

**Synthesis, characterization, and catalytic evaluation of hybrid MCM-41  
mesostructured materials:  
A novel attempt**

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The synthesis of ordered hybrid mesoporous materials were attempted using tetraethyl orthosilicate (TEOS) and 3-chloropropyltriethoxysilane (CIPTES). In the present study, generation of ionic liquids on chloropropyl functionalized MCM-41 (CP-MS41) via the immobilization of trialkylamines ( $R_4Cl$ -MS41) for chemical fixations of  $CO_2$ , which is a vital step in the production of cyclic carbonates. The first step was a simple condensation under basic conditions yielding CP-MS41 leading sequentially to  $R_4Cl$ -MS41. A wide variety of CP-MS41s were synthesized by manipulating the TEOS to CIPTES ratios, their physico-chemical measurements was done by various techniques such as XRD, BET, FT-IR, CP  $^{13}C$ ,  $^{29}Si$  MAS-NMR and TGA.  $^{29}Si$  MAS-NMR and FT-IR spectra reveal adduct formation of ionic-liquids with the chloropropyl groups tethered to the silica surface. The amount of CIPTES incorporated in the silica framework increased with the CIPTES concentration in the synthesis gel, while the ordering of the mesoporous structure gradually decreased.