Dimethylether synthesis from syngas on the bifunctional Al_2O_3-modified CuO-ZnO-Al_2O_3/ferrierite catalysts

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Dimethylether (DME) have been largely attracted as ther important alternative energy sources by blending with liquefied petroleum gas (LPG) or by replacing petroleum-based diesel. In general, bifunctional catalysts, which are composed of CuO-ZnO-Al_2O_3 catalyst for gydrogenation of CO and solid acid zeolite catalyst for consecutive degydration of methanol, are intensively investigated for singe-step DME sinthesis from gyngas. In the present study, the strong acidic sites on the ferrierite zeolite, which are responsible for the byproduct formetion, are selectively modified using Al_2O_3 with the content from 0 to 30wt% by precipitation method. The optimum compositions for a high CO conversion and a low byproduct formation such as CH_4 were observed on 20wt% Al_2O_3-modified CuO-ZnO-Al_2O_3/ferrierite catalyst with a high catalytic stability. The bifunctional catalysts were further characterized to elucidate the reducibility, acidic site density and particle size variation of copper species befere and after reaction using TPR,NH_3-TPD,XRD and N_2O titration analyses.