

Selective Hydrogenation of Aldehydes and Ketones under Syngas Using Au NPs Supported on CeO₂

Category

Polymer-Supported Synthesis

Key words

gold catalysis

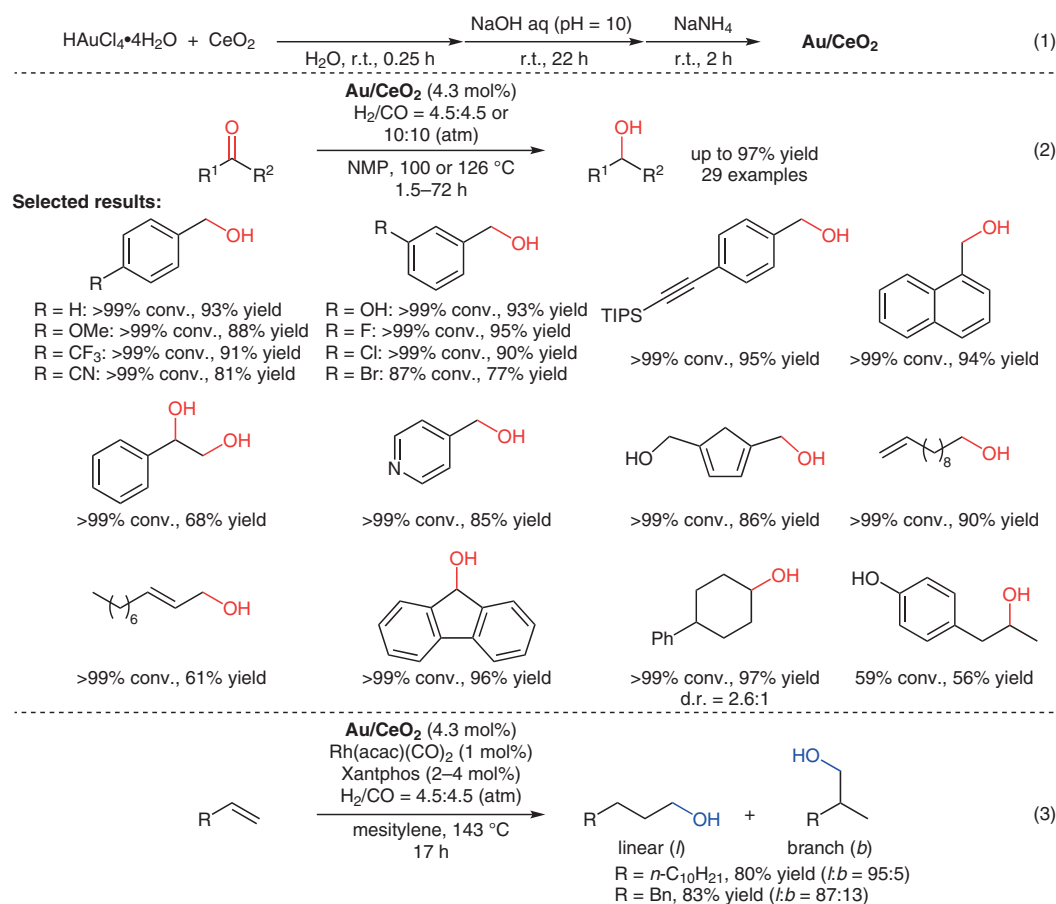
selective hydrogenation

syngas

aldehydes

ketones

Synfact
of the Month



Significance: Gold nanoparticles supported on ceria (Au/CeO₂), prepared according to equation 1, catalyzed the selective hydrogenation of aldehydes and ketones bearing various reducible substituents, such as alkyne, alkene, nitrile, and halogen groups under H₂/CO atmosphere to afford the corresponding alcohols in up to >99% conversion with 97% selectivity (eq. 2). Au/CeO₂ also promoted the one-pot hydroformylation/hydrogenation of terminal alkenes in the presence of Rh(acac)(CO)₂ and Xantphos to afford the corresponding alcohols (eq. 3).

Comment: In the hydrogenation of 10-undecenal, the catalyst was recovered by filtration, treated with 1 atm of H₂ at 150 °C, and reused three times without significant loss of its catalytic activity. Mechanistic studies suggested that CO is adsorbed onto the Au NPs and acts as a site blocker to suppress the hydrogenation or isomerization of the alkene substituent.