

GEOCHEMICAL STUDIES OF OILS/CONDENSATES AND NATURAL GASES FROM KIM-KATPUR AREA FOR THEIR GENETIC CLASSIFICATION AND CORRELATION AND FOR UNDERSTANDING THEIR GENESIS

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ABSTRACT

Geochemical studies of hydrocarbons in petroleum provide important clues to genetic classification and genetic correlation of petroleum in terms of environments of deposition of source organic matter, nature of source organic matter and the thermal maturity of source organic matter at which petroleum is expelled from source rocks. These studies also help in understanding post accumulation alteration history of petroleum in terms of in-reservoir thermal evolution, gas de-asphalting, water washing and biodegradation.

Seventeen oils and condensates producing from different pay sands of Ankleshwar Formation of Kim, Katpur, Ankleshwar and Kosamba fields and seven gas samples producing from sequentially younger to older Kand, Tarkeshwar and Ankleshwar Formations of Kim, Katpur, Ankleshwar and Olpad fields from Narmada Block of Cambay Basin were studied to bridge the gap of knowledge on their genetic classifications and correlations.

Applications of techniques of molecular separation and characterization such as column chromatography, temperature programmed gas chromatography equipped with suitable wall-coated capillary columns, gas chromatography mass spectrometry and ratio-recording mass spectrometry for stable carbon isotopes enrichment determination in hydrocarbons have been made during the course of geochemical studies.

The oils of Kim, Katpur, Ankleshwar and Kosamba are of low to high API Gravity oils having low asphaltenes and sulphur contents and high saturated/aromatic hydrocarbon ratios. These oils have been derived from terrigenous/ mixed organic matter deposited in oxic to sub-oxic environments and have been sourced from source rocks having organic matter in late proto-catagenetic to early catagenetic stage of organic matter maturation. Some of the oils of Kosamba field are found to be biodegraded. The oils that occur in Narmada Block in Kim-Katpur oil fields are genetically correlated with the oils that occur in Ankleshwar and Kosamba fields of this Block..

The studies have also revealed that gases of Olpad field are of biogenic origin. Gases of Kim, Katpur and Ankleshwar are of thermogenic origin and the carbon isotopes enrichments suggest a common source for all of them. The younger stratigraphic level gases may be the product of migration fractionation from the older Ankleshwar Formation

It can be postulated from the correlation studies that the source rock which has charged the reservoirs of Ankleshwar and Kosamba fields has also charged the reservoirs of Kim-Katpur, at similar organic matter maturity levels in source rocks.. As the Cambay Shale and Olpad Formations are shallow, inadequately matured and practically devoid of source rock characteristics in Narmada Block, the origin of Kim-Katpur hydrocarbons seems to be from the Tankari Depression in the north as has been proposed for Ankleshwar and other oils in Narmada Block.

Keywords: Source rocks, Geochemical studies, thermal maturely, organic matter, water washing, kim-katpur area.