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Coal as a source rock for oil: Petrographic evidence from Tertiary coals, onshore Sarawak

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A decade has now passed since Cook and Struckmeyer (1986) published a paper on "The role of coal as a source rock for oil" based mainly on petrographic evidence. The mid 80's was the time when an increasing number of workers in the field of petroleum geochemistry began to reconsider the long held view that coals could only source gas. Now, in the mid 90's, the majority of geochemists take a more open view on the role of coal and prefer to consider each case on their own merits with no preconceived notions on whether or not they can generate oil.

The onshore and offshore Tertiary sedimentary sequences of Sarawak contain numerous coal seams of Oligocene and Lower Miocene age. The offshore extensions and equivalents of these onshore basins contain oil that is considered to be possibly sourced from these coals and related terrestrial-derived organic matter. Despite this, very little information has been published on the geochemical and petrographic characteristics of the Sarawak coals. To rectify this, all the major Tertiary coal deposits of Sarawak have been visited and samples collected. In this preliminary study, results from two areas i.e. the Bintulu area and the Sepang block of the Merit-Pila coalfield will be presented emphasizing on the type of common liptinitic constituents of the coals and the petrographic features indicating oil generation from coals.

A number of petrographic features that are commonly considered to indicate oil generation and expulsion from coals have been observed in the Sarawak coals. Such features include:

- the occurrence of exsudatinite veins
- development of micrinite
- changes of fluorescence intensity
- occurrence of oil droplets and oil haze

In addition to these, coal macerals which are considered associated with oil generation are also observed and include bituminite and fluorinate. Petrographically, therefore, there is little doubt that these coals possess a very high oil-generating potential.

The question of whether a coal can generate oil is not straightforward; a definite yes or a definite no should not be offered depending upon which school of thought you prefer. Many issues have to be considered, such as which liptinitic maceral possess the greatest potential; does the maceral vitrinite have a role to play; what is the relationship between organic microlithotypes and inorganic constituents, hence depositional environment, and how do they influence oil generation; at what maturation level is generation of oil from different macerals likely to occur; and what processes/conditions are required for the effective expulsion of oil from coal. Many of these issues still do not have satisfactory answers but it is hoped that the Sarawak coals, due to their variety in type, setting and maturity, will provide some answers.

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