of  $\delta^{13}C$  and some molecular geochemical parameters, the possible effects of common geochemical factors on the  $\delta D$  values were discussed, and suggested that different factor processes, including source, maturity and biodegradation effects, could be related.



**Figure 1**  $\delta D$  values of individual *n*-alkanes in the collected oils from the Tarim Basin.

## Conclusions

Source, maturity and biodegradation were the main factors to influence hydrogen isotopes. However, the oils from different area in the Tarim basin have different major factors. Source is the major factor in the collected oil samples except for the oils from Tahezhti area, which the major factor is maturity. Furthermore, biodegradation has an influence in some oils.

## References (Use of sections is optional)

- [1] Li, M. W., Y. S. Huang, M. Obermajer, et al. 2001. Hydrogen isotopic compositions of individual alkanes as a new approach to petroleum correlation: case studies from the Western Canada Sedimentary Basin, *Org. Geochem.* 32(12): 1387-1399.
- [2] Dawson, D., Grice, K., Alexander, R., 2005. Effect of maturation on the indigenous  $\delta D$  signatures of individual hydrocarbons in sediments and crude oils from the Perth Basin (Western Australia). *Org. Geochem.* 36, 95-104.
- [3] Schimmelmann, A., Sessions, A.L., Boreham, C.J., Edwards, D.S., Logan, G.A., Summons, R.E., 2004. D/H ratios in terrestrially-sourced petroleum systems. *Org. Geochem.* 35, 1169-1195.