

Thermodynamics and kinetic analysis of oil shale pyrolysis using iso-conversional methods

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Production of shale oil during pyrolysis of Ellajun oil shale (Jordan) was investigated using non-isothermal conditions in a retort. Knowledge of thermodynamics and pyrolysis kinetics are of great importance for the design and simulation of reactors in order to establish optimum process conditions. The experimental runs were conducted at heating rates between 1 and 30 °C min⁻¹ using a thermogravimetric analyzer. The activation energy values as a function of the extent of conversion for the oil shale pyrolysis process have been calculated using Friedman, KAS and FWO procedures. The results showed that the pyrolysis process reveals no clear dependency of the activation energy on oil shale conversion. This paper applies the golden section search algorithm to determine the activation energy as a function of conversion to compare with the values obtained by known procedures.