Investigation into the start-up solvent for slurry phase Fischer-Tropsch synthesis

이경우[1,2], 임근배[2], 이현송[2], Deviana Deviana[2], 윤민혜[2], 이관영[1], 천동현[2,†]
[1]고려대학교; [2]한국에너지기술연구원
(cdhsl@kier.re.kr†)

Fischer-Tropsch synthesis (FTS) is considered an attractive way to produce valuable hydrocarbon products from low-value carbon-containing resources such as coal, natural gas, waste biomass/plastics, and CO_2 via syngas ($CO + H_2$). A slurry phase reactor can be efficiently used for FTS because this reactor can easily remove the heat released from catalysts to heat exchanger via a liquid medium, which allows near isothermal operation of FTS. A liquid medium is essential for carrying out the FTS in a slurry phase reactor. In particular, an initial liquid medium should be included in the slurry phase reactor. Therefore, the start-up solvent can play an important role in determining catalyst performance in the slurry phase FTS. In this study, we performed the FTS in a continuously stirred tank reactor (CSTR) using various start-up solvents such as mineral oil, icosane, and squalene. We focused on the effects of start-up solvents on the activity, stability, and selectivity of precipitated iron-based catalysts. The activity and stability were evaluated in terms of CO conversion as a function of reaction time, and the selectivity was evaluated in terms of hydrocarbon distribution.