

Investigation of geochemical, diagenetic processes and deposition environment of Tirgan Formation in eastern part of Kopet Dagh basin of north east of Iran

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Abstract

The Tirgan Formation, Cretaceous (Barremian-Aptian) in age, a carbonate formation with shale and Marl interlayers. Considering reservoir potential, this formation has not been studied precisely in the study areas, and from the viewpoint of diagenesis, based on geochemical results. Therefore, in order to study, two sections, Sar-rud with 136 m thick, and Kalteh Ebrahim Baig with 45 m thick, in the eastern of the Kopet Dagh basin, were measured. Finally, for petrology study, 132 thin section were prepared. In according to petrology studies, 4 facies associations, including 14 carbonate facies, intertidal flat, semi-restricted lagoon, shoal and open sea, and also 4 siliciclastic facies in two groups related to tidal flat were indentified. Due to identified rock facies, this formation deposited in a homoclinal carbonate ramp. The most important identified diagenetic processes in the Tirgan Formation are cementation, micritization, dissolution, compression, dolomitization, fracturing, neomorphism, stylolization and silicification. For the geochemical studies, 35 samples by inductively coupled plasma, and also 15 samples by atomic absorption method were analyzed. The dispersion of the major elements (Ca, Mg) and the minor element (Fe, Mn, Na, Sr) and the isotopic range of O¹⁸ and C¹³, indicate the composition of primary calcite mineralogy. Also, these values show the effect of the dominant burial environments on this strata in a diagonal and semi-closed diagonal system with a low water-rock reaction. The sea water temperature at the time of precipitation of carbonates of Tirgan Formation using the heaviest oxygen isotope in limy mud 234.6 ° C is estimated.

Keywords: Tirgan Formation, depositional environment, diagenesis, geochemistry, Kopet-Dagh