

FT-IR Investigation of the Influence of Acid-Base Sites on Cr-Incorporated MCM-41 Nanoparticle in C-C Bond Formation

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Abstract : The most popular mesoporous molecular sieves, Mobil Composition of Matter (MCM) are keenly studied by researchers because of these materials possess amorphous silica wall and have a long range of ordered framework with uniform mesopores. These materials also possess large surface area, which can be up to more than $1000 \text{ m}^2\text{g}^{-1}$. Herein the investigation is focused upon the synthesis and characterization of chromium and aluminum doped MCM-41 using XRD and FTIR. Acid-base properties of Cr-Al-MCM 41 was investigated by molecularly sensitive transmission FT-IR spectroscopy by adsorbing pyridine. In addition, these MCM nanomaterial was used to catalyze C-C bond formation from acetaldehyde adsorption. The assignment of all infrared peaks during adsorption of pyridine provided detail information on the presence of acid-base sites which in turn helped us to explain the roles of these in the condensation reaction of aldehyde. Reaction mechanisms of C-C bond formation is therefore explored to shed some light on this elusive reaction detail.

Keywords : mesoporous nanomaterial, MCM 41, FTIR studies, acid-base studies

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