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Development and Characterization of Cobalt Metal Loaded ZSM-5 and H-ZSM-5 Catalyst for Fischer -Tropsch Synthesis

Authors : Shashank Bahri, Divyanshu Arya, Rajni Jain, Sreedevi Upadhyayula

Abstract : Petroleum products can be obtained from syngas catalytic conversion using Fischer Tropsch Reaction. The liquid fuels obtained from FTS are sulphur and nitrogen free and thus may easily meet the increasing stringent environment regulations. In the present work we have synthesized Meso porous ZSM-5 supported catalyst. Meso structure were created in H-ZSM-5 crystallites by demetalation via subsequent base and acid treatment. Desilication through base treatment provides H-ZSM-5 with pore size and volumes similar to amorphous SiO2 (Conventional Carrier). Modifying the zeolite texture and surface chemistry by Desilication and acid washing alters its accessibility and interactions with metal phase and consequently the CO adsorption behavior and hydrocarbon product distribution. Increasing the mesoporosity via desilication provides the micro porous zeolite with essential surface area to support optimally sized metal crystallites. This improves the metal dispersion and hence improve the activity of the catalyst. Transition metal (Co) was loaded using wet impregnation method. Synthesized catalysts were characterized by Infrared Spectroscopy, Powdered X-Ray Diffraction, Scanning Electron Microscopy (SEM), BET Method analytical techniques. Acidity of the catalyst which plays an important role in FTS reaction was measured by DRIFT setup pyridine adsorption instead of NH3 Temperature Programmed Desorption. The major difference is that, Pyridine Adsorption can distinguish between Lewis acidity and Bronsted Acidity, thus giving their relative strengths in the catalyst sample, whereas TPD gives total acidity including Lewis and Bronsted ones.

Keywords : mesopourus, fischer tropsch reaction, pyridine adsorrption, drift study
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