

## Alumina Supported Copper-manganese Catalysts for Combustion of Exhaust Gases: Catalysts Characterization

**Authors :** Krasimir I. Ivanov, Elitsa N. Kolentsova, Dimitar Y. Dimitrov, Georgi V. Avdeev, Tatyana T. Tabakova

**Abstract :** In recent research copper and manganese systems were found to be the most active in CO and organic compounds oxidation among the base catalysts. The mixed copper manganese oxide has been widely studied in oxidation reactions because of their higher activity at low temperatures in comparison with single oxide catalysts. The results showed that the formation of spinel  $Cu_xMn_{3-x}O_4$  in the oxidized catalyst is responsible for the activity even at room temperature. That is why most of the investigations are focused on the hopcalite catalyst ( $CuMn_2O_4$ ) as the best copper-manganese catalyst. Now it's known that this is true only for CO oxidation, but not for mixture of CO and VOCs. The purpose of this study is to investigate the alumina supported copper-manganese catalysts with different Cu/Mn molar ratio in terms of oxidation of CO, methanol and dimethyl ether. The catalysts were prepared by impregnation of  $\gamma-Al_2O_3$  with copper and manganese nitrates and the catalytic activity measurements were carried out in continuous flow equipment with a four-channel isothermal stainless steel reactor. Gas mixtures on the input and output of the reactor were analyzed with a gas chromatograph, equipped with FID and TCD detectors. The texture characteristics were determined by low-temperature (-196 °C) nitrogen adsorption in a Quantachrome Instruments NOVA 1200e (USA) specific surface area & pore analyzer. Thermal, XRD and TPR analyses were performed. It was established that the active component of the mixed Cu-Mn/ $\gamma$ -alumina catalysts strongly depends on the Cu/Mn molar ratio. Highly active alumina supported Cu-Mn catalysts for CO, methanol and DME oxidation were synthesized. While the hopcalite is the best catalyst for CO oxidation, the best compromise for simultaneous oxidation of all components is the catalyst with Cu/Mn molar ratio 1:5.

**Keywords :** supported copper-manganese catalysts, CO, VOCs oxidation, combustion of exhaust gases

**Conference Title :** ICCEA 2015 : International Conference on Chemical Engineering and Applications

**Conference Location :** Venice, Italy

**Conference Dates :** June 22-23, 2015