

Alumina Supported Copper-Manganese Catalysts for Combustion of Exhaust Gases: Effect of Preparation Method

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Abstract : The development of active and stable catalysts without noble metals for low temperature oxidation of exhaust gases remains a significant challenge. The purpose of this study is to determine the influence of the preparation method on the catalytic activity of the supported copper-manganese mixed oxides in terms of VOCs oxidation. The catalysts were prepared by impregnation of γ -Al₂O₃ with copper and manganese nitrates and acetates and the possibilities for CO, CH₃OH and dimethyl ether (DME) oxidation were evaluated using continuous flow equipment with a four-channel isothermal stainless steel reactor. Effect of the support, Cu/Mn mole ratio, heat treatment of the precursor and active component loading were investigated. Highly active alumina supported Cu-Mn catalysts for CO and VOCs oxidation were synthesized. The effect of preparation conditions on the activity behavior of the catalysts was discussed. The synergetic interaction between copper and manganese species increases the activity for complete oxidation over mixed catalysts. Type of support, calcination temperature and active component loading along with catalyst composition are important factors, determining catalytic activity. Cu/Mn molar ratio of 1:5, heat treatment at 450°C and 20 % active component loading are the best compromise for production of active catalyst for simultaneous combustion of CO, CH₃OH and DME.

Keywords : copper-manganese catalysts, CO, VOCs oxidation, exhaust gases

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