Biomarker distributions of the Upper Palaeozoic sediments from East Pahang, Peninsular Malaysia

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A number of organic-rich sediments of the Upper Palaeozoic Kuantan Group of East Pahang were analysed for their biomarker distribution. These sediments consist of shales and coaly shales from the Charu and Sagor Formation, and a Panching Limestone sample. The TOC content varies from trace amounts in the limestone to about 9 wt % in the coaly shales. Although negligible in TOC, the organic origin of the limestone is evidenced by the presence of shell debris and algal fragments within the sample. The thermal maturity of all the samples analysed is in the range of 1.08–1.13% mean vitrinite reflectance, indicating that these sediments have reached a high level of thermal maturity (late oil window).

The biomarkers analysed include n-alkanes, isoprenoids, terpanes, and triterpanes. The gas chromatograms of the saturated hydrocarbon fractions of the Charu and Sagor samples display a smooth high end-member distribution of n-alkanes extending beyond n-C_{30}. A relatively lower abundance of n-alkanes is displayed by the limestone sample. Most of the samples show evidence of slight biodegradation as suggested by the presence of unresolved complex compounds and the loss of some of the lower molecular weight n-alkanes. The strong predominance of high molecular weight n-alkanes in the shales/ coaly shale of the Charu and Sagor formations suggest significant input of higher land plant organic matter into these sediments.

The Panching limestone sample is dominated by nC_{17}–nC_{19} alkanes suggesting significant contributions of algal-derived organic matter. The even n-alkane predominance commonly associated with limestones is apparent within the medium range (nC_{14}–nC_{19}) of the Panching limestone analysed. The possible presence of C_{21} highly branched isoprenoid is noted in this limestone sample but is not observed in the other samples. The lack of higher land plant-derived organic matter within the Panching limestone sample is evident from the low concentration of higher molecular weight n-alkanes compared to the Charu and Sagor sediments.

No distinct variation is observed for the Ts/Tm ratio (generally considered to be associated with higher land-plant organic matter) among the samples studied, suggesting this ratio may not be indicative of source input but are strongly influenced by the high thermal maturity attained by all of these samples. The 22S/22S+22R C_{32} hopane has reached equilibrium and therefore supports the high maturity level indicated by the vitrinite reflectance data. The high abundance of C_{24} tetracyclic terpanes could be associated either with higher land-plant, algae or microbial sources. The presence of significant marine influence is suggested by the high abundance of tricyclic terpanes in all of the samples studied.

Warta Geologi (Newsletter of the Geological Society of Malaysia), Vol. 25, No. 6, November-December 1999