Causes of methane and carbon dioxide generation in the Nosud water-transfer tunnel, Kermanshah Province, using geochemical assessments

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Abstract

The Garau formation (Apthian - Cenomanian) is one of the hydrocarbon-generating formations in the Zagros basin. Investing hydrocarbon potential of the Garau Fm., 14 samples were taken through the Nosoud water-transfer tunnel, NW Kermanshah. The samples were analyzed by Rock- Eval 3 pyrolysis method. The results show that kerogen type III is the most abundant in the Garau Fm. According to the T_{max}, and organic matter results, this formation is thermally matured in the study area. The HI vs TOC values indicate a CD organic facies representing an oxidizing environment of plant organic origin in this formation at the study area. In terms of genetic potential, the Garau Fm. is a poor to relatively good source rock, but its hydrocarbon potential ranks poor. The vitrinite reflectance is more than 1.3 in the most samples, which indicates gas production stage that is also confirmed by T_{max} more than 440 C°. Furthermore, the thermal history model of the Garau Fm. in the study area suggests this formation entered to catagenetic stage in Paleogene and reached to high thermal maturity in late Neogene. The existing methane and carbon dioxide in the tunnel with a concentration of more than 870 ppm can be attributed to the generation of gaseous hydrocarbons according to the results of thermal modeling.

Keywords: Garau formation, Rock eval pyrolysis, Hydrocarbon potential, Kermanshah