

Industrial features

J.C. Védrine (GB-2) *

University of Liverpool, Leverthulme Centre for Innovative Catalyse, Department of Chemistry, PO Box 147, Oxford Street, Liverpool, Merseyside L69 7ZD, UK

Contributors: J.A. Lercher (NL-1, D-3); K.H. Sperker (A-1)

Abstract

The main physical and chemical features of the fresh and the used samples from the industrial supplier are given. The industrial catalytic conditions are given resulting in the so-called used catalyst after 9000 hours at 280°C in an industrial gas turbine. ©2000 Elsevier Science B.V. All rights reserved.

Keywords: SCR standard catalyst; EUROCAT oxide; $V_2O_5-WO_3/TiO_2$; Industrial aspects

The catalysts, which were studied in the round-robin exercise, were kindly supplied in large amounts by Austrian Energy and Environment from Wien in Austria in their monolith form. The support, WO_3/TiO_2 , was supplied in the same form as well. Two samples were supplied, namely the catalyst as synthesised and before any catalytic reaction and which will be designated as **Fresh $V_2O_5-WO_3/TiO_2$ catalyst** and the same sample which has been used in a gas turbine operation for 9000 h at 280°C and which will be designed as **Used $V_2O_5-WO_3/TiO_2$ catalyst**.

The object of the exercise was to characterise more completely the two catalysts and the WO_3/TiO_2 support and to determine what modifications could the catalysts have undergone during the 9000 h operation. It is known that such type of catalysts are usually sold by a catalysts supplier for at least 15 000 h operation in a gas turbine. The used catalyst was therefore ex-

pected to represent a material in an optimal steady working state.

Experimental data: The following data were given by Austrian Energy and Environment and should therefore be compared with the data obtained during the round-robin exercise. No information about catalyst preparation was provided to us.

• *Catalyst production on:* 1 June 1989

• *Chemical composition (wt.%)*

TiO_2	78
WO_3	9
V_2O_5	3.15
SiO_2	6.5
Al_2O_3	1.5
CaO	1.0
SO_4^{2-}	0.85

• *Catalytic conditions for the fresh catalyst*

	$T (^{\circ}C)$	$K_o (N m^3 h^{-1} m^{-2})$
$NH_3/NO = 1.2,$	154	6.9
$H_2O = 10 \text{ vol.}\%$	175	11.0
	203	19.4
	284	52.4

* Corresponding author. Tel.: +44-151-794-2297;

fax: +44-151-794-3589.

E-mail address: vedrine@liverpool.ac.uk (J.C. Védrine (GB-2)).

NH ₃ /NO = 1.0,	280	45.0	Wall thickness	0.58 mm
H ₂ O = 10 vol. %			Channel width	3.58 mm
GHSV/Spec. surface		12.8 N m h ⁻¹ (N m ³ h ⁻¹ m ⁻²)	Fraction of accessible channel cross sections	69.8%
Linear velocity		2.3 N m s ⁻¹	Surface/volume catalyst	779 m ⁻¹
• SO ₂ conversion to SO ₃	280°C	1.3%	• Working conditions: 9000 h at 280°C with 1 mg SO ₃ per N m ³ in the exit.	
• Catalyst parameters				