Positive effect of phosphorus modification on the cobalt-based Fischer-Tropsch catalysts

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The effect of phosphorus modification on the cobalt-based Fischer-Tropsch (F-T) catalysts such as Co/P-Al2O3, Co/ZrP/SiO2 and Co/AlPO4 was investigated. The activities of the catalysts were compared with the unmodified Co/Al2O3 and Co/Zr/SiO2 catalysts. Positive effects with respect to CO conversion and C5+ selectivity are observed in all F-T catalysts with a moderate amount of phosphorus addition on Al2O3 and SiO2 support. The catalysts have been characterized by X-ray diffraction (XRD), Transmission electron microscopy (TEM), temperature programmed reduction (TPR), hydrogen chemisorption, surface area measurement and pore size distribution. The enhanced catalytic performances during F-T synthesis are related to the cobalt cluster size and its reducibility on the phosphorus modified Al2O3 and SiO2 support.