



## Cycle time of polymerization and chain growth probability in Fischer-Tropsch synthesis over Cobalt supported silica catalyst

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Polymerization of CO and H<sub>2</sub> to produce long chain hydrocarbons via FTS was investigated over cobalt supported silica catalyst. Chain growth probability during the interval reaction time has been focused to understand the cycle time of terminated product in polymerization. Surface morphology and the reducibility of cobalt-based catalyst were carried out by SEM and H<sub>2</sub>-TPR technique. The FTS performance was studied in a fixed bed reactor at 220 °C, 1 atm, and GHSV of 305 h<sup>-1</sup> for 72h time-on-stream using H<sub>2</sub>:CO ratio of 2:1. The FTS product was designed to be collected at 1, 3, 6, 9, 12, 18, 24, 48 and 72h. The product distribution and chain growth probabilities at the collected time were calculated using the Anderson–Schulz–Flory (ASF) equation. The results show that CO conversion, product yield and selectivity of long chain hydrocarbons increases when increasing time-on-stream. The average chain growth probability ( $\alpha$ ) of liquid product for 72h is 0.71, corresponding to gasoline to diesel range of hydrocarbons.

**Keywords:** Polymerization; Chain growth probability; Gasoline; Diesel; Fischer-Tropsch synthesis