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Geochemical Characteristics of Asmari, Sarvak and Khalij reservoirs in Pazanan and Khaviz Oil Fields Using Gas Chromatography and Gas Chromatography-Mass Spectrometry

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INTRODUCTION

Investigation and geochemical correlation between the oil samples of Asmari and Sarvak reservoirs in the Pazanan oil field and Khalij reservoir from the Khaviz oil field are the aim of this research. Two oil samples of Asmari and Sarvak reservoirs and one oil sample from Khalij reservoir in Khaviz oil field have been used for this purpose.

GEOLOGIC AND GEOGRAPHIC SETTING

Khaviz oil fields are situated in the Dezful Embayment sub-zone of Zagros sedimentary basin in the southwestern part of Iran. Dezful Embayment hosts the most important reservoirs of Iran. Based on geographic position, the Pazanan oil field is located on 150 Km southeast of Ahwaz. Also, the Khaviz oil field is located on 10 Km northeast of Behbahan.

RESEARCH METHOD

In order to carry out geochemical survey, columnar chromatography, Gas Chromatography (GC) and Gas Chromatography Mass–Spectrometry (GC/MS) methods have been used in the geochemical research laboratories of Research Institute Petroleum Industry, Iran.

RESULTS AND DISCUSSION

CHEMICAL COMPOSITION OF SAMPLES

Chemical composition of oil is determined in terms of its components including saturate, aromatic, resins and asphaltenes. In the

Asmari oil reservoir sample, saturate and asphaltene fractions are in maximum and minimum amounts in comparison with the Sarvak and Khalij oil reservoir samples. It shows that the Asmari oil reservoir sample has got better quality.

DETERMINING THE KIND AND QUALITY OF HYDROCARBON

Based on chart of Tissot and Welt (1984), oil samples of the Asmari, Sarvak and Khalij are paraffinic, mainly paraffinic to paraffinic-naphthenic and paraffinic–naphthenic respectively.

MATURITY OF OIL SAMPLES

Based on biomarker maturity sensitive biomarkers such as C29 Sterane αββ/(αββ+ααα) versus C29 Sterane 20S/(20S+20R) [2] and CPI degree (near to 1), oils have got higher thermal maturity, and they are in oil producing window.

LITHOLOGY OF SOURCE ROCK

Based on charts pristane to phytane (Pr/Ph) against dibenzothiophene to phenanthrene (DBT/Phen) [3], lithology of generator source rock of Asmari sample was shaly carbonate. Also, source rock of Sarvak and Khalij oil reservoir samples were marine marly carbonate.

SEDIMENTARY ENVIRONMENT AND KKEROGEN TTYPE

The triplot diagram for regular steranes, C27, C28, C29 the oil reservoir samples shows open marine to parallic environment. Also, based on the chart ratios of Pr/ Ph, the samples show type II kerogen in all source rocks.

AGE OF SOURCE ROCK

It seems that mixture of oleanane hopanoid which is a 30–carbon triterpenoid is derived from prerequisites of different dry needs, especially angiosperms which produce a lot of resins [4]. These are terrestrial in origin and transported to marine environment. Since angiosperms have been appeared after late Cretaceous, negation of oleanane in early Cretaceous and older deposits is understandable. By referring to above subjects and negation of oleanane in oil samples, we can estimate the age of source rocks of oil samples about early Cretaceous.

GENETICS OF OIL RESERVOIRS

Star chart of odd alkane to even ratio (Kaufman et.al ,1990) and non-overlap of charts show dissimilarity of source rocks of oil generators, lacking adjustment in oil and source rocks. According to this, oil samples of Asmari, Sarvak and Khalij reservoirs have been generated from different source rocks which are different in terms of geochemical properties, and they show oil contamination or secondary process.

CONCLUSIONS

Chemical composition of the oil samples include saturate, aromatic, resin and asphaltene components. Amongst them saturate and asphaltene fractions are the highest and lowest values respectively. Based on chart of Tissot and Welt (1984), oil samples of the Asmari, Sarvak and Khalij are paraffinic, mainly paraffinic to paraffinic-naphthenic and paraffinic–naphthenic respectively. In terms of maturity, all the three samples have high thermal maturity. Also, they are in oil producing window, and the lithology of generator source rock of Asmari sample is shaly

carbonate. The source rock of Sarvak and Khalij oil reservoir samples are marine marly carbonate. In addition, the oil reservoir samples show marine environment with reducing condition that accompanied by type II kerogen. Absence of Oleanane in samples shows that they are made of source rocks with the age of related to early cretaceous. Therefore, oil samples from Asmari, Sarvak and Khalij reservoirs are genetically different from each other.

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