Removal of Nitrous Oxides from Flue Gas – at the Forefront of Legislation

Helene Kolding, and Rasmus Fehrmann
Centre for Catalysis and Sustainable Chemistry,
Department of Chemistry, Technical University of Denmark
Email: s052396@student.dtu.dk, rf@kemi.dtu.dk

Why is abatement of flue gas emissions important?

- Abatement of flue gas emissions is important to protect the environment.
- There is no legislation on the abatement of N2O emissions.
- A tandem SCR-deN2O module can remove NOx gases more efficiently than contemporary solutions.

Initiatives for abatement

SO2
- Scrubber for removal of SO2.

Particles
- Filters
- Electrostatic particle removal.

NOx
- Selective catalytic reduction. Produces N2O.

N2O
- None

Novel catalysts

SCR
15 % V2O5 on TiO2
First-order rate constant: 2150
(commercial: 854)
Resistant to alkali poisoning.

Analysis methods:
FT-IR, Raman, XPS, ESR
Conclusions:
Highly disperse, high loading, robust.

deN2O
CoNi oxide
100 % conversion at 300-350 °C

Analysis methods:
XPS
Conclusions:
Highly disperse, alkali promoter is at surface.

Emissions in Denmark

1987
SO2: 163.000 tons
NOx: 129.000 tons

2008
SO2: 5.000 tons
NOx: 20.000 tons

N2O
Lifetime: 150 years in the atmosphere.
Catalyst for ozone degragation.
Greenhouse gas: 300 times more potent than CO2.

Conclusions

Abatement of flue gas emissions is important to protect the environment.
There is no legislation on the abatement of N2O emissions.
A tandem SCR-deN2O module can remove NOx gases more efficiently than contemporary solutions.

References