

Effect of phosphorus on the Ru/Co/Zr/SiO₂ catalyst during Fischer–Tropsch synthesis

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The catalytic activity on the phosphorus-modified Ru/Co/Zr-P/SiO₂ (molar ratio of Zr/P = 19) was compared with that of the unmodified Ru/Co/Zr/SiO₂ during Fischer–Tropsch (F–T) synthesis in a fixed-bed reactor. The enhanced activities on the phosphorus-modified catalyst are mainly attributed to the low sintering of cobalt clusters during F–T reaction and its facile reducibility at low temperature. The catalysts were characterized by using the X-ray diffraction (XRD), transmission electron microscopy (TEM), temperature-programmed reduction (TPR), hydrogen chemisorption and pore size distribution. The catalytic performances on the Ru/Co/Zr-P/SiO₂ are further examined at various reaction conditions such as temperature, space velocity, pressure and H₂/CO ratio.