

Napapan Jaronvechatam 2013: Synthesis of Cu-based-Al-MCM-41 for Conversion CO₂ to Value Added Chemicals. Master of Engineering (Chemical Engineering), Major Field: Chemical Engineering, Department of Chemical Engineering. Thesis Advisor: Associate Professor Paisan Kongkachuichay, Ph.D. 104 pages.

The aim of this research is to synthesize metals/Al-MCM-41 catalysts for conversion of carbon dioxide to value added chemicals. Al-MCM-41, the support, have been successfully synthesized via a sol-gel process at pH 11.5 using Tetraethylorthosilicate (TEOS) and aluminum nitrate as silica and alumina sources and Cetyl Trimethyl Ammonium Bromide (CTAB) as a template. Then, the obtained Al-MCM-41 was loaded with metals (Cu, Rh, Zn, Mn and Ni) by an incipient wetness impregnation. Subsequently, the metal/Al-MCM-41 was used to catalyze the reaction between CO₂ and H₂ with volume ratio of 1:3. The total of gas feed flow rate was 20 ml/min. The temperature and pressure was varied in the range of 250–300 °C and 10–20 bar, respectively. The effluent stream was analyzed by means of Gas Chromatography. Consequently, the total conversion of CO₂ and the yield of products (CO, CH₄, C₂H₆, CH₃OH) were determined. From the obtained results, it can be concluded that 1%Rh10%Cu/Al-MCM-41 catalyst reacting at 300 °C, 15 bar was the optimal condition giving the conversion of CO₂ = 43 mole%, yields of CO, CH₄, C₂H₆, CH₃OH = 26.8, 61.5, 31.3 and 8.9 x 10⁻⁴ mole%, respectively.

Student's signature

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