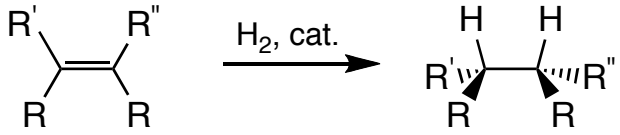
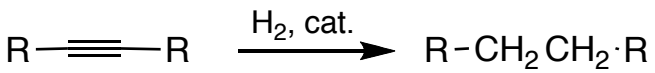
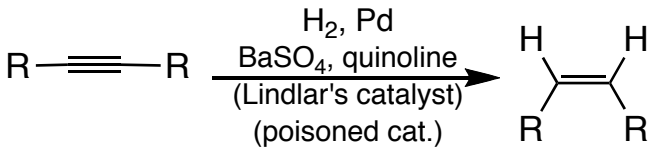
CHM 422 Organic Synthesis, Dr. Laurie S. Starkey
Common Reduction Reactions

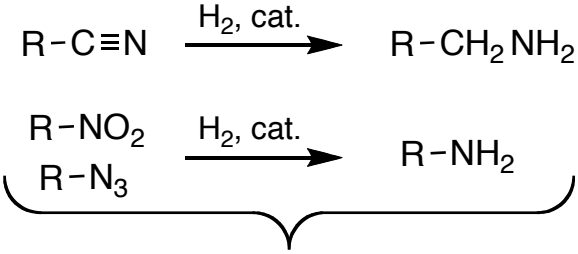
catalytic* hydrogenation



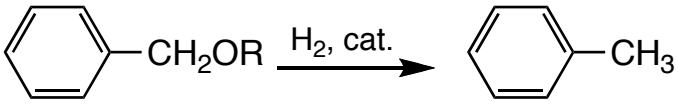
***catalyst** = Pd, Pt, Ni *or* Ru or Rh organometallic reagents such as $RhCl[PPh_3]_3$







useful reactions for the synthesis of amines



Since the benzylic position is easily reduced, the benzyl group ($PhCH_2$–) is commonly used to protect alcohols.

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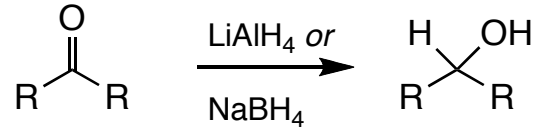
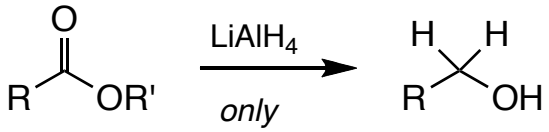
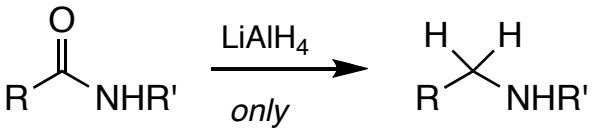
hydride reagents

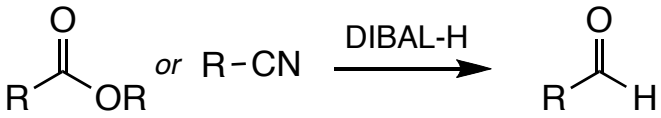




R'=H (acid) *or* R'=alkyl (ester)



Note: Lithium aluminum hydride (LAH) reductions are always followed by an aqueous workup (H_3O^+). $NaBH_4$ is less reactive and can be used with protic solvents (ROH).



DIBAL-H, diisobutylaluminum hydride, reduces esters and nitriles to aldehydes

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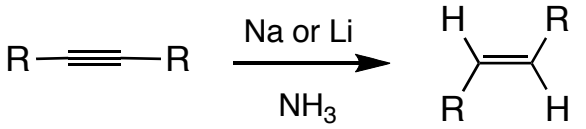
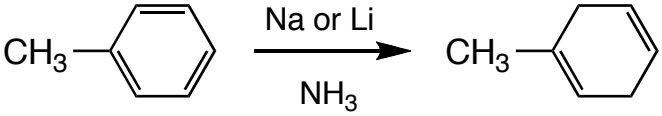
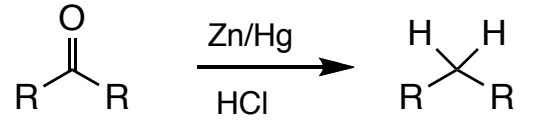
metal reagents



Dissolving metal reduction gives *trans* alkene product.



Birch reduction gives 1,4-diene products.



Clemmensen or Wolff-Kishner (NH_2NH_2, KOH) reduction converts a carbonyl to a methylene. Conversion can also be done by reduction of the dithiane ($HSCH_2CH_2CH_2SH$; Raney Ni).