

Effects of preparation route on catalytic properties of iron-based catalysts for the Fischer-Tropsch synthesis

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The Fischer-Tropsch synthesis (FTS) has received much attention as an essential part of the coal-to-liquid process. Iron-based catalysts are preferred for this process due to their high activity and low cost. Furthermore, the use of iron-based catalysts has a considerable merit for the FTS with low H_2/CO ratio synthesis gas from coal gasification because of their potential activity for the water-gas shift reaction. In this study, we carried out the FTS over a series of precipitated iron-based catalysts at 250°C and 3.0 MPa. The catalysts were prepared by two comparative ways, i.e., pre-incorporation of SiO_2 and post-incorporation of SiO_2 , respectively. The catalysts with pre-incorporation of SiO_2 showed higher catalytic activity for the FTS than those with post-incorporation of SiO_2 or without incorporation of SiO_2 . Catalyst characterization revealed that the iron-based catalysts showed enhanced dispersion of iron-based oxides when the SiO_2 was pre-incorporated before co-precipitation. We attribute the high activity of the catalysts with pre-incorporation of SiO_2 to the enhanced dispersion of iron-based oxides.