

Hydrocarbon generation potential and depositional environment of the Cherat coal, Khyber Pakhtunkhwa, Pakistan

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Abstract

The coal from Paleocene Hangu Formation is evaluated for hydrocarbon generation potential, using optical microscopy and geochemical analysis. The kerogen type identified is dominated by type-III and maceral type by vitrinite, with collinite being dominant sub-group. The >2% TOC values suggest a promising source of the coal for hydrocarbon generation with the highest TOC value (>76%) recorded in coal sample SK-4 and the lowest (7.02%) in coal sample DG-1. All the coal samples show good to very good values (>6%) of generation potential (GP) with highest value 59.68 in sample SK-4 and lowest 6.3 in DG-1 HI versus T_{max} plot indicates that coal samples are post mature. However, the vitrinite reflectance values (R_o) range from 1.03% to 1.26%, showing late mature stage. OI is continuously low throughout the analyzed interval, which further supports that coal is of good quality and is gas prone. Based on the maceral types and Rock-Eval data, anoxic to terrestrial environment is inferred for the deposition of this coal. All these parameter show that the coal is of good quality (i.e. bituminous grade), mature and lying in gas window. It has also been confirmed with the rock maceral analysis through visual recognition. Most of the pre and post-Paleocene coals in Pakistan are not of good grade since they contain more water content, but in this case the water content is negligible. The Paleocene Hangu Formation is present both on surface and in the subsurface throughout the Kohat sub-basin and thus can be regarded as a potential candidate for coal bed methane, unconventional gas and as well as carbon sequestration.