

Kinetic Study of Methane Decomposition over Ni-based catalyst in Thermogravimetric Analyzer

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The reaction kinetics of catalytic methane decomposition (CMD) over a spray-dried Ni/Al₂O₃ catalyst was modeled using a set of experiments conducted in a thermogravimetric analyzer (TGA). The experiments were carried out at a temperature range of 550–600 °C and a CH₄ partial pressure range of 0.3–0.5 atm. The power-law model showed a good match with the experimental data, and the estimated kinetic parameters were found close to those reported in the literature (the methane cracking activation energy was estimated to be 69 kJ/mol). This kinetic model would be useful for its implementation to fluid flow models of reactor systems such as fluidized beds.