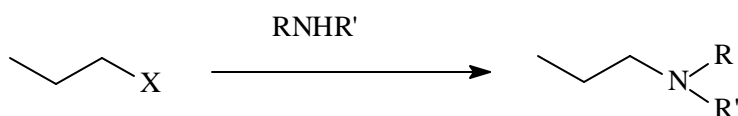
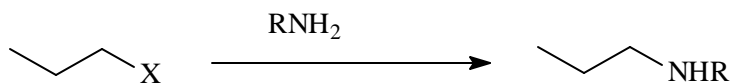
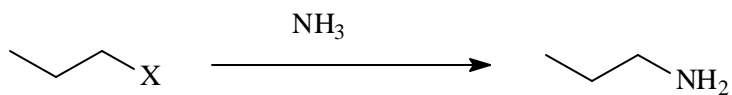


## Amine Reactions

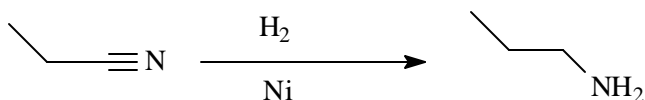
### Preparation

- 1) Substitution -- reaction of a primary alkyl halide with ammonia or an amine with at least one H on N

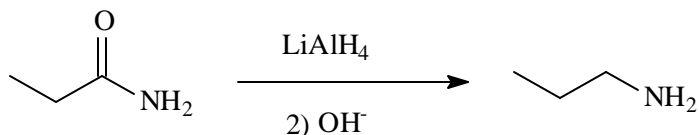


- 2) Reduction of aryl nitro compounds (i.e.  $-\text{NO}_2$  on a benzene ring) using Sn or Fe and HCl; see Benzene reactions sheet)

- 3) Reduction of a nitrile using  $\text{H}_2/\text{Ni}$

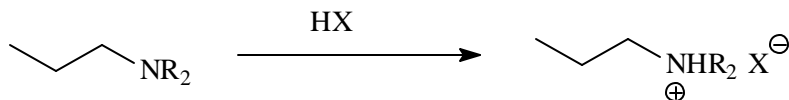


- 4) Reduction of an amide using  $\text{LiAlH}_4$



### Reactions of Amines

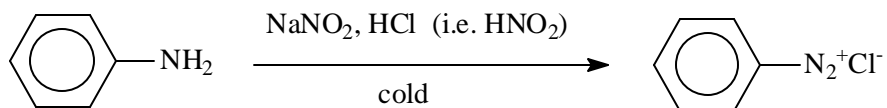
- 1) Salt formation – reaction with a mineral acid



- 2) Reaction with an acid halide or acid anhydride to form an amide (see Carboxylic acid derivation notes)

- 3) Reaction with a methyl or primary alkyl halide to produce 2<sup>o</sup> and 3<sup>o</sup> amines (see 1 in the **Preparation** section)

4) Reaction of aniline with  $\text{HNO}_2$  (i.e.  $\text{NaNO}_2 + \text{HCl}$ ) to form a diazonium salt



**\* the diazonium ion is very useful because it is an intermediate for many additions to the benzene ring \***

