NOx reduction kinetic model for urea-based SCR-SNCR hybrid processes

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For the hybrid process of homogeneous gas-phase SNCR (selective non-catalytic reduction) followed by SCR (selective catalytic reduction), a nitrogen oxides (NOx) reduction kinetic model is developed and validated with the data obtained from a pilot-scale urea-based SNCR-SCR reactor installed with a 150MW LPG burner.
The SNCR kinetic mechanism with seven reactions for NOx reduction by urea-water solution is used to predict NOx reduction, ammonia slip and N2O concentration. The SCR kinetics on a commercial catalyst (TiO2-WO3-V2O5) is identified at temperature 200-400oC in the presence of oxygen (12%), where the Langmuir-Hinshelwood reaction mechanism is used.