OIL-OIL CORRELATION USING POLAR AND NON-POLAR FRACTIONS OF CRUDE OIL: A CASE STUDY IN IRANIAN OIL FIELDS

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Oil-oil correlation is one of the most important issues in geochemical studies that enables to classify oils genetically. Oil-Oil correlation is generally estimated based on non-polar fractions of crude oil (e.g., saturate and aromatic compounds). Despite several advantages, the drawback of using these compounds is their susceptibility of being affected by secondary processes. The polar fraction of crude oil (e.g., asphaltenes) has similar characteristics to kerogen, and this structural similarity is preserved during migration, thermal maturation, biodegradation, and water washing. Therefore, these structural characteristics can be considered as a usefull correlation parameter, and it can be concluded that asphaltenes from different reservoirs with the same genetic signatures have a similar origin. Hence in this contribution, an integrated study by using both non-polar and polar fractions of oil was performed to use the merits of both fractions. Therefore, five oil samples from oil fields in the Persian Gulf were studied. Structural characteristics of extracted asphaltenes were investigated by Fourier transform infrared (FTIR) spectroscopy. Graphs based on aliphatic and aromatic compounds (predominant compounds in asphaltenes structure) and sulphoxide and carbonyl functional groups (which are representatives of sulphur and oxygen abundance in asphaltenes) were used for comparison of asphaltenes structures in different samples. Non-polar fractions were analyzed by GC-MS. The study of asphaltenes showed the studied oil samples comprise two oil families with distinct genetic characteristics. The first oil family consists of Salman and Reshadat oil samples, and the second oil family consists of Resalat, Siri E, and Siri D oil samples. To validate our results, biomarker parameters were employed, and this approach completely confirmed previous results. Based on biomarker analyses, both oil families have a marine source rock, whereby marl and carbonate source rocks are the source rock for the first and the second oil family, respectively.