

A Study on the Metal Oxide Supported Copper Catalysts for the Low-Temperature Water Gas Shift Reaction

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The Water Gas Shift reaction (WGS) is not only important for generating hydrogen, but also useful in enriching hydrogen in effluents stream from reforming units by decreasing the concentration of CO. Ternary CuO-ZnO-Al₂O₃ catalysts have been widely employed commercially since the early 1960s in the low temperature WGS reaction. But commercial catalysts have some significant drawbacks, such as the pyrophoric nature, susceptibility to poisoning and long pretreatment. In the present study, we are developing improved Cu-supported catalysts for the low-temperature WGS reaction. Supported 30 wt% Cu-metal oxide catalysts were prepared by co-precipitation using oxides of Zn, Zr, Ce, Cr. Catalysts were characterized using XRD, BET surface area, porosimeter, XPS, ICP, H₂-TPR and N₂O decomposition. The crystallite size of copper in the catalysts was also determined using the Scherrer equation. The surface composition has been measured by XPS analysis (~ 5-10 at%) and the bulk composition by ICP (~ 25-20 wt%).