

Nisarath Sahakit 2013: Effect of Mg Promoter on the Performance of CuZnAl/Ferrierite Bifunctional Catalyst for Direct Synthesis of DME. Master of Engineering (Chemical Engineering), Major Field: Chemical Engineering, Department of Chemical Engineering. Thesis Advisor: Assistant Professor Kandis Sudsakorn, Ph.D. 114 pages.

A direct synthesis of dimethyl ether (DME) via the syngas-to-DME process or STD has relied significantly on the performance of bifunctional catalysts containing both methanol synthesis and methanol dehydration parts. Various promoters including Mg have been studied to enhance the catalytic activity. This research investigated the effect of Mg loading on the activity of bifunctional Cu-based catalysts admixed with ferrierite zeolite having CuZnAl as a methanol synthesis part and ferrierite as a methanol dehydration part. The CuZnAl catalysts were prepared with various loadings of Mg (0–5 wt. %) using a co-precipitation method and then physically mixed with ferrierite zeolite. In addition, Mg-modified ferrierite catalysts were prepared with various loadings of Mg (0–1 wt. %) using the impregnation method and then physically mixed with CuZnAl. The catalysts were characterized using N₂-adsorption, ICP-OES, XRD and FT-IR techniques. The catalytic activity was tested in a fixed bed reactor using reactants with a H₂/CO ratio of 1 and measured in terms of CO conversion, product selectivity, and yield of DME. The results indicated that an optimal Mg loading of 2.5 wt% on methanol synthesis catalyst increased the DME yield by 23% and Mg loading of 0.25% on methanol dehydration catalyst increased the DME yield by 37% compared to unmodified catalyst.

Student's signature

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