

Theoretical evidence of the observed kinetic order dependence on temperature during the N₂O decomposition over Fe-ZSM-5

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Supplementary Information

Experimental determination of the reaction order.

To determine the reaction order in respect to N₂O, the N₂O decomposition was studied varying concentrations of N₂O (2.0, 1.3, 1.0 and 0.75 %) at the total gas flow rate constant. Finally, the concentration was adjusted again to 2.0% to check the reproducibility of the experiment and the catalyst stability. The result for 573 K is presented in Figure S1 showing little influence of N₂O concentration on the rate. The amount of catalyst has been adjusted to obtain a conversion < 15% allowing to consider the reactor as differential.

$$r = \frac{-dC_{N_2O}}{dt} \cong \frac{C_{N_2O,in} - C_{N_2O,out}}{\tau} \quad (\text{eq. S1})$$

$$r = kC_{N_2O}^n \quad (\text{eq. S2})$$

$$C_{N_2O,in} - C_{N_2O,out} = k\tau \cdot C_{N_2O}^n \quad (\text{eq. S3})$$

$$\ln(C_{N_2O,in} - C_{N_2O,out}) = \ln(k\tau) + n \ln(C_{N_2O}) \quad (\text{eq. S4})$$

Reaction order has been determined using (eq. S1) by a linear fitting of $\ln(C_{N_2O,in} - C_{N_2O,out})$ as function of $\ln(C_{N_2O})$ [mol.s⁻¹].

SI Figure captions

Figure S1: N_2O , N_2 , O_2 and Ar inlet and outlet concentrations monitored during the N_2O decomposition over $\text{HZSM-5}_{1200\text{Fe};40\text{Si}/\text{Al}}$ catalyst at 573 K under steady state conditions

Figure S2: Rate of N_2O decomposition as a function of N_2O concentration at 573 K on $\text{HZSM-5}_{1200\text{Fe};40\text{Si}/\text{Al}}$

Figure S1

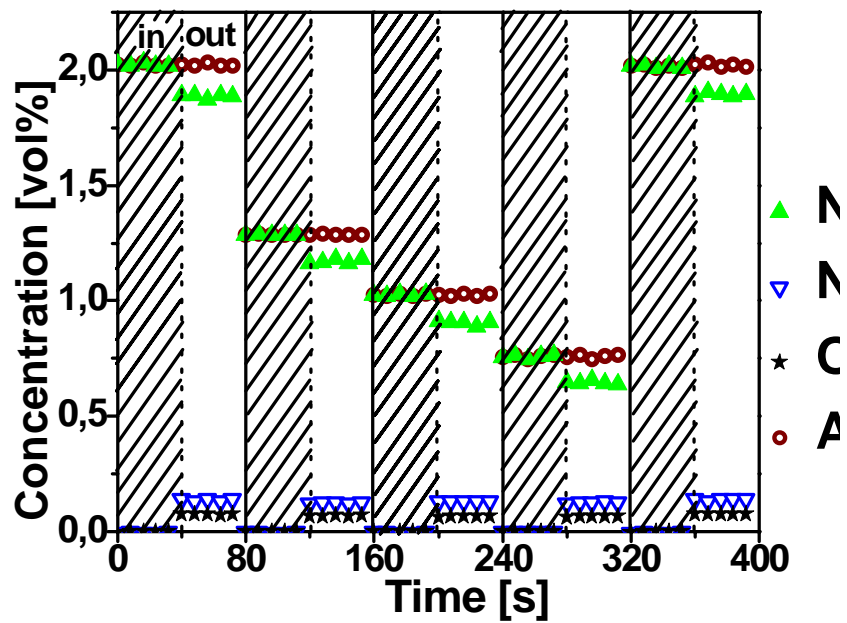


Figure S2

