Sedimentology and Petroleum Potential of Chia Gara Formation (Middle Tithonian – Berriasian) in Selected Sections in Kurdistan Region, Iraq

Govand H. Sherwani[1] and Ayad N. Edilby[2]

[1]Geology, Salahaddin University, Erbil, Erbil Governorate, Iraq.
[2]Soran University, Soran, Erbil Governorate, Iraq.

ABSTRACT

The sedimentology and petroleum potential of Chia Gara Formation (Late Jurassic – Early Cretaceous; Tithonian – Berriasian) in Northern Iraq are studied. The formation is exposed in the High Folded and Imbricated Zones of Iraq. Two outcrops and one well located in three different tectonic zones were chosen for current study. The selected sections are Banik (Duhok Governorate), Barsarin, (Erbil Governorate), Aj-12 well (Salahaddin Governorate). The Chia Gara Formation is lithologically composed of black shale, thin bedded brown argillaceous limestone, thin to medium yellowish limestone, and marly limestone in uppermost part. The petrographic investigation of limestone beds along with microfacies analysis of limestones were based on 97 thin sections. The skeletal grains consist of pelagic fauna of both type's macro and micro. Pelagic macrofossils include ammonite, while pelagic microfossils include planktonic forams, radiolaria, ostracods, calcispheres, and others. Non-skeletal grains were not observed in the current study. Rocks of the Chia Gara Formation were subjected to different diagenetic processes. Limestones of the Chia Gara were divided into three principal microfacies: Mudstone, Wackestone, and Packstone. Each of these had been further subdivided. Using lithology, paleontology, and some other criteria; the depositional environment of the Chia Gara Formation is concluded to be beginning of toe of slop to deep open marine environment. Source rock potential of the Chia Gara Formation was also studied. The average values for TOC% of the formation were 1.70, 3.40 and 0.89 for Barsarin, Banik and Aj-12 sections that show Good, Very Good, and Fair respectively. The Pyrolysis executed for studied samples revealed that kerogen in Banik section and Aj-12 well belong to Types II and III kerogen, whereas Barsarin section obtained Types III and IV kerogen. Pyrolysis Parameters and diagrams suggested mature stage in Banik and Barsarin sections, and immature (or late immature) stage in well Aj-12. TOC% versus S1+S2 parameter indicated poor to excellent type of source rock in the studied formation. Vitrinite Reflectance (R%) and (TAI) indicated Oil Window and Early Gas Window in Barsarin, Oil Window in Banik, and Early Oil Window in Aj-12.