

Source Rock Evaluation and Paleoenvironment of Some Prerift Rock Units at the Central Part of the Gulf of Suez, Egypt

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Abstract

Source rock potentiality, Maturity and depositional environment of seven rock units which include Thebes, Esna, Sudr, Brown Limestone, Matulla, Wata, Abu Qada and Raha Formations in WFA-1 and GS 197-2 wells at the centre of the Gulf of Suez is based on rock eval pyrolysis data. The Gulf of Suez includes the most important oil field in Egypt. In this study, an attempt has been made to evaluate the possibility of upper Cretaceous, Paleocene and Eocene as a source material for oil and gas generation. One hundred and three samples were collected from Thebes, Esna, Sudr, Brown Limestone, Matulla, Wata, Abu Qada and Raha Formations and have been analysed using Rock- Eval pyrolysis. It has been observed that the total organic matter content (TOC) of Thebes, Sudr and Brown Limestone varies mainly between good and very good and reached to excellent source for Thebes Formation which has values of 1.16 - 4.05wt%, and of 1.76-2.86 wt% for Brown Limestone and between 0.61 and 3.17 wt% for Sudr Formation. The hydrogen indices of the studied samples ranges from 290 to 609mg Hc/g Corg and contain mainly type II kerogen and occasionally type I kerogen for Thebes Formation and between (411- 580) and (164-535) for Brown Limestone, Matulla and Sudr Rock units respectively. While the other rock units have lower hydrogen indices these reflect the increase of the vitrinite content. The Tmax versus production indices reflect that the maturity regime of kerogen falls within the oil-generation window. Hydrogen indices and Tmax plot reflect also that the kerogens are occurred in the zone of 20% to 100% type II kerogen. The higher hydrogen indices reflect increasing amount of lipid-rich material in the marine carbonates rock units, either from cutinite, resinite, exinite (terrestrial macerals) or from marine algal materials. Kerogen is type II is mainly of oil prone and that of type III, mainly gas-prone and tends to be marginally mature to mature with main oil-generation potential. The studied rock units are deposited under shallow marine slow transgressive stage and reached to high transgressive stage during the deposition of Brown Limestone and Sudr Formations (late Upper Cretaceous) and the second one during the deposition of Thebes Formation (Early Eocene).