

The Influence of Salt Body of J. Ech Cheid on the Maturity History of the Cenomanian: Turonian Source Rock

Authors : Mohamed Malek Khenissi, Mohamed Montassar Ben Slama, Anis Belhaj Mohamed, Moncef Saidi

Abstract : Northern Tunisia is well known by its different and complex structural and geological zones that have been the result of a geodynamic history that extends from the early Mesozoic era to the actual period. One of these zones is the salt province, where the Halokinesis process is manifested by a number of NE/SW salt structures such as Jebel Ech-Cheid which represents masses of materials characterized by a high plasticity and low density. The salt masses extrusions that have been developed due to an extension that started from the late Triassic to late Cretaceous. The evolution of salt bodies within sedimentary basins have not only contributed to modify the architecture of the basin, but it also has certain geochemical effects which touch mainly source rocks that surround it. It has been demonstrated that the presence of salt structures within sedimentary basins can influence its temperature distribution and thermal history. Moreover, it has been creating heat flux anomalies that may affect the maturity of organic matter and the timing of hydrocarbon generation. Field samples of the Bahloul source rock (Cenomanian-Turonian) were collected from different sights from all around Ech Cheid salt structure and evaluated using Rock-eval pyrolysis and GC/MS techniques in order to assess the degree of maturity evolution and the heat flux anomalies in the different zones analyze. The Total organic Carbon (TOC) values range between 1 to 9% and the (Tmax) ranges between 424 and 445°C, also the distribution of the source rock biomarkers both saturated and aromatic changes in a regular fashions with increasing maturity and this are shown in the chromatography results such as Ts/(Ts+Tm) ratios, 22S/(22S+22R) values for C31 homohopanes, $\beta\beta/(\beta\beta+\alpha\alpha)$ 20R and 20S/(20S+20R) ratios for C29 steranes which gives a consistent maturity indications and assessment of the field samples. These analyses are carried to interpret the maturity evolution and the heat flux around Ech Cheid salt structure through the geological history. These analyses also aim to demonstrate that the salt structure can have a direct effect on the geothermal gradient of the basin and on the maturity of the Bahloul Formation source rock. The organic matter has reached different stages of thermal maturity, but delineate a general increasing maturity trend. Our study confirms that the J. Ech Cheid salt body have on the first hand: a huge influence on the local distribution of anoxic depocentre at least within Cenomanian-Turonian time. In the second hand, the thermal anomaly near the salt mass has affected the maturity of Bahloul Formation.

Keywords : Bahloul formation, depocentre, GC/MS, rock-eval

Conference Title : ICGGG 2017 : International Conference on Geology, Geophysics and Geochemistry

Conference Location : Paris, France

Conference Dates : May 18-19, 2017