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Distribution of Naphthalene, Phenanthrene and Their Alkyl Substituents in some Egyptian crude oils as a Tool of Thermal Maturity Assessment

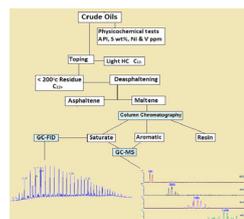


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The distribution of alkylated polycyclic aromatic compounds (PACs) is highly variable in hydrocarbon mixtures. This is because the concentrations are controlled by both the nature of the source organic matter and the conditions of diagenesis/thermal maturation. Different organic matter sources yield bitumens with varying amounts of PACs and different patterns of alkylation. Aromatic fractions separated from seven different Egyptian crude oils, having different geological origins, were analyzed by gas chromatography– mass spectrometry (GC/MS) especially for the generated alkyl naphthalenes and alkyl phenanthrenes. Naphthalene (N), Methyl naphthalenes (MN), Dimethyl naphthalenes (DMN), Trimethyl naphthalenes (TMN) and Tetramethyl naphthalenes (TeMN) have been identified in the m/z (128, 142, 156, 170 and 184) mass chromatograms. Phenanthrene (P), Methyl phenanthrene (MP), dimethyl phenanthrene (DMP), and trimethyl phenanthrene (TMP) isomers have been identified in the m/z (178, 192, 206 and 220) mass chromatograms. Ratios depending on the differences in the thermal stability of the isomers were applied (eg. MPI, MPr, MNr, DMNr, TMNr2 ..etc.). The ratios of β -substituted to α -substituted isomers of both alkyl naphthalenes and alkyl phenanthrenes revealed higher maturity of ND1 from Quassim formation in Nile Delta basin compared to other samples. WD1 oil samples from Faghur basin is characterized by a high abundance of 1,3,7- and 2,3,7-trimethyl naphthalenes (TMN) with (TMNr2=1.154) and high Pristan/Phytan ratio (Pr/Ph=2.63) compared to WD2 from the same basin suggesting in-reservoir mixing of crude oils of different maturities.



Biography

M A Ebiad is an Assistant Professor, and Researcher of Physical Chemistry at Egyptian Petroleum Research Institute. Since the last three years he has been the Head of Gas Chromatography Lab, Analysis and Evaluation Department. He has active effort in the demonstrations of central lab for services. He has 20 research articles in different physical chemistry research area. He develops many gas chromatographic applications in the lab such as PVT study, geochemistry, trace analysis for sulfur and inverse gas chromatography. He also participate in three research projects using GC-MS: Project for biomarker for Suez Gulf region as a data base for Egyptian crude oil, supported by EPRI; STDF project "Finger printing of some Egyptian crude oil via GC-MS in relation to their biomarker" and; Gas analyzer MS (HIDDEN) in STDF project "The development of recent catalysts and membrane reactors for dry reforming of natural gas using CO₂".

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