Study of carbon monoxide hydrogenation to higher hydrocarbons over nano-sized iron catalyst

Y. Zamani1,2*, M. Bakavoli1, M. Rahimizadeh2, A. Mohajeri1, S. M. Seyedi2

1Research Institute of Petroleum Industry (RIPI), National Iranian Oil Company;
2Department of Chemistry, Ferdowsi University of Mashhad, Azad Square, Mashhad, 91735-48974, Iran

Fischer–Tropsch synthesis (FTS) is an established technological route for upgrading natural gas, coal, and biomass to liquid fuels and other chemical products[1-4]. In this study, the nano-sized iron catalyst prepared by microemulsion method. The catalyst characterized using N2 physical adsorption, temperature-programmed reduction (TPR), X-Ray and TEM techniques. The FTS performances of the catalyst tested in a fixed-bed stainless steel reactor. Iron catalyst with K promoter significantly improve the FTS and WGS activities and decrease secondary reactions.

\[
\text{CO} + \text{H}_2 \xrightleftharpoons{\text{GHSV}=3\text{nl.h}^{-1}\cdot\text{gCat}^{-1}} P=17 \text{ atm}, H_2/CO =1 \\
T= 290^\circ\text{C} \rightarrow (\text{CH}_n)^+ + \text{H}_2\text{O} + \text{CO}_2
\]

References: