Kinetic Parameter Estimation of Catalytic Nathpha Cracking Process

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Catalytic naphtha cranking (CNC) has been studied to improve efficiency of cracking process. Due to the characteristics of a solid acid catalyst, CNC process operates at the lower temperature than the conventional cracking temperature. The ethylene-plus-propylene yield of the CNC process is 10% higher than that of the conventional cracking process, and the propylene-ethylene weight ratio of CNC process is also higher. Consequently, the CNC process could save about 20% of the energy cost and create higher value-added products. Indeed, the CNC process involves not only free radical reactions but also catalytic reactions. Nevertheless, there are not enough attempts to build kinetic models which involve both radical reactions and catalytic reactions. In this study, radical reactions consist of five types of reaction families and catalytic reactions consist of nine types of reactions families. The reaction rate of each reaction family is affected by carbon numbers or molecular weights or transition states. In this model, these factors are applied in terms of activation energy and rate constant during the estimation of the parameters such as pre-exponential factor.