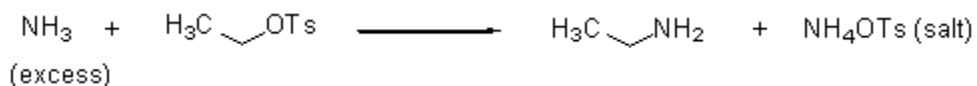
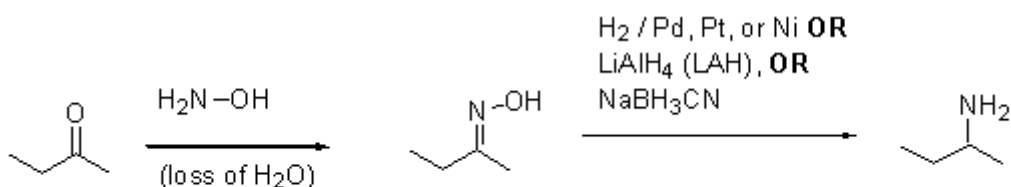


I. Synthesis of Primary (1°) amines - R-NH₂

A. Addition of excess ammonia to a primary alkyl halide:



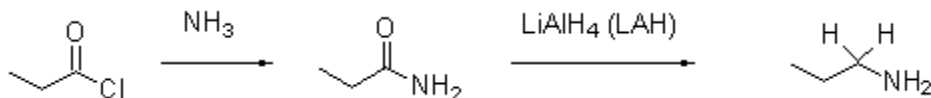
B. Reductive amination:



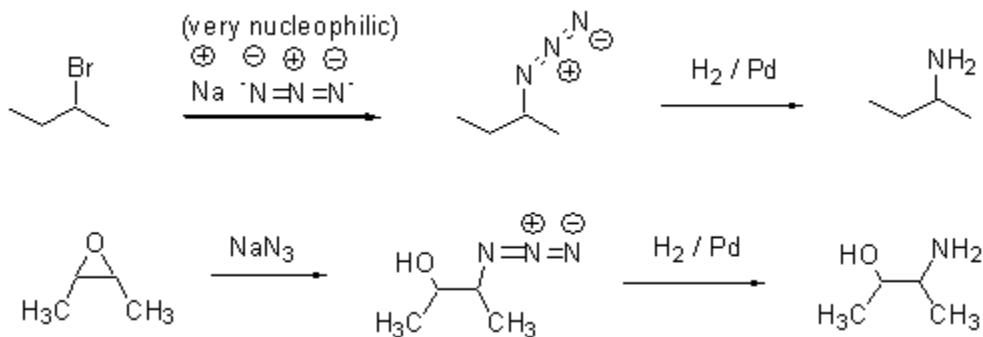
Note:

Ketones yield 2° adjacent to 1° amine, while Aldehydes yield 1° adjacent to 1° amine.

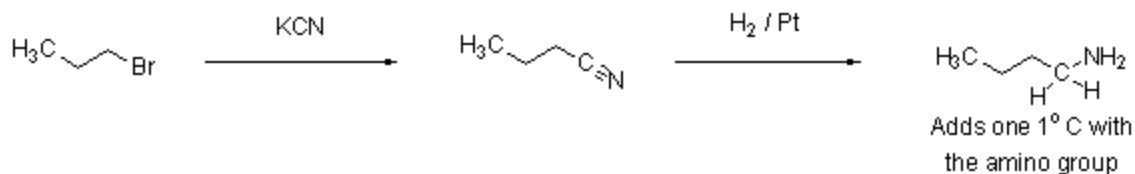
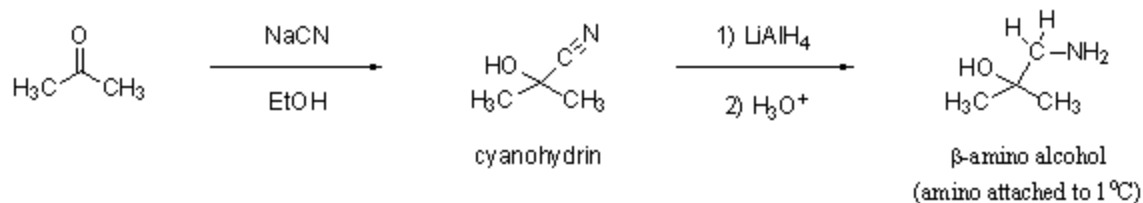
C. Reduction of amides:



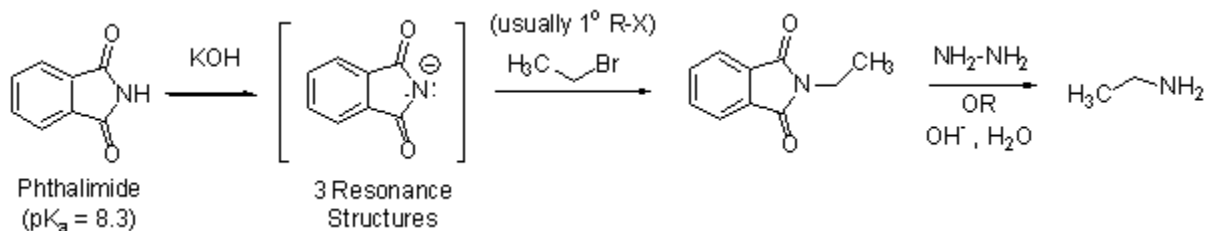
D. Addition of sodium azide to a primary or secondary alkyl halide, tosylate or epoxide:



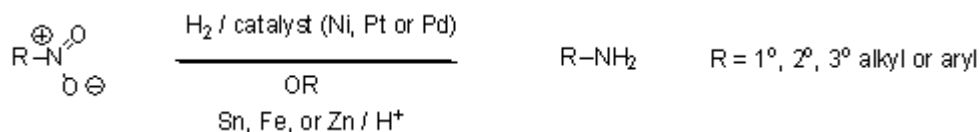
E. Cyanide additions followed by reduction:



F. Gabriel amine synthesis (1887, Siegmund Gabriel, Berlin)



G. Reduction of a nitro group:

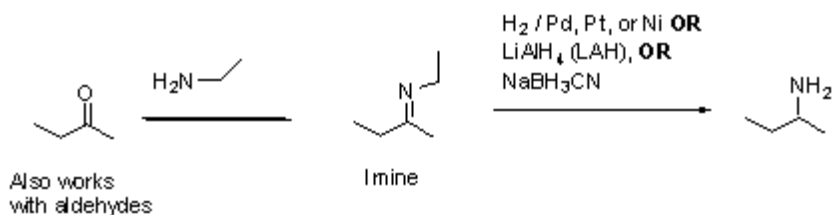


H. Hofmann Rearrangement (RAR):

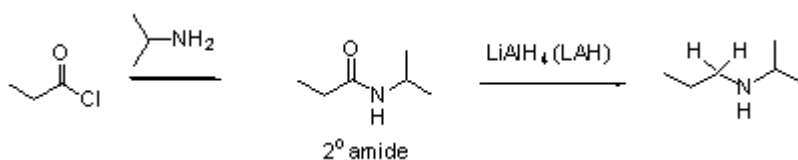


II. Synthesis of Secondary (2°) amines - R₂NH

A. Reductive amination (Reduce imine to a secondary amine):

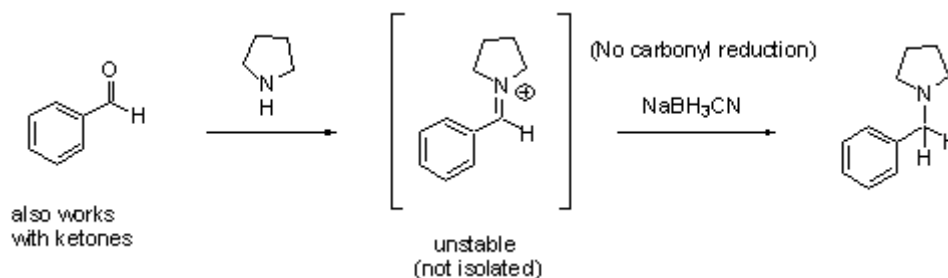


B. Reduction of a secondary amide:

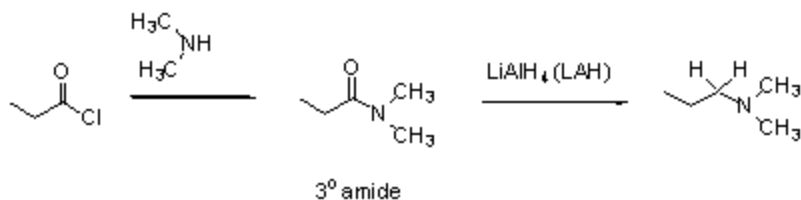


III. Synthesis of Tertiary (3°) amines - R₃N

A. Reductive amination (Reduce iminium ion to a tertiary amine)



B. Reduction of a tertiary amide:



C. Worth mentioning - Hofmann elimination produces a tertiary amine. See notes