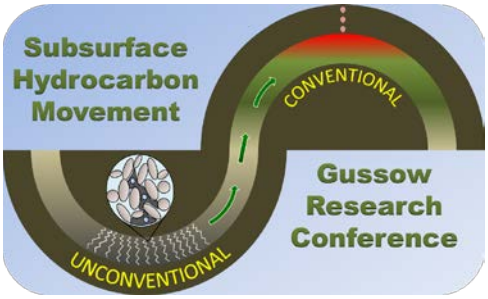


# *A Simple Relative Absorptivity Model of Petroleum Expulsion*

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## Summary

That the timing of petroleum expulsion from a source rock is influenced strongly or even dominated by expulsion from kerogen has its roots a half-century ago and is very widely accepted. Similarly, solubility and swelling theory is commonly used to explain the compositional differences between retained and expelled oil. This paper proposes and implements a simple sorption-expulsion algorithm based on the concept of saturation limits and relative sorptivities of lumped chemical classes in immature kerogen and on residual kerogen (semi-coke). Saturation thresholds as a function of kerogen composition are estimated from published swelling and adsorption data, and relative sorptivities are calibrated for several published data sets for hydrous and semi-open pyrolysis. The model is implemented in a compositional kinetic simulator, PMod2, which treats open and closed system pyrolysis as well as a relative absorptivity model for geological expulsion. Although not as rigorous as the models based on Flory-Rehner and Regular Solution theories, it is more easily calibrated within the context of compositional chemical kinetic models for which the molecular speciation of the lumped species is limited. Improved compositional models for Type I and Type II organic matter are derived, and comparisons to laboratory and field data are presented. Agreement is obtained over a very wide range of conditions, including isothermal pyrolysis at 470 □C, slow pyrolysis in both open and closed systems, and composition of retained oil in source rocks.