Title:

Variable Activation Energy to Model Oil Shale Pyrolysis Kinetics

Abstract: (Your abstract must use 10pt Arial font and must not be longer than this box)

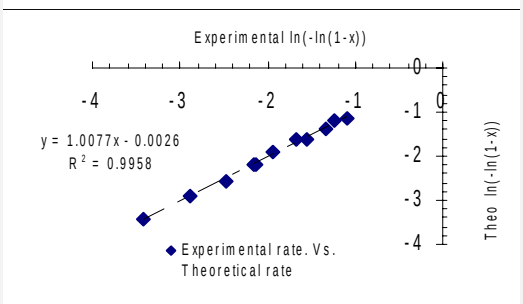
Fixed bed experimental runs are used to model the kinetics of total weight loss of Ellajun oil shale. Samples of 400g are used in the study at 350 – 550 ^{o}C temperatures and heating rate h in the range of 2.6 - 5 ^{o}Cmin^{-1}. The total loss of the oil shale is fitted to standard first order kinetic model encompassing heating rate and variable activation energy as a function of conversion

$$\ln\left[-\ln(1-x)\right] = \ln\left\{\left(\frac{k_o RT}{hE(x)}\right)\left(1-\frac{2RT}{E(x)}\right)\right\} - \frac{E(x)}{RT}$$

where, x is defined as the difference in weights of fresh charged sample and spent shale at the end of the run. A better fit to the data is achieved when the pre-exponential factor k_o is taken to be a function of x , i.e. $k_o = f(x)$. This result is in agreement with other researchers who modelled TGA and DGA kinetic data with variable activation energies depending upon number of reactions involved. Rate of liquid accumulation from fixed bed retort also has been modelled with second order kinetics in which activation energy is taken constant:

$$\frac{dw_l}{dt} = k_o \exp\left(-\frac{E}{RT}\right)(1-x)^2$$

where x is defined as total accumulated weight of liquid at any time divided by total liquid collected at the end of run. The fit to the data is excellent as indicated in figure.



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