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Hybrid Inorganic-Organic Materials Carrying Tertiary Amine and Thiourea Residues Tethered on Mesoporous Silica Nanoparticles: Synthesis, Characterization, and Co-Operative Catalysis

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Michael Additions Catalyzed by Bifunctional Mesoporous Silica

Category

Polymer-Supported Synthesis

Key words

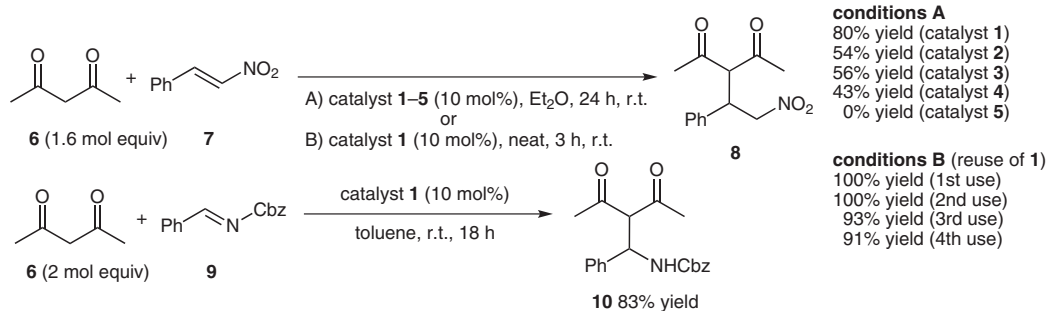
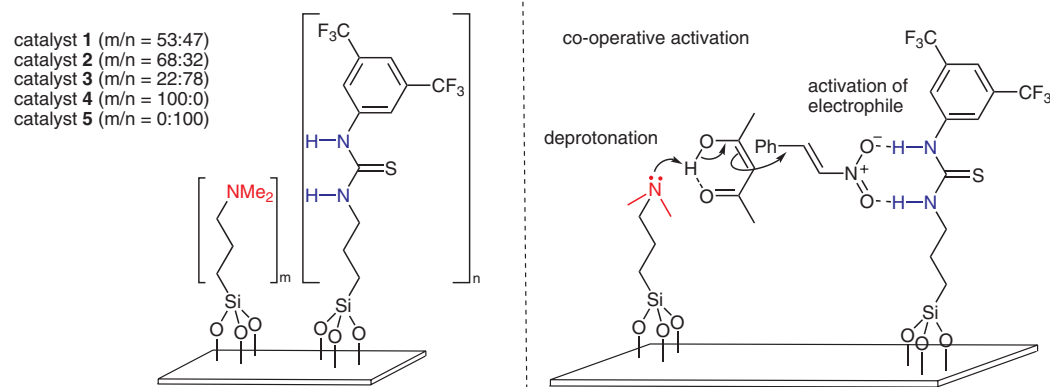
bifunctional catalysts

thiourea residues

tertiary amines

mesoporous silica

SYNFACT
of the month



Significance: The Michael reaction mediated by mesoporous silica-supported amine-urea bifunctional catalysts is reported in which the tertiary amine and the urea moieties work as a base and an acid, respectively. The reaction of acetylacetone (**6**) with 2-nitrostyrene (**7**) was carried out with bifunctional catalyst **1** (amine/urea = 53:47) under conditions A to give 3-[1-(1-phenyl-2-nitroethyl)]-2,4-pentadione (**8**) in 80% yield. When catalysts **2-5** were used, product **8** was obtained in 0-56% yield. Catalyst **1** was reused three times under conditions B to afford product **8** in high yields.

Comment: The reaction of Cbz-benzaldimine (**9**) and **6** with catalyst **1** in toluene was also performed to afford product **10** in 83% yield. Catalysts **1-5** were prepared in accordance to the previously reported procedure (V. S.-Y. Lin and co-workers *Angew. Chem. Int. Ed.* **2005**, *44*, 1826). Enantioselective Michael addition of malonates to nitroolefins using bifunctional organocatalysts was reported by Takemoto and co-workers (*J. Am. Chem. Soc.* **2003**, *125*, 12672).

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