# UNDERSTANDING OF HYDROCARBONS GENERATION AND PRIMARY MIGRATION USING CONTROLLED HYDROUS PYROLYSIS EXPERIMENTS

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## ABSTRACT

Facing declining production, the U.S. started looking for new unconventional resources. Shale gas and oil are considered to be the future of the U.S. energy industry. One of the biggest factors governing the success of shale development is maturity. Thermal maturity not only reflects produced hydrocarbons, but also influences many petrophysical properties. Lacking a spectrum of source rocks at spanning the observed range of maturities found in shale plays, hydrous pyrolysis can be used to emulate the natural maturation process and its products. However, the original experiments on finely ground samples and modified uniaxial plug configurations without pressure controls, destroys the microstructural texture of pyrolyzed samples. In this study, samples were pyrolyzed in an open system but under uniaxial loading which minimized texture destruction. Transformation ratio quantified from total organic carbon (TOC) loss at different maturities can be used to develop precise basin models. Chemical analysis and Rock-Eval® measurements confirm the correlation between HI and Tmax for both natural and pyrolyzed samples. This suggests that kerogen type and maturity correction can be derived from hydrous pyrolysis core samples. We also observed for the first time unique microstructural textures in organic matter during artificial maturation which are similar to those observed in natural samples. Microcracks were observed in organics and at a larger, mesoscale, cracks were observed in the rock matrix, this combination provides a very reasonable explanation for primary migration. Porosity in organic matter appears to be associated with clays. Overall, the study provides a general understanding of maturation impact on source rock, which is crucial in framing primary migration models.

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