

Raman Spectroscopic Technique to Distinguish Constituents of Hydrocarbon-Bearing Fluid Inclusions of Kerala-Konkan Basin, Western offshore, India

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Abstract

Fluid inclusion studies have a great diversity of applications in exploration geology and are necessary tools in the determination of palaeotemperature and nature of fluids associated with the rocks in a basin. Using various fluid inclusion techniques such as petrography, microthermometry and Laser Raman Spectroscopy of fluid inclusions with Hydrocarbon fluid inclusions (HCFIs) help us to understand the generation potential of the basin. The representative micron sized fluid inclusions that intruded into the different geological formations of the KK-4C-A1 well drilled by Oil and Natural Gas Corporation in Kerala-Konkan Basin, India has been selected for this study. Petrographic analyses confirm the presence of HCFIs with the help of Ultraviolet (UV) light. Raman spectra of HCFIs identified in different formations were examined. The temperature of homogenization (T_h) obtained through microthermometric analysis of the fluid inclusions indicate the palaeotemperature of the sedimentary rock units. Coeval-aqueous inclusions associated to HCFIs show T_h within the oil window range 60-140°C, indicating a temperature favourable for oil generation in Kerala-Konkan Basin (K-K Basin). Characterisation of hydrocarbon bearing fluid inclusions were carried out using Raman spectroscopy. HCFIs were observed in the annealed micro-cracks of Cannanore (Early Miocene), Calicut (Early Oligocene) formation (Type I) and Kasaragod (Palaeocene to Early Eocene) Formation (Type II), might get trapped along the micro-fracture by re-healing process. Laser Raman study could decipher hydrocarbon species such as Alkanes, SO_2 , COS , H_2S , etc.

Keywords: Hydrocarbon Fluid Inclusions, Oil Window Temperature, Raman Spectroscopy, Kerala-Konkan Basin

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