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Heterogeneously Catalyzed Synthesis of Primary Amides Directly from Primary Alcohols and Aqueous Ammonia
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Category

Polymer-Supported Synthesis

Key words

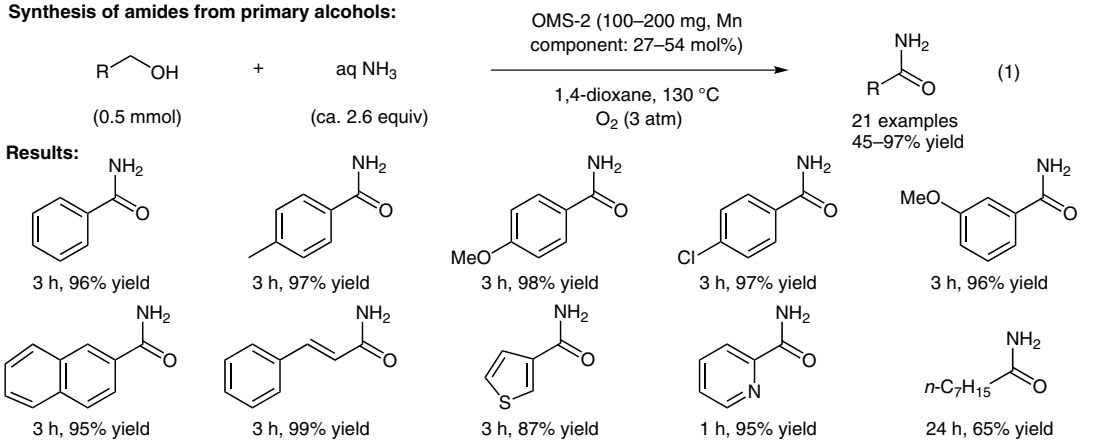
amides

manganese oxide

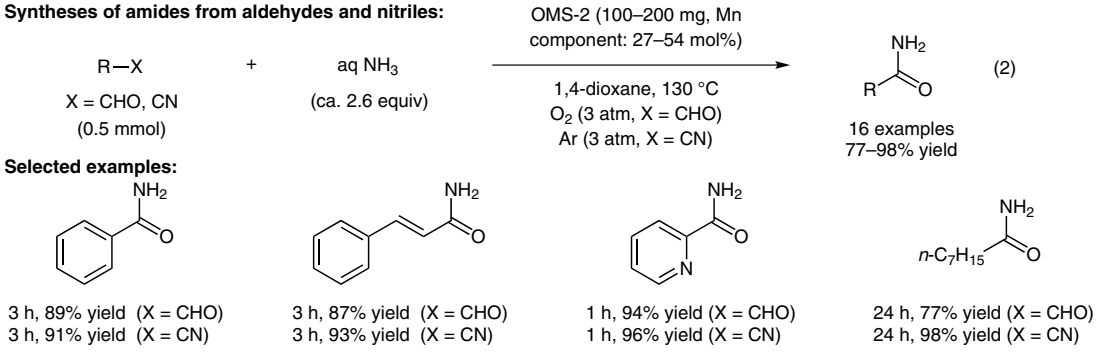
heterogeneous catalysis

Synthesis of Primary Amines with OMS-2

Synthesis of amides from primary alcohols:



Syntheses of amides from aldehydes and nitriles:



Significance: Manganese oxide based octahedral molecular sieves (OMS-2) catalyzed the reaction of primary alcohols with aqueous ammonia to give the corresponding amides in 65–99% yield under molecular oxygen (10 examples, eq. 1). The reactions of aldehydes and nitriles with aqueous ammonia also proceeded in the presence of OMS-2 to give the corresponding amides in 77–98% yield (16 examples, eq. 2). In the formation of 2-pyridinecarboxamide from 2-pyridinemethanol, the catalyst was recovered by filtration and reused eleven times without significant loss of its catalytic activity (1st reuse: 93% yield, 11th reuse: 85% yield).

Comment: Suib and co-workers have previously reported the preparation of OMS-2 (*Chem. Mater.* **1994**, *6*, 815). In the formation of benzamide from benzyl alcohol, the catalytic activity of OMS-2 was superior to that of precursors of OMS-2 ($KMnO_4$, $MnSO_4 \cdot H_2O$), other manganese-based oxides (MnO_2 and Mn_3O_4) and other metal oxides (Co_3O_4, CeO_2). After the reaction of benzyl alcohol with aqueous ammonia, no leaching of manganese species was observed by ICP-AES analysis.

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