Modeling of seven lumped kinetics and deactivation behavior in MTO (Methanol to olefins) process over SAPO-34

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The Methanol-Olefin Conversion (MTO) process is a production process for light olefins (ethylene, propylene, and butene), which are the basic materials of the petrochemical industry, and has received constant attention in preparation for depletion of oil reserves. In this work, a lumped kinetic model which takes into account seven individual steps of primary stable components for the MTO process over SAPO-34 catalyst was proposed. The estimation of the kinetic parameters has been based on genetic algorithm. The catalyst deactivation by coke deposition in MTO reaction medium strongly affects methanol conversion and product selectivities. Thus, this paper reports a mathematical model of deactivation behavior in terms of effective amount of catalyst in reactor with time on stream. Reasonable agreement is observed between product yield calculated by the proposed model and experimental data obtained from fixed bed reactor.