

Comparative study of Cu/ZnO catalysts derived from different precursors as a function of aging

ABSTRACT

Structural modifications of Cu/ZnO catalysts for methanol steam reforming (MSR) as a function of precipitate aging in catalysts preparation process has been investigated comparatively. Freshly precipitated Cu,Zn-hydroxycarbonate (HC) and Cu,Zn-hydroxynitrate (HN) were aged in their mother liquor for a period of 120 min followed by washing, drying, calcination and reduction. Pronounced effect of aging was found for aged HC precipitates while no significant effect of aging was observed for aged HN solids. The bulk structure of the Cu/ZnO catalysts was investigated by means of TG/MS, in situ XRD and ^{63}Cu NMR. The increase in the activity of the catalysts prepared by HC aging did not correlate linearly with the specific Cu surface area but coincides with an increase in the microstrain in the copper clusters presumably because of the improved interface between Cu and ZnO. Meanwhile, aging of HN precipitates results in large, separated and less strained Cu and ZnO particles with an inferior catalytic activity. Finally, both aged Cu/ZnO catalysts revealed smaller copper crystallite size compared to unaged samples.

Keyword: Precipitating agent, Aging, Copper, Zinc oxide, Microstrain