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Organic Facies Classification, Distribution, and Their Geochemical Characteristics in Sirt Basin, Libya

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Abstract : The failed rifted epicratonic Sirt basin is located in the northern margin of the African Plate with an area of approximately 600,000 km2. The organofacies' classification, characterization, and its distribution vertically and horizontally are carried out in 7 main troughs with 32 typical selected wells. 7 geological and geochemical cross sections including Rock-Eval data and % TOC data are considered in order to analyze and to characterize the main organofacies with respect to their geochemical and geological controls and also to remove the ambiguity behind the complexity of the orgnofacies types and distributions in the basin troughs from where the oil and gas are generated and migrated. This study confirmes that there are four different classical types of organofacies distributed in Sirt basin F, D/E, C, and B. these four clasical types of organofacies controls the type and amount of the hydrocarbon discovered in Sirt basin. Oil bulk property data from more than 20 oil and gas fields indicate that D/E organoface are significant oil and gas contributors similar to B organoface. In the western Sirt basin in Zallah-Dur Al Abd, Hagfa, Kotla, and Dur Atallha troughs, F organoface is identified for Etel formation, Kalash formation and Hagfa formation having % TOC < 0.6, whereas the good quality D/E and B organofacies present in Rachmat formation and Sirte shale formation both have % TOC > 1.1. Results from the deepest trough (Ajdabiya), Etel (Gas pron in Whadyat trough), Kalash, and Hagfa constitute F organofacies, mainly. The Rachmat and Sirt shale both have D/E to B organofacies with % TOC > 1.2, thus indicating the best organofacies quality in Ajdabiya trough. In Maragh trough, results show that Etel F organofacies and D/E, C to B organofacies related to Middle Nubian, Rachmat, and Sirte shale have %TOC > 0.66. Towards the eastern Sirt basin, in troughs (Hameimat, Faregh, and Sarir), results show that the Middle Nubian, Etel, Rachmat, and Sirte shales are strongly dominated by D/E, C to B (% TOC > 0.75) organofacies.

Keywords : Etel, Mid-Nubian, organic facies, Rachmat, Sirt basin, Sirte shale
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