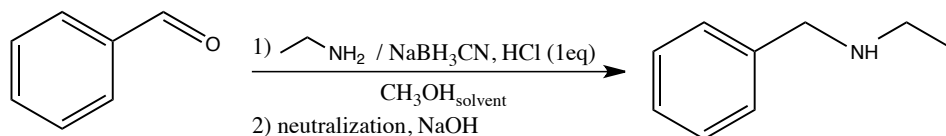
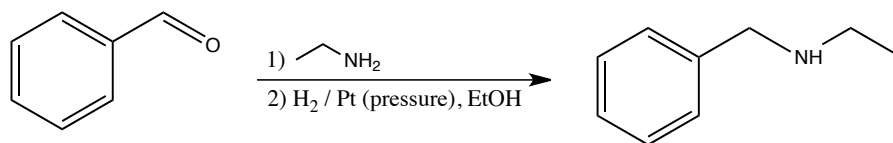
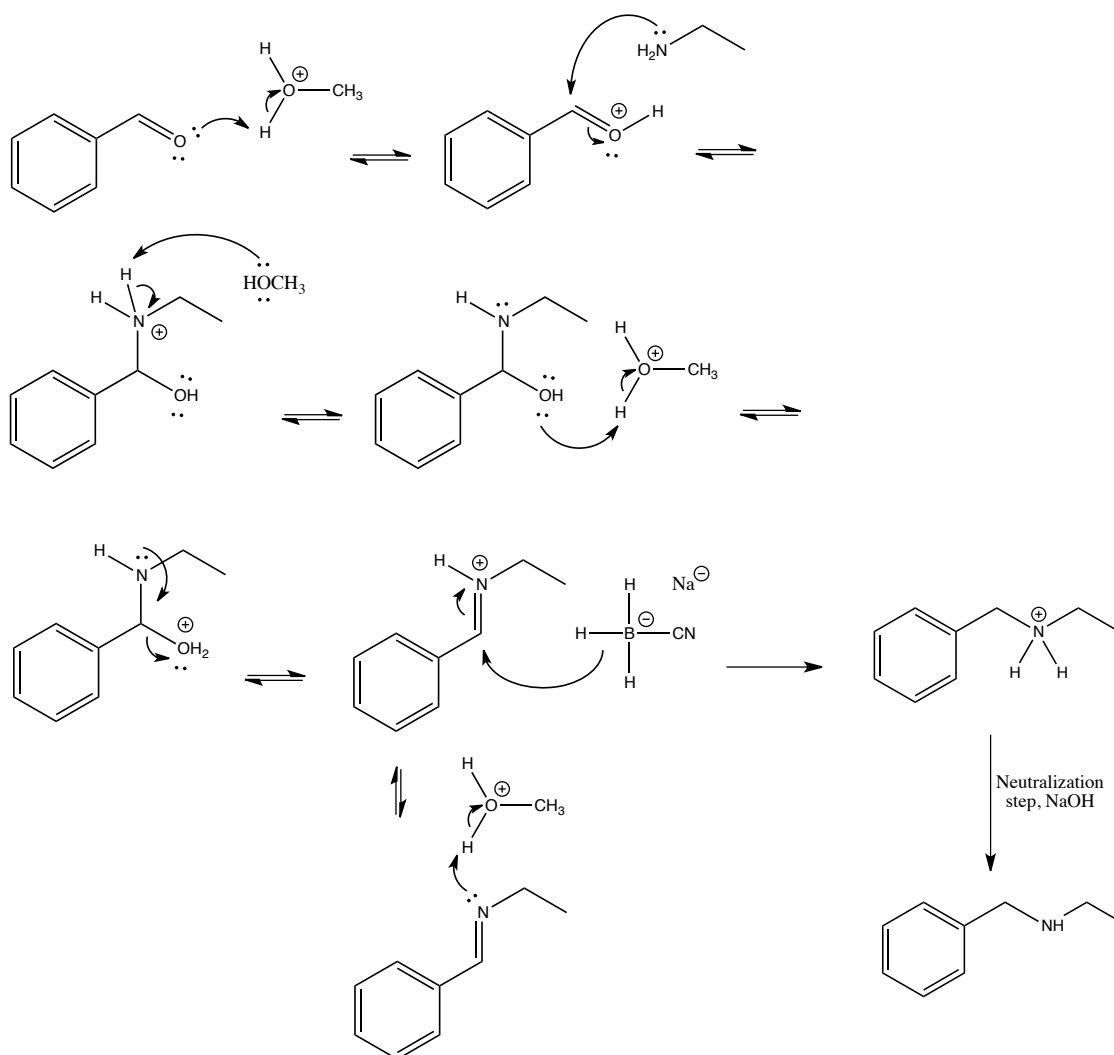


Reactions of Amines: Reductive Amination (Borch Reaction)

Reactions:



Mechanism:



When ketone or aldehydes react with 1° amines an imine is formed. Enamines are the product of 2° amines and an aldehyde or a ketone. These imines or enamines can be reduced to 2° or 3° amines, respectively. One way is hydrogen addition using a metal catalyst.

The mechanism for the use of a non-metal-hydride as the reducing agent is shown above. This synthesis procedure requires the formation of an intermediate imine. Because the formation of an amine from the imine does not require a nucleophilic attack of the nitrogen there is no concern with over-alkylation.

The reaction between an amine and formaldehyde followed by reductive amination can produce a selectively methylated amine. A tertiary amine is usually the product of the reaction if excess formaldehyde is used. The mechanism for the synthesis is the same as the above.

