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Organic facies characteristics and petroleum generation potential of the Permian coals and related fine-grained sediments of the Dighipara coal basin, Bangladesh

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Abstract

The organic matter compared to inorganic mineral matter (MM) can be considered to distinguish three organic-rich rock types. These are coals (MM<20 vol.%), carbargillites (MM 20-60 vol.%) and mudstones (MM>60 vol.%). The organic versus inorganic proportion is also reflected in the TOC content. The coals, carbargillites and mudstones have TOC>40 wt.%, between 40-20 wt.% and <20 wt.% respectively. We carried out a study based on organic geochemical and organic petrological methods using 17 core samples of 2 different drill holes from the Dighipara coal basin. An attempt is taken to characterize the organic facies of currently studied coals and related fine-grained sediments of the basin. Biomarker analysis (TIC, m/z 191 and m/z 217 fragmentograms) and maceral composition distinguishes three different organic facies of the studied samples: coals, carbargillites and mudstones.

CPI values, hopane C_{29}/C_{30}, Tm/Ts, sterane/hopane and predominance of aromatic hydrocarbons indicate the coals are dominantly terrestrial with minor contribution from marine sources. The carbargillites are mixture of terrestrial and marine sources and mudstones being terrestrial with no marine input. The cross-plot of Pr/nC_{17} versus Ph/nC_{18} indicates the suboxic depositional conditions for the studied samples. Very good petroleum generation potential is estimated for the analyzed samples ranging from fair to excellent. The carbargillites possess reasonably good potential for both oil and gas. It is followed by coals (mainly gas with minor oil) and mudstones (gas only). All the studied samples were thermally mature. The presence of exsudatinite, free oils and micrinite suggests the analyzed samples have already expelled petroleum.

Biography

Md. Farhaduzzaman has received BSc and MSc in Geology in the year 2001 and 2002 respectively from Jahangirnagar University, Bangladesh and has 5 years working experience with Asia Energy Corporation Pty Ltd (UK based company) as an “Assistant Geologist” from August 2004 to June 2009. After leaving Asia Energy, he has been working with Sylhet Gas Fields Limited, Petrobangla as an “Assistant Manager” since July 2009. My PhD thesis (from University Malaya, Kuala Lumpur) is now under evaluation in USA. He had published several papers in different high impact journals. He was a member of AAPG, SEG, GSM, BGS and SEAPEX.