

## ACTIVATION ENERGIES PARAMETERS STATISTICAL SEARCH ESTIMATES FOR OPTIMALITY

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### ABSTRACT

The paper is a corollary consistency research of constrain statistical search technique to estimate activation energies of hydrocarbon lumps of crude oils. The typical lumps of hydrocarbons species in petroleum are the paraffin olefins naphthene and aromatics PONA. The crude oil lumps in this work are Paraffin naphthene, aromatics PNA plus gases. A mathematical optimal search for the best convergence of F-Test set at 2.911 values greater than or equals to F-calculated values were carried out for a maximum of 41-iterations on each species totaling 164 search for the activation energy  $E_i$  of Paraffin aromatics naphthene and gas. The results of the search process are given as: 356451.71KJ/Kmol; 174494.90KJ/Kmol; 394295KJ/Kmol and 394385KJ/Kmol of P, N, A and G species respectively. The optimal  $E_i$ -values gave updated  $k_i$ -values of 5.63E-12; 2.46E-04; 1.76E-08 and 1.78E-08 of P, N, A and G. Deviations from literature values shows 0.425%, 0.535%, 0.0157% and 0.0951% and 0.57%, 0.361%, 0.65% and 12% for  $E_i$ -values and  $k_i$ -values of P, N, A, & G respectively. These values can confidently be applied to reactor design and model simulation studies.

**Keywords:** Statistical search, activation energies, HCs-lumps, model, convergence.