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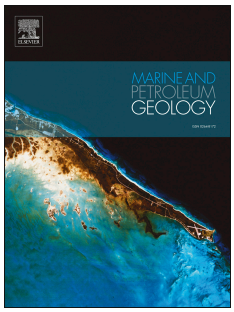

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Chemical Structure Evolution of Kerogen during Oil Generation

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Abstract

Kerogen was isolated from the source rock of Well L69, Zhanhua depression, Bohai Bay Basin and an artificial pyrolysis experiment was carried out in a closed gold tube system with a heating rate of 2□/h. Products were collected at eleven temperature points every ten degrees from 350□ to 450□. The soluble organic matter and residual kerogens from the experiment were quantified by weighing. Furthermore, the residual kerogens were analysed by element analysis, X-ray photoelectron spectroscopy (XPS) and solid ^{13}C nuclear magnetic resonance (^{13}C NMR) spectroscopy to determine the chemical structural of kerogen during oil generation. Combining the data from the analyses, information on the elemental compositions as well as on how functional groups were connected in residues was obtained. Seven molecular models of initial and residual kerogens were established to trace the structure changes in kerogen with maturity. The results suggest that as the temperature increases, aliphatic chains and small clusters of aromatic groups break down from kerogens, generating soluble hydrocarbons at temperatures of less than 390□ (Easy% Ro1.15). At higher thermal maturity, a few short aliphatic carbons remain in the structure of residues. The number of aromatic groups increases and their size grows

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