

Monolithic Co-Mn-Al Oxide Catalysts in Total Oxidation of Ethanol

Ludvíková, Jana 2012

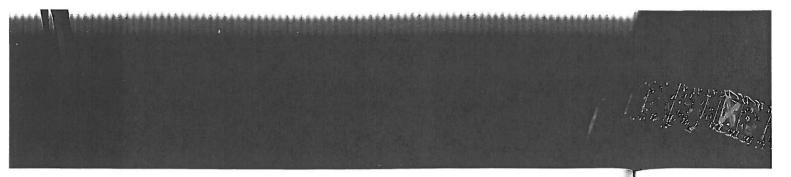
Dostupný z http://www.nusl.cz/ntk/nusl-127035

Dílo je chráněno podle autorského zákona č. 121/2000 Sb.

Tento dokument byl stažen z Národního úložiště šedé literatury (NUŠL).

Datum stažení: 11.04.2024

Další dokumenty můžete najít prostřednictvím vyhledávacího rozhraní nusl.cz .



Po 2

MONOLITHIC Co-Mn-Al OXIDE CATALYSTS IN TOTAL OXIDATION OF ETHANOL

Jana Ludvíková, Květa Jirátová, Jan Klempa

Institute of Chemical Process Fundamentals, v.v.i., Czech Academy of Sciences, Rozvojová 135, 165 02 Praha 6, Czech Republic

Abatement of volatile organic compounds in industrial gases is necessary in order to improve life environment, but it is desirable to minimize the cost of the process. In our previous study¹, we found high catalytic activity of the calcined Co-Mn-Al LDH-like precursor in total oxidation of ethanol. However, the concentration of the metals in such catalyst is high, and a considerable part of the pellet volume is not utilized because of internal diffusion in the fast oxidation reaction. Therefore, we studied preparation of mixed oxide Co-Mn-Al catalysts over cordierite monoliths and examined their properties in comparison with properties of other catalysts prepared by impregnation or pelletizing. The calcined catalysts were examined by adsorption/desorption of N_2 , H_2 -TPR, NH_3 -TPD, scanning electron microscope and catalytic activity in oxidation of ethanol. The results are summarized in Table 1.

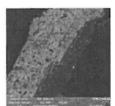
Table 1 Properties and catalytic activity in total oxidation of ethanol of the Co-Mn-Al catalysts

prepared over preformed supports

Catalyst name	Support	Method	Co+Mn+Al wt. %	T ₅₀ °C	T ₉₀ °C
1	Monolith	W+Ie	8.45	210	231
2	Monolith	W+Ie	6.61	211	254
3	Monolith	W+Ie	5.56	214	242
4	Monolith	W+Ic	6.61	218	268
5	Monolith	W+I°	6.31	217	270
KL110317D	θ-A1 ₂ O ₃	Ip	6.39 ^d	199	295
KL110317C	γ-Al ₂ O ₃	Ip	8.25 ^d	225	333
110824	γ-Al ₂ O ₃	Dc	7.03 ^d	ndtd	220
110815	γ-Al ₂ O ₃	D ^c	6.03 ^d	201	270
110808.2B	γ-Al ₂ O ₃	D ^c	4.32 ^d	174	217
110216	-	Pa	70.38 ^d	ndtd	210

("pelleting of dried precipitate, bimpregnation by nitrates solution, deposition of the precursor over support spheres, bum of Co and Mn, washcoating and impregnation by nitrates solutions, T_{50} , the temperatures at which 50 and 90 % conversion of all organic compounds was observed at 20 000 ml g⁻¹·h⁻¹)





The Co-Mn-Al mixed oxide catalysts prepared over washcoated monoliths show comparable activity in ethanol oxidation, but slightly lower than the pelletized Co-Mn-Al LDH-like precursor (110216). However, the amount of active components is nearly 10 times lower. Deposition of the precursor in a thin layer over the alumina spheres leads to similarly active catalysts as the monolithic ones. Impregnation of the Al_2O_3 spheres with nitrates solution does not provide sufficiently active catalysts.

Acknowledgement: This work was supported by the Czech Science Foundation (Projects P106/10/1762).

References:

¹ Jirátová, K.; Mikulová, J.; Klempa, J.; Grygar, T.; Bastl, Z.; Kovanda, F.: Appl. Catal. A **2009**, 361, 106-116.

CESIUI

Jana Lu

¹Institute

² Jagiellonia

The more str active and c catalysts, hig promising. Ir coprecipitate oxidation of c

In th mechanocher modification were studied methanol. Th

Table 1 Prope and their catal

	Catalyst	ľ
	110214 ZZ	-
	100621 K	1
1	KL111019C	1
	KL111019A]
	KL111020	ī
1	KL111019B	1

"coprecipitation, bcs T₉₀ - the temperatu observed under res helium, 0.5 % metha

prepared mec and the T_{90} te and $T_{90} > 21$ similar activi prepared by c

Thus, and therefore ~ 2.6 wt.% in

Acknowledgem

References:

¹ Jirátová, K.;
A 2009, 361,