View metadata, citation and similar papers at core.ac.uk

brought to you by CORE

provided by Online Research Database In Technology

# Poisoning of vanadia based SCR catalysts by potassium:influence of catalyst composition and potassium mobility - DTU Orbit (08/11/2017)

## Poisoning of vanadia based SCR catalysts by potassium:influence of catalyst composition and potassium mobility

The deactivation of $V_2O_5$–$(WO_3)/TiO_2$ catalysts for selective catalytic reduction (SCR) of $NO_x$ upon exposure to aerosols of KCl or $K_2SO_4$, at different temperatures, has been studied. All samples exposed for more than 240 hours lost a substantial fraction of their initial activity although lower exposure temperatures slowdown the deactivation. $K_2SO_4$ causes a lower rate of deactivation compared to KCl. This may be related to a faster transfer of potassium from the solid KCl matrix to the catalyst, however, it cannot be ruled out toalso be caused by a significantly larger particle size of the $K_2SO_4$ aerosol (mass based distribution mode:1.3 μm) compared to that of the KCl aerosol (mass based distribution mode: 0.12 μm). The relative activities of exposed catalysts indicate that promotion with $WO_3$ accelerates the deactivation, likely due to theenhanced Brønsted acidity which appears to promote the transport of potassium. Using a newly developed experimental protocol consisting of two-layer pellets of SCR catalysts, where one side is impregnated with KCl or $K_2SO_4$, the potassium transport in such systems, which is assumed to take place through reactionand diffusion over acid sites, was investigated. SEM-WDS measurements on pellets heat treated at 350 °Cshow that potassium bound in KCl readily leaves its counter ion and thus moves faster into the catalystcompared to potassium from K2SO4, which is in agreement with results from the aerosol exposures.

### General information

State: Published
Organisations: Department of Chemical and Biochemical Engineering, CHEC Research Centre, Freiberg University of Mining and Technology
Authors: Olsen, B. K. (Intern), Kügler, F. (Ekstern), Jensen, A. D. (Intern)
Pages: 2249-2260
Publication date: 2016
Main Research Area: Technical/natural sciences

### Publication information

Journal: Catalysis Science & Technology
Volume: 6
ISSN (Print): 2044-4753
Ratings:

BFI (2017): BFI-level 1

Web of Science (2017): Indexed Yes

BFI (2016): BFI-level 1

Scopus rating (2016): CiteScore 5.64 SJR 1.795 SNIP 1.288

Web of Science (2016): Indexed yes

BFI (2015): BFI-level 1

Scopus rating (2015): SJR 1.838 SNIP 1.319 CiteScore 5.46

Web of Science (2015): Indexed yes

BFI (2014): BFI-level 1

Scopus rating (2014): SJR 1.897 SNIP 1.485 CiteScore 5.44

Web of Science (2014): Indexed yes

BFI (2013): BFI-level 1

Scopus rating (2013): SJR 1.776 SNIP 1.343 CiteScore 4.89

ISI indexed (2013): ISI indexed yes

Web of Science (2013): Indexed yes

Scopus rating (2012): SJR 1.649 SNIP 1.013 CiteScore 3.7

ISI indexed (2012): ISI indexed no

ISI indexed (2011): ISI indexed no
Original language: English
DOIs:

10.1039/c5cy01409c
Source: PublicationPreSubmission
Source-ID: 123038506
Publication: Research - peer-review › Journal article – Annual report year: 2016