

Biomarkers released from the asphaltenes by Hydropyrolysis in the crude oils

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METHOD AND RESULTS

A suit of asphaltenes, isolated and purified from crude oils with various depositional environments, biodegradation and thermal maturation, were conducted on catalytic Hydropyrolysis apparatus [1]. The generated hydrocarbons were collected in the trap cooled with dry ice, and recovered in DCM for subsequent fractionation, and the covalently-bond biomarkers of the asphaltenes were released. It was found that the composition and evolution of the free and bond biomarkers were distinct. The bond steranes and terpanes were less mature than (or consistent) their counterparts in the oil phase; this is consisting with the bond biomarkers in kerogen [2]. Moreover, some biomarkers have not been detected or very low in the bond phase including 4-methylsteranes, triaromatic steroids and isoprenoids, although they were abundant in the oil phase. Contrast with the biodegraded aromatics of oil, PAH such as naphthalenes and phenanthrenes were highly rich in the Hypy yields.

DISCUSSION

Petroleum biomarkers are believed to be derived from the biological precursors directly or via decarboxylation, aromatization or reduction in diagenesis [3]. They will undergo configurational isomerization and rearrangement with maturation, and forming the free biomarkers in the oil phase, including many source- and age-diagnostic biomarkers. In contrast, a stream of biological precursors would bond into asphaltenes (or kerogen), including n-alkanes, steranes, hopanes, and PAH. Their evolution will be inhibited by the large structure that they host. In addition, these bond biomarkers would not be destroyed during biodegradation.

- [1] Love *et al.* (1997) *Energy Fuels* 11, 522-531. [2] Murray *et al.* (1998) *Org. Geochem.* 29, 1487-1505. [3] Peter *et al.* (2005) *The Biomarker Guide*, Cambridge University Press.