Paper 6

Developing consistent and reasonable kerogen kinetics using rock-eval-type pyrolysis

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Although determination of kinetic parameters for individual source-rock samples is currently very popular, the accepted mathematical method of deconvolving raw pyrolysis data in order to obtain activation-energy distributions and frequency factors, will often yield results which are not chemically or physically reasonable. The inadequacy of such kinetic parameters is demonstrated here, using a data set consisting of a number of samples of the same kerogen type, but at different levels of maturity. Use of these incorrect kinetic parameters in modeling studies, can lead to disastrous errors in predictions of hydrocarbon generation under subsurface conditions.

We also briefly outline general aspects of an alternative new method of determining kinetic parameters from raw pyrolysis data. This method is based much on the laws of thermodynamics and on empirical data about chemical reactions, rather than on mathematical curve fitting.

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Kinetic parameters derived using our method are more internally consistent, both for samples at the same maturity level, and for samples at different maturity levels. They are also more consistent with the kinetics of vitrinite reflectance. When applied in modelling studies under geologic conditions, they will give much more realistic answers than kinetic parameters determined by the standard mathematical method.