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Oxidant-Free Alcohol Dehydrogenation Using a Reusable Hydrotalcite-Supported Silver Nanoparticle Catalyst Angew. Chem. Int. Ed. 2008, 47, 138-141.

Oxidation of Alcohols Using Hydrotalcite-Supported Silver Nanoparticles

Significance: Hydrotalcite (HT) reacted with 5.0 mM aqueous solution of AgNO3 at 3 °C for 1 h to afford HT-supported Ag(I). The Ag(I) ions were reduced with hydrogen to give the Ag/HT catalyst (eq. 1). The oxidation (dehydrogenation) of various alcohols 1 without oxidant took place under Ar atmosphere in the presence of the Ag/HT catalyst to give the corresponding carbonyl compounds 2 with up to 99% conversion and chemoselectivity (eq. 2). This catalyst was reused four times in the oxidation of 1-phenylethanol with no significant loss of activity and chemoselectivity.

Comment: In this paper, the HT-supported Ag nanoparticle was used as a highly selective catalyst for oxidation of various alcohols. The Ag/HT catalyst is superior to various hetero- or homogeneous catalysts, for example Ag/SiO₂, Ag/TiO₂, Pd/HT, Ru/HT, CP*Ir(PyOH). Generation of an equimolar amount of molecular H2 was observed as the alcohol oxidation proceeded.

SYNFACTS Contributors: Yasuhiro Uozumi, Yutaka Matsuura Synfacts 2008, 3, 0317-0317 Published online: 21.02.2008

DOI: 10.1055/s-2008-1042675; Reg-No.: Y01008SF

Category

Polymer-Supported Synthesis

Key words

alcohols

dehydrogenation

heterogeneous catalysis

silver nanoparticles

