

703877 Prediction of Hydrocarbon Generation from Lower Silurian Hot Shale Source Rocks by Using Bulk and Compositional Kinetics Results in the Murzuq Basin, SW Libya

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Organic-rich "hot shales" of the Lower Silurian Tanezzuft formation are regarded as the principal source rocks for Palaeozoic oil fields in North Africa. Thus, the evolution of the petroleum system of the Murzuq basin, Southern Libya, is largely controlled by the lateral extension, thickness, organic geochemical characteristics and maturity of the Tanezzuft hot shale. In this context the petroleum generation potential of Tanezzuft hot shale samples from the Murzuq basin was studied by geochemical and petrological methods and a numerical modelling study was performed taking into account the structural evolution and thermal history of this basin[1].

Core and cutting samples of the Lower Silurian interval were selected from two wells of the northern and central part of Murzuq basin. High TOC contents and HI-values from Rock-Eval pyrolysis indicate organic-rich source rocks with moderately hydrogen-rich organic matter, classified as Type II kerogen, at different maturity levels.

To enhance the geochemical source rock characterisation as well as to predict hydrocarbon phases and generation [2], bulk and phase kinetics were performed by open system- and closed system pyrolysis.

The bulk kinetic analysis confirmed the early to mid mature level for the northern part and immature to early mature level for the central part of the basin. The activation energy distribution for the samples is characterised by a smooth bell-shaped, Gaussian-like distribution, typical of marine type II kerogen. Temperature and timing of petroleum generation were calculated using activation energies and frequency factors with a linear geological heating rate of 3.3 K/my [2].

The compositional kinetic analysis was performed to assess the composition of generated petroleum. The results show that 75 % of hydrocarbons is generated as oil and 25 % as gas fraction. The gas-oil ratio was calculated and found to increase with increasing the maturity.

[1] Belaid, A., B. Krooss and R. Littke, 2009, Thermal history and source rock characterization of a Palaeozoic section in the Awbari Trough, Murzuq Basin, SW Libya, Marine and Petroleum Geology, doi: 10.1016/j.marpetgeo.2009.06.006.

[2] di Primio, R., Horsfield, B., 2006, From petroleum type organofacies to hydrocarbon phase prediction. AAPG Bulletin, v. 90, no. 7, p.1031 - 1058

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