

Influence of copper surface area of Cu/ZnO/Al₂O₃ on the catalytic performance in methanol, dimethyl ether and desulfurization reactions

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The influence of metallic copper surface area of Cu/ZnO/Al₂O₃ was investigated in the synthesis of methanol and dimethyl ether (DME) from syngas, water-gas shift reaction and adsorptive desulfurization. The structural promoters such as ZnO and Al₂O₃ play significant roles in varying the dispersion of active copper species and result in altered catalytic performance. The nature of acidic component such as zeolite on DME synthesis from syngas significantly affects DME yield. In methanol synthesis, Ga (or Zr) addition on Cu/ZnO/Al₂O₃ enhances copper surface area by acting as structure promoters. The catalysts showing high activity on methanol synthesis also presents high activity on water-gas shift reaction. In addition, the concentration of structural promoter (Al₂O₃) in Cu/ZnO/Al₂O₃ is also optimized to obtain high copper surface area and high capacity in adsorptive desulfurization reaction.