Geochemical Modeling of Source rock Hydrocarbon Generation Potential

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ABSTRACT

The initial petroleum potential of a source rock can be determined by Rock-Eval pyrolysis experiment. The process is based on first-order kinetics with rate constants obeying an Arrhenius equation and the result is plotted with the fraction of initial potential versus activation energy with an interval of 2 Kcal/mole among 40 and 80 Kcal/mole. This kinetic parameter offers the advantage of kerogen type characterization and hydrocarbon generation of source rock in a sedimentary basin.

Thirty source rock samples from offshore and north-western Taiwan were analyzed to obtain their activation energy distribution in this study. Type III or Type IV kerogens were characterized in most of these samples except Type II kerogen was found in the Middle Eocene Formation of the Penghu Basin. The highest potential fraction centered on 60 or 62 Kcal/mole shows that source rock of Taiwan area needs significant maturation to produce expected amount of HC generation. This is demonstrated in the simulated variation of transformation ratio and HC generation with vitrinite reflectance for these samples.

The kinetic parameters were also applied to the Miocene source rock in the Hsinchu-Miaoli area. The burial history, maturation and HC generation history etc. were simulated to evaluate the petroleum exploration potential.

Key Words: Rock-Eval pyrolysis, S_2 pyrolyzed hydrocarbon, First-order Arrhenius equation, Activation energy distribution, Kerogen type, Maturity, Transformation ratio, Hydrocarbon generation, burial history.