

Maleimides: Novel biological markers in the petroleum and source rocks

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METHOD AND RESULTS

1*H*-Pyrrole-2,5-diones (maleimides) are pigment derivatives that have been identified in crude oils and extracts of sediments and shales. 2-Methyl-3-*iso*-butyl-maleimide (Me,*i*-Bu maleimide), commonly also 2-methyl-3-*n*-propyl-maleimide (Me,*n*-Pr maleimide), and aryl isoprenoids are diagnostic indicators for photosynthetic sulfur bacteria (Chlorobiaceae) and therefore proxies for reconstructing ancient and modern photic zone euxinia [1,2,3]. Here, we investigated a series of oil and rocks samples to explore their geochemical behaviour and significance during petroleum formation and accumulation. The higher Me, *i*-Bu/Me, Et and Me, *n*-Pr/Me, Et ratios ranging from 1.4-4.8 and 3.7-17.3, respectively, in crude oils generated by the Es4 petroleum source rocks indicate deposition under saline and stratified water column in Bohai Bay Basin, which is affected by a H₂S rich, oxygen-free water column that extends into the photic zone, whereas the lower ratios of Me, *i*-Bu/Me, Et and Me, *n*-Pr/Me, Et varying from 0.3-1.3 and 2.3-4.8, respectively in oils derived from the source rock beds to be rather oxic conditions of a freshwater dominated environment such as Pearl River Mouth Basin (PRMB) [4].

DISCUSSION

Our data demonstrate the applicability of maleimides in oils for reconstructing the paleoenvironment and paleodepositional conditions. In addition, they can be valuable biomarkers for oil-oil and oil-source correlation as well as for the diagnosis of potential source horizons when only oil samples are available. In a word, maleimides have large potential as novel and robust indicators of petroleum exploration.

REFERENCES

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