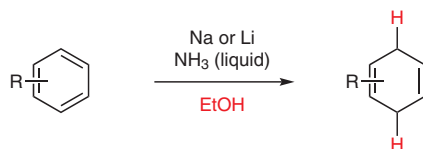
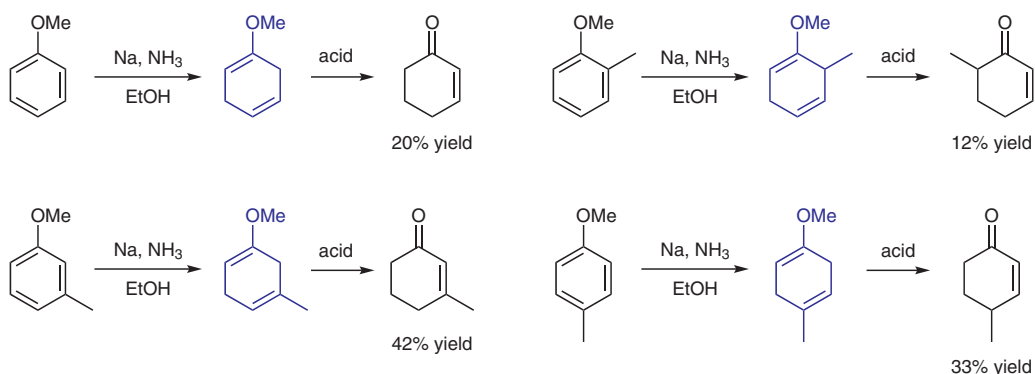


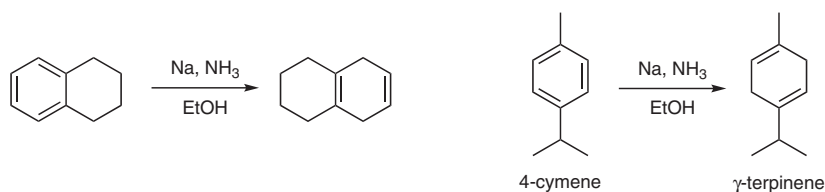
The Birch Reduction



Selected examples:



Reduction of benzoid hydrocarbons:



Significance: In 1944, Arthur Birch reported the selective 1,4-reduction of aromatic rings to the corresponding unconjugated cyclohexadienes by alkali metals dissolved in liquid ammonia in the presence of an alcohol. The regioselectivity thereby depends on the nature of the substituent. Subsequent treatment with mineral acid produced the corresponding α,β -unsaturated ketones in moderate yields. The synthetic scope is limited due to the low solubility of many compounds in liquid ammonia.

Comment: The birch reduction is of great interest for organic synthesis, since other catalytic hydrogenations reduce the aromatic ring all the way to the cyclohexane. Heterocycles, such as pyridines, pyrroles and furans, are also reduced under these conditions. In contrast, ordinary alkenes are not affected by the birch reduction. If the substituent is electron-donating, the rate of reduction is lower than unsubstituted compounds and the substituent is found on the non-reduced part of the product. If the substituent is electron-withdrawing, the result is opposite (see Reviews below).

Reviews: A. J. Birch *Pure Appl. Chem.* **1996**, *68*, 553–556; G. S. R. Subba Rao *Pure Appl. Chem.* **2003**, *75*, 1443–1451.