

GEOCHEMICAL SOURCE ROCK EVALUATION OF LATE JURASSIC TO EARLY CRETACEOUS ROCKS OF SULAIMAN RANGE, PAKISTAN: INTEGRATION OF OUTCROP AND WELL DATA

Bilal Wadood¹, Abdullah², Muhammad Eisa², Muhammad Asim³, Wajahat Menhas³ and Zakir Ullah³

¹Department of Geology, University of Swabi, KPK, Pakistan

²National Centre of Excellence in Geology, University of Peshawar, KPK, Pakistan

³Department of Geology, University of Peshawar, KPK, Pakistan

bilalwadood@gmail.com

Abstract

The present study focuses on Geochemical Source Rock evaluation of the Jurassic Chiltan Formation and Early Cretaceous Sember Formation. A total of 85 outcrop samples and 18 well cuttings were investigated to study the source rock potential of the rock units. The Sann #1 well data are integrated with the collected outcrop samples from the Mughal Kot section, Sulaiman Range. The techniques of the Rock-Eval pyrolysis and total organic carbon (TOC) tests were used. The analysis of both outcrop and well data sets revealed significant information regarding hydrocarbon generation potential of the Sember and Chiltan Formations. The source rock quality, Kerogen type, Level of maturity and expulsion/migration of hydrocarbons is determined by data plots of different geochemical parameters. The outcrop data of the Sember Formation reveals that the source rock quality ranges from poor to fair. The Kerogen type II in the lower most part while Kerogen type III in the middle and upper part with indigenous hydrocarbon potential was observed. The subsurface geochemical parameters of the Sember Formation in the Sann # 1 well confirmed the presence of very good values of TOC, Kerogen type II, immature to mature organic matter and no expulsion of hydrocarbon; pointing towards the presence of indigenous hydrocarbon potential. Similarly, the outcrop data of Chiltan Formation suggests poor to fair source rock quality in the upper part, very good to good in the middle part and poor to good in the lower part. The Kerogen type II, immature source rock with indigenous hydrocarbon generation potential is observed. The well data of Chiltan Formation shows good TOC with both Kerogen type II and type III, immature to mature source rock, having an indigenous hydrocarbon generation potential. The difference in the geochemical parameters like source rock quality, source rock maturity and hydrocarbon potential of the outcrop and well data is attributed to the overburden thickness, geothermal gradient, and environment of deposition.