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# GEOCHEMICAL SIGNIFICANCE OF PETROLEUM ASPHALTENES AS MATURITY AND SOURCE INDICATORS

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## Abstract

In the last few years, asphaltenes have been of immense interest for exploration techniques, since it was reported that they possess structural features of the related source rock kerogens. This is because the use of asphaltenes from crude oils may help to overcome the lack of source rock samples in basin analysis when reliable predictions for the generation of hydrocarbons are required. Potential source rocks are described in terms of quantity, quality and level of thermal maturity of organic matter, but pertinent source rock information is frequently absent because exploratory drilling does not reach deeply buried source facies. Even if the source is reached, samples are often inappropriate for reliable oil-source rock correlation due to low maturity or organic facies variation.

Asphaltenes separated from two different crude oils from upper Assam basin, India having different geological origins, namely DK (Eocene) and JN (Oligocene-Miocene) were pyrolysed at $600^0$C in a PY-2020iD double shot pyrolyzer and the products were analyzed by gas chromatography-mass spectrometry (GC/MS) especially for the generated Methylnaphthalenes and Methylphenanthrenes. Both the asphaltenes produce aliphatic as well as aromatic compound classes. Methylnaphthalenes and Methylphenanthrenes were identified by using reference chromatograms and literature data and their distributions were used to assess thermal maturity of the asphaltenes. The ratios of â-substituted to á-substituted isomers of both Methylnaphthalenes and Methylphenanthrenes revealed higher maturity of the JN asphaltenes than that of the DK asphaltenes. For both the asphaltenes, the abundance of 1-methylphenanthrene dominates over that of 9-methylphenanthrene showing the terrestrial nature of the organic matter. Based on the distribution pattern of n-alkanes in pyrolysed product of asphaltenes and their respective crude oils, it was concluded that crude oil and asphaltenes originate from the same source and that asphaltenes are the unconverted parts of kerogens.

***Keywords:*** Maturity; Methylnaphthalenes; Methylphenanthrenes; Asphaltenes; Pyrolysate.