

## Accepted Manuscript

Role of  $\text{NH}_3$  oxidation in  $\text{NO}_x$  reduction performance of dual-layer and mixed LNT-SCR configurations

Shephali Singh, Divesh Bhatia

PII: S1385-8947(18)31430-X  
DOI: <https://doi.org/10.1016/j.cej.2018.07.181>  
Reference: CEJ 19579

To appear in: *Chemical Engineering Journal*

Received Date: 2 April 2018  
Revised Date: 3 July 2018  
Accepted Date: 27 July 2018



Please cite this article as: S. Singh, D. Bhatia, Role of  $\text{NH}_3$  oxidation in  $\text{NO}_x$  reduction performance of dual-layer and mixed LNT-SCR configurations, *Chemical Engineering Journal* (2018), doi: <https://doi.org/10.1016/j.cej.2018.07.181>

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

## Role of $\text{NH}_3$ oxidation in $\text{NO}_x$ reduction performance of dual-layer and mixed LNT-SCR configurations

Shephali Singh, Divesh Bhatia\*

Department of Chemical Engineering, Indian Institute of Technology Delhi, Hauz Khas, New Delhi, India-110016

\*Corresponding author: [dbhatia@chemical.iitd.ac.in](mailto:dbhatia@chemical.iitd.ac.in)

### Abstract

A global kinetic model for  $\text{NH}_3$  oxidation is developed and incorporated into an existing LNT-SCR kinetic model to study its effect on the performance of dual-layer and mixed LNT-SCR configurations. The model predicts a decrease in the  $\text{NO}_x$  conversion and an increase in the  $\text{NO}_x$  storage with the inclusion of  $\text{NH}_3$ -oxidation reactions for both the configurations. This is due to the selective oxidation of  $\text{NH}_3$  on the LNT catalyst instead of its consumption by the  $\text{NO}_x$  reduction reactions on the SCR catalyst. The decrease in  $\text{NO}_x$  conversion is negligible at low temperatures and is more prominent at intermediate temperatures ( $\sim 300^\circ\text{C}$ ). The limited supply of stored  $\text{NH}_3$  for the oxidation reactions lowers the negative effect of  $\text{NH}_3$  oxidation at high temperatures. The fractional contribution of  $\text{NH}_3$ -oxidation reactions towards the consumption of  $\text{NH}_3$  is calculated to be higher for the mixed configuration, which is further confirmed by the uniform axial profiles of stored  $\text{NH}_3$  in the mixed configuration as compared to the dual-layer configuration. This results in a more prominent decrease in  $\text{NO}_x$  conversion for the mixed configuration as compared to the dual-layer configuration. The formation of  $\text{NO}_x$  at high temperatures by the oxidation of  $\text{NH}_3$  in the combined configurations can result in a  $\text{NO}_x$  conversion even lower than the standalone LNT catalyst. A higher  $\text{NH}_3$  slip is predicted for the mixed configuration as compared to the dual-layer configuration. It is highlighted that the composition of the LNT catalyst, its activity for  $\text{NH}_3$ -oxidation and the selectivity of products

Download English Version:

<https://daneshyari.com/en/article/6577960>

Download Persian Version:

<https://daneshyari.com/article/6577960>

[Daneshyari.com](https://daneshyari.com)