Preparation, characterization and catalytic activity of CuO/TS-1 on benzene hydroxylation reaction

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Abstrak

CuO/TS-1 catalysts have been prepared and tested in the benzene hydroxylation. TS-1 was synthesized by hydrothermal method, while CuO/TS-1 was prepared by impregnation method using Cu(NO)2. 3H2O as precursor. Catalysts were characterized by using X-ray diffraction (XRD), infrared spectroscopy (IR), and N2 adsorption-desorption techniques. The catalytic activity was tested in the hydroxylation reaction of benzene. The products were analyzed using gas chromatography.
Catalyst characterization by XRD and IR techniques have showed that the catalyst structure was a MFI type of zeolite. XRD pattern have showed the orthorombic structure and indicated the presence of CuO aggregation. The results of the pyridine adsorption have found that the acidity of TS-1 and CuO/TS-1 were a Lewis acid and it?s increased with an increasing amount of CuO loading.
The results of nitrogen adsorption analysis have showed decreasing of surface areas of catalyst with increasing amount of CuO loading. The optimum conditions of benzene hydroxylation was observed by 1%CuO/TS-1 catalyst at 70 °C, reaction time 2 h and acetic acid as the solvent yielded 27.6% of phenol with phenol selectivity was 75.5%