



CHALMERS
Competence Centre for Catalysis

Master thesis, 30 or 60 credit points: KCK, Chalmers

Understanding low-temperature deactivation of Cu/SAPO-34 catalysts for ammonia selective catalytic reduction in vehicle emission cleaning

This is a master thesis work at Chemical Engineering and Competence Center for Catalysis at Chalmers

The objective is performing experiments on a catalyst used in vehicle exhaust, in order to increase the knowledge about the behavior of this catalyst at low temperature. Trucks equipped with diesel engines have a better fuel economy compared to engines that run at stoichiometric conditions. There is, however, a major problem with oxygen excess in the exhaust and that is the presence of nitrogen oxides (NO_x). One solution is urea selective catalytic reduction of NO_x over ion-exchanged zeolites (such as Cu/SAPO-34). The urea decomposes to ammonia and HNCO. HNCO is further hydrolysed to form NH₃ and CO₂. The ammonia then reacts selectively with the polluting NO_x on the catalyst to produce harmless N₂ and H₂O. However, we found that Cu/SAPO-34 become inactive for the SCR reaction when the exhaust stream contains water vapour at 70 °C. It is thought that a transformation of the copper sites in the catalyst is responsible. Nevertheless this behavior is not yet understood and further investigations are necessary.

The objective of the work is to examine the SCR catalyst Cu/SAPO-34 exposed to low temperature, wet SCR conditions. Catalyst synthesis, XRD, flow reactor experiments, DRIFTS and micro calorimetry will be used.

Education program: Chemical Engineering (K), Chemical Engineering with Physics (Kf), or Physics (F).

Project start: Flexible.

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