

PETROLEUM GEOCHEMISTRY: APPLICATIONS TO RESERVOIR MANAGEMENT AND EXPLORATION IN THE 21ST CENTURY

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Petroleum Geochemistry: Applications to Reservoir Management and Exploration in the 21st Century PETERS, KENNETH E. Mobil Technology Company, Dallas, Texas U.S.A. 75247 Petroleum geochemistry is an established science that reduces the risk associated with exploration and production of crude oil and natural gas. Since its early development, petroleum geochemistry is periodically declared to be mature. This is misleading because among geologists and industry management, the term mature is associated with extensively explored basins with little further potential. Petroleum geochemistry is mature in that powerful tools were developed to characterize source rocks and petroleum and these have been remarkably successful. It is estimated that about two-thirds of the worldwide petroleum resource has been discovered and geochemistry continues to play a critical role. However, it is not a mature predictive science. Many enigmas remain whose solutions could yield tremendous competitive advantages in exploration and production. Landmarks in petroleum geochemistry include: the petroleum system concept, reliable correlation using chemometrics of biomarker and isotopic data, recognition that certain coals generate oil, calibrated 3D fluid-flow and compositional basin simulation, and new deepwater exploration models. Some remaining enigmas include poorly constrained input for deterministic volumetric models, insufficient treatment of statistical ranges of input values to basin models to assess output sensitivity, limited ability to predict the regional quality of accumulated hydrocarbons, and inadequate advances in reservoir geochemistry. What is the future of petroleum geochemistry? As exploration and production become more difficult in the twenty-first century, petroleum geochemistry will continue to gain importance as a tool to reduce risk. The challenge is to make it an even more reliable predictive science.