

HOW VALUABLE IS GAS GEOCHEMISTRY FOR NATURAL GAS EXPLORATION?

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Natural gas has become increasingly important as a primary source of energy and raw material for the petrochemical industry since the sixties. At present, 23 % of the commercial world energy demand is met by natural gas. Although predictions about future developments are very uncertain, demand will definitely increase, primarily due to population growth, increase in gross domestic product, and ecological requirements. This development will be accompanied by an increasing need for geoscientific input, particularly since easy-to-find and easy-to-exploit plays do not exist anymore. During the last three decades, geochemists have developed various techniques and interpretation tools for genetic characterisation of natural gases, for correlating gas with source rocks, for understanding of migration and secondary fractionation processes, and surface geochemistry. The interpretation tools use chemical and isotopic compositions of all natural gas components: hydrocarbons, contaminants (CO₂, N₂, H₂S), and noble gases (He, Ar). Gas and isotope geochemical data, together with other geoscientific information, is the key to understanding reservoir development, not only in geologically rather simple settings, like NW Siberia, but also in very complex settings, like the southern Permian basin in NW Europe, in which multiple sources, intrusives, highly variable maturity, and tectonic inversion occur. The objective of recent work is better understand the molecular and isotopic kinetics of gas generation in the different types of source rocks. These findings are already used to model the filling of reservoirs fill and will allow gas quality to be predicted.