Alumina Supported Cu-Mn-La Catalysts for CO and VOCs Oxidation

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Abstract : Recently, copper and manganese-containing systems are recognized as active and selective catalysts in many oxidation reactions. The main idea of this study is to obtain more information about γ-Al_2O_3 supported Cu-La catalysts and to evaluate their activity to simultaneous oxidation of CO, CH_3OH and dimethyl ether (DME). The catalysts were synthesized by impregnation of support with a mixed aqueous solution of nitrates of copper, manganese and lanthanum under different conditions. XRD, HRTEM/EDS, TPR and thermal analysis were performed to investigate catalysts' bulk and surface properties. The texture characteristics were determined by Quantachrome Instruments NOVA 1200e specific surface area and pore analyzer. The catalytic measurements of single compounds oxidation were carried out on continuous flow equipment with a four-channel isothermal stainless steel reactor in a wide temperature range. On the basis of XRD analysis and HRTEM/EDS, it was concluded that the active component of the mixed Cu-Mn-La/γ–alumina catalysts strongly depends on the Cu/Mn molar ratio and consisted of at least four compounds – CuO, La_2O_3, MnO_2 and $Cu_{1.5}Mn_{1.5}O_4$. A homogeneous distribution of the active component on the carrier surface was found. The chemical composition strongly influenced catalytic properties. This influence was quite variable with regards to the different processes.

Keywords : Cu-Mn-La oxide catalysts, carbon oxide, VOCs, deep oxidation
Conference Title : ICNET 2016 : International Conference on Nanoscience, Engineering and Technology
Conference Location : Prague, Czechia
Conference Dates : July 07-08, 2016