

Theeraporn Savin 2011: Effect of Manganese Promoter on the Synthesis of Fischer - Tropsch Fuels using Silica Xerogel Supported Iron-Cobalt Catalysts. Master degree of Engineering (Chemical Engineering), Major Field: Chemical Engineering, Department of Chemical Engineering. Thesis Advisor: Assistant Professor Kandis Sudsakorn, Ph.D. 153 pages.

Manganese (Mn) promoter was investigated as an improvement of iron-cobalt bimetallic catalysts on silica support prepared by sol-gel technique for the synthesis of liquid hydrocarbons such as gasoline and diesel via Fischer-Tropsch reaction. The 10Fe:10Co/SiO<sub>2</sub> catalyst was prepared as a base comparing to the catalysts with Mn additions of 1, 2 and 3 wt% in terms of physical properties and catalytic performance. It was found that the surface areas were in a range of 326-363 m<sup>2</sup>/g and pore size were 7.8-8.0 nm which of suitable for liquid hydrocarbon synthesis. From XRD analysis, Fe<sub>2</sub>O<sub>3</sub> and Co<sub>3</sub>O<sub>4</sub> were found in both Mn-promoted and unpromoted catalysts. However, Manganese oxide was not noticeable with the Mn-promoted catalysts. Mn addition was found to decrease the crystal size of Fe<sub>2</sub>O<sub>3</sub> but slightly increase that of Co<sub>3</sub>O<sub>4</sub>. After reaction, Fe-Co alloy and iron carbides were found on the surface of spent catalysts. From TPR, the 10Fe:10Co-2Mn/SiO<sub>2</sub> catalyst possessed the highest reducibility possibly relating to catalytic activity. Under the reaction condition of 280 °C, 5 bar, and 2:1 H<sub>2</sub>/CO ratio, this catalyst was found to be highly efficient for the synthesis of liquid fuels giving the CO conversion of 86.23%, C<sub>5+</sub> selectivity and yield of 50.62% and 44.62%, respectively.

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