

Early Eocene black shales of western Kachchh: Depositional environment and source rock potentiality

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Study area

The Kachchh region of Gujarat, western India, is considered as promising hydrocarbon exploration area. Jurassic to Eocene black shales in this area may have potentiality to be source rock. Tectonic events and Deccan volcanism are responsible for development of structural traps and maturation of organic matter. The present study is pursued on early Eocene black shales associated with lignite seams in Matanomadh (18 core samples) and Naliya-Narayan Sarovar Road (NNSR, 4 samples) area. Foraminiferal and Rock Eval Pyrolysis investigations were performed on these samples to understand their depositional environment as well as source rock potentiality.

Discussion of results

All these black shales are completely barren of foraminifera. Scanning electron microscopic study of shales reveal that the samples from core and NNSR are rich in framboidal pyrite. The total organic carbon (TOC) values recorded in these samples are ranging between 0.08 to 27.2%. Absence of foraminifera and presence of pyrite within shales indicate their deposition in highly reducing non-marine environment. The HI (Hydrogen Index) and OI (Oxygen Index) plot and T_{max} values show that the organic carbons of NNSR are immature, type - III and IV and prone to generate coal. The Core samples from Matanomadh represent two fold distribution in terms of kerogen nature. The upper part of the core exhibits relatively high, immature, type - III and IV organic carbon which is prone to generate coal upon maturation. Whereas, core samples from the lower section of black shales are rich in immature, higher amount of mixed type (kerogen type – II and III) organic carbon. Thus it is considered that this part of core having high potentiality to generate oil and gas after attaining suitable thermal maturity.