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Author: Hisahiro Einaga Nanako Maeda Yasutake Teraoka



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# Effect of catalyst composition and preparation conditions on catalytic properties of unsupported manganese oxides for benzene oxidation with OZONE

Hisahiro Einaga\*, Nanako Maeda and Yasutake Teraoka

*<sup>a</sup>Department of Energy and Material Sciences, Faculty of Engineering Sciences, Kyushu University, Kasuga, Fukuoka 816-8580, Japan. Fax: +81-92-583-8853; Tel: +81-92-583-7525; E-mail: einaga.hisahiro.399@m.kyushu-u.ac.jp*

## ABSTRACT

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Catalytic oxidation of benzene in gas phase with ozone was carried out at 70°C over manganese oxides and manganese-based mixed oxides to investigate the effect of catalyst composition and preparation conditions on their catalytic properties. The oxides were prepared by an evaporation-to-dryness method and a co-precipitation method from metal nitrate precursors, followed by calcination at 400-900°C. As for manganese monoxides, benzene oxidation rate normalized by catalyst surface area, product distribution and ozone/benzene decomposition ratio were almost independent of the preparation method and calcination temperature. Perovskite-type mixed oxides,  $\text{LaMnO}_3$  and  $\text{La}_{0.8}\text{Sr}_{0.2}\text{MnO}_3$  showed much lower activity and lower efficiency for ozone utilization in benzene oxidation than manganese monoxide and La sites promoted the accumulation of less-reactive byproduct compounds on the catalysts. In the case of manganese-based mixed oxides that contained Fe, Co, Ni, and Cu, benzene oxidation activity,  $\text{CO}_2$  selectivity and ozone/benzene

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