Activity of K-Promoted Co-Mn-Al Mixed in Direct Decomposition of No and Deep Oxidation of Ethanol.

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2018

ACTIVITY OF K-PROMOTED Co-Mn-Al MIXED OXIDE IN DIRECT DECOMPOSITON OF NO AND DEEP OXIDATION OF ETHANOL

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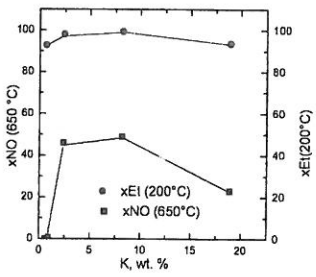
Co-Mn-Al mixed oxides are active in direct NO decomposition[1] as well as in deep oxidation of organic compounds[2]. In this study, Co-Mn-Al mixed oxides modified by K were prepared by co-precipitation of a solution of metal nitrates with the aqueous solution of K_2CO_3 and KOH, washing the precipitates to different level of K concentrations and finally calcined at chosen temperature, usually 500 °C. The catalysts were characterized by AAS, nitrogen physisorption (S_{BET}), TPR-H_2, XRD, and TPD-CO_2. In case of direct NO decomposition, the catalysts pre-calcined at 700 °C were tested for direct NO decomposition in inert gas (650 °C, 0.5 g, 1000 ppm NO/N_2, 49 ml min^{-1}). Deep oxidation of ethanol was carried out under following conditions: 0.2 g, 760 ppm of ethanol in air, 4 000 ml h^{-1}, the temperature ramp of 2 °C min^{-1}.

Chemical composition and physical-chemical properties of the prepared catalysts are shown in Table 1. Dependence of catalytic activity in NO decomposition and ethanol oxidation on K concentration is given in Fig. 1. Both reactions exhibit highest catalytic activity when Co-Mn-Al mixed oxides contain ca 8 wt. % of K. This catalyst shows the highest amount of basic sites desorbing during TPD in the range 25-500 °C.

Table 1 Composition of catalysts calcined at 500 °C, characteristics of their porous structure and positions of peak maxima in TPR curves

Sample	K	Co	Mn	Al	S_{BET}	TPD-CO_2	TPR	X_{NO}	X_{Et200}
	wt. %	wt. %	wt. %	wt. %	m^2/g	mmol /g	T_{max}, °C	650°C, %	%
1	18.90	28.2	6.0	3.0	< 1	0.01	376	23	93.7
2	8.20	40.0	8.8	4.0	58	0.14	290; 614	49	99.5
3	2.39	45.4	10.2	4.7	110	0.13	362; 709	46	98.1
4	0.92	46.8	10.2	4.7	105	0.05	368; 726	0.6	ndtd
5	0.60	45.6	9.9	4.4	102	0.06	371; 756	0	92.9

Fig. 1 Dependence of NO and EtOH conversions on K concentration



Acknowledgements: We thank Czech Science Foundation (project No. 18-19519S) and the Ministry of Education, Youth and Sports of the Czech Republic (National Feasibility Program I, project LO1208 TEWEP and project No. LM2015039) for financial support.

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