

## The Use of Gas-to-Liquid Technology (GTL) to Produce Gasoline and Diesel Fuels

**Dr.Khalid A. Sukkar**

Petrol Technical Department, University of Technology/ Baghdad

**Dr. Farah T. Jassm**

Chemaical Engineering Department, University of Technology/Baghdad

**Dr.Aswar A. Alwasiti**

[Asaw20042003@yahoo.com](mailto:Asaw20042003@yahoo.com)

Petrol Technical Department, University of Technology/Baghdad

**Muayad M. Hasan**

Chemaical Engineering Department, University of Technology/Baghdad

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### ABSTRACT

The conversion of methane gas to synthesis gas ( $\text{CO}$  and  $\text{H}_2$ ) and then into clean liquid fuels via Fischer–Tropsch synthesis is investigated in the present work. The effects of the catalyst type, pretreatment conditions, and process temperature on the catalysts activity and selectivity are investigated.

The syngas production and Fischer–Tropsch synthesis were carried out in two catalytic units connected in series. The first one contains a fixed bed reactor of 128  $\text{cm}^3$ , while the second fixed bed reactor is of 68  $\text{cm}^3$ . The results of syngas production over the prepared (Pt/HY) catalyst showed excellent resistance to carbon deposition and stable performance during 20 h-on-stream at 700°C.

The Fischer–Tropsch synthesis was carried out under different temperatures of 220, 230, 240, 250, 260, and 270°C and constant atmospheric pressure. The results showed that the catalytic synthesis leads to a wide variety of products such as gasoline, diesel and waxes. It was concluded that the best operating temperature for all Fischer–Tropsch synthesis is 240°C, where, this temperature gives the highest hydrocarbons production for diesel and gasoline.

The results indicate that the  $\text{Cu-Co/Al}_2\text{O}_3$  was the most active and selective catalyst in the Fischer–Tropsch process which gives the excellent production of the desired products.

In addition, this process shows a great potential for economical production of GTL fuels in Iraq at low costs.

**Keywords:** GTL technology; Fischer-Tropsch synthesis; catalysts preparation; Gasoline and diesel.