

OIL AND GAS GENERATING POTENTIAL OF BARAIL SHALES OF UPPER ASSAM BASIN: THEIR PROSPECTS AS AN OIL SHALE OR SHALE OIL RESOURCE

N. Mathur & S. V. Raju.

Centre of Excellence for Energy Studies, Oil India Limited, Rukminigaon, GS Road, Guwahati, Assam;

R&D Department, Oil India Limited, Duliajan, Assam.

E-mail: neeraj.nmathur@gmail.com svraju@oilindia.in

Abstract

Oilshales are organic matter rich fine grained sequences, rich in kerogen, and produce hydrocarbons on pyrolysis. They are regarded as unconventional resources of hydrocarbons. The coal-shale unit of the Oligocene Barail Formation is an organic matter rich unit and constitutes one of the principal source rocks for conventional oil and gas deposits located in the Assam shelf area. An earlier study on this unit of Assam and Arunachal Pradesh, carried out by DGH, indicated significant oil shale resources in the region. The present study aims to fill the gap of data on the quantitative distribution of hydrocarbons generated by the shale upon pyrolysis.

The study is based on analysis of 43 surface and subsurface samples from the thrust belt area of Upper Assam.. Selected samples were analyzed using Rock Eval and Pyrolysis Gas Chromatograph Mass Spectrometer (Py-GC-MS) to determine the hydrocarbon distribution in the pyrolysate produced at 6000C.

Results indicate significant number of samples with a TOC content of more than 5%. Hydrogen Index ranges from 75 to 395 mg per g TOC. The shale unit is either immature or is in an the early stage of organic matter maturation (Tmax < 437°C), with significant hydrocarbon generation potential as indicated by S2 values up to 62 Kg of oil per ton of rock. These parameters, taken together, characterize them as important unconventional fossil fuel resource.

Py-GC-MS analysis indicate that the organic matter in the shale unit is predominantly composed of Type III kerogen that will generate paraffinic - naphthenic oils on maturation, or pyrolysis. The gas : oil generation index for these shales varies from 0.14 to 0.72, implying that the unit can generate both oil and gas.

The results call for detailed stratigraphic distribution of organic matter rich sequences within the Barail Shale Formation and to map such sequences for obtaining refined estimates of resources and developing strategies for exploitation of oil shale resources within the immature portion of the sequences and shale oil potential in the mature sequences within the mature generative basin.

Keywords: Oil shales organic matter, oil and gas generation, upper Assam and Basin.