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Geochemical significance of petroleum asphaltenes as maturity and source indicator of oil

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In the last few years, asphaltenes have become 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. 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°C in a PY-2020iD double shot pyrolyzer and the products were analyzed by gas chromatography-mass spectrometry (GC/MS). Both the asphaltenes produces aliphatic as well as aromatic compound classes. Aromatic compounds like methyl naphthalenes, methyl phenanthrenes and methyl dibenzothiophenes generated as a result of pyrolysis of the asphaltenes were used to assess thermal maturity of the oils. The ratios of β -substituted to α -substituted isomers of methyl naphthalenes, methyl phenanthrenes and methyl dibenzothiophenes revealed higher maturity of the JN oil than that of the DK oil. For both the asphaltenes the abundance of 1-methyl phenanthrene dominates over that of 9-methyl phenanthrene showing the terrestrial nature of the organic matter. The biomarkers present in saturated and aromatic fractions of oils plays an important role in determination of maturity and source of oils. However, it is very difficult to determine maturity of severely biodegraded oils due to bacterial removal of some of the biomarkers in these types of oils. Therefore, asphaltenes should be a better choice for maturity calculation in severely biodegraded oils.

Biography

Manoj Kumar Sarmah received his PhD degree in Petroleum Geochemistry in 2009 from Dibrugarh University. Presently he is working as Senior Research Scientist in R&D Department of Oil India Limited, Duliagan, Assam, India. He has published more than 10 papers in reputed journals. His research interests include oil-oil, oil-source and source-source correlation studies using petroleum bio-markers and application of petroleum geochemistry in oil exploration.

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