

Amines (R-NH₂)

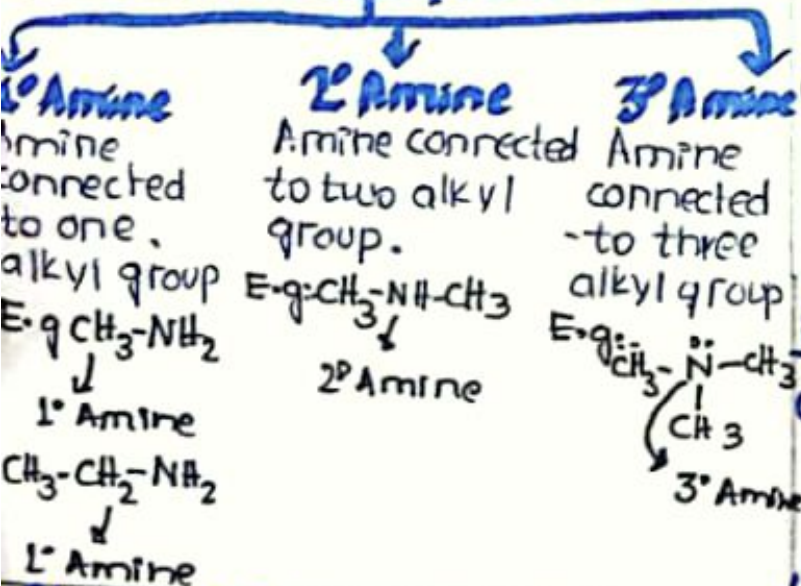
Nitrogen is linked with alkyl group with a lone pair on it.

E.g.: CH₃-NH₂ (Methanamine)

General formula: C_nH_{2n+1}NH₂

Derivatives of ammonia (NH₃)

Classification of Amines



Physical Properties of Amines

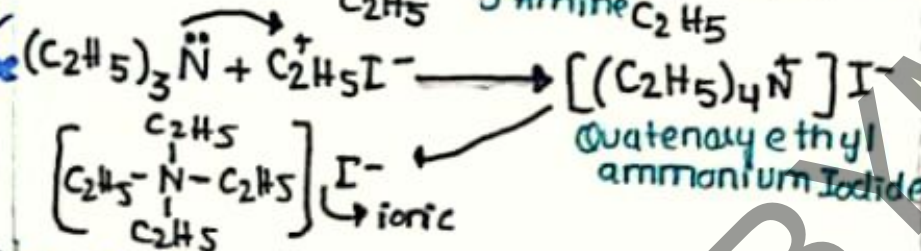
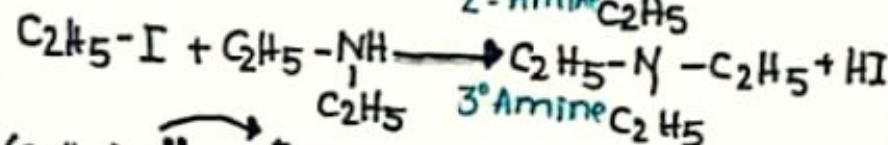
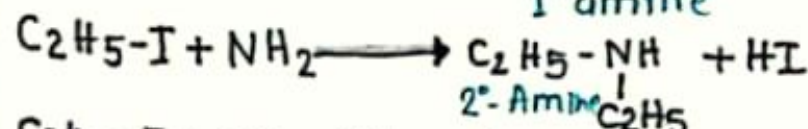
- NH bond is polar (ΔE.N) results in formation of H-bond.
- Due to H-bonding they have high m.p and B.p (than analogous alkane)
- CH₄ alkane Low M.P + B.P
- CH₃-NH₂ (Amine) High M.P + B.P
- H-bond is highly Soluble in water.

Structure of Amines

- nearly tetrahedral structure.
 - Ability to donate e⁻ (coordinate covalent bond) act as base and nucleophile.
 - 3 diff groups are optically active
- (sp³ hybridized)

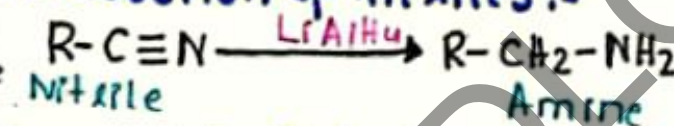
Preparation of Amines

① Rxn of R-X with NH₃:



Reduction of Nitrogen containing

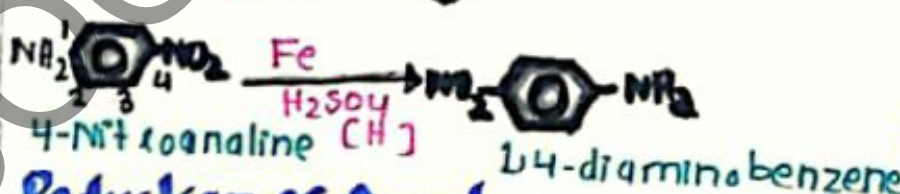
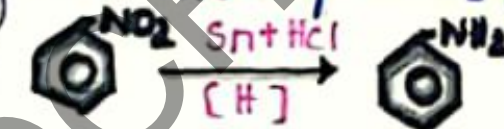
(a) Reduction of Nitriles:-



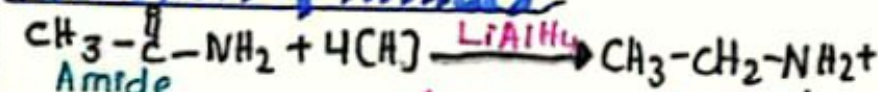
(b) Catalytic Reduction:-



(c) Reduction of Nitro group:-



Reduction of Amides:-



Basicity of Ammonia and Methyl amine



Basic acid



Methyl amine

P_{K_b} = 4.76

Ammonia

P_{K_b} = 3.38

Ammonia

Reason 1:-

Reason 2:-

Alkyl group → weakly e⁻ donor

Donate e⁻ to Amine → making it more e⁻ rich.

Comparison of Basicity of 1° and 2° Amine

3° Amine > 2° amine > 1° amine

e⁻ donating group increases basicity of amine.

Reaction of Amines:-

① Reaction of Amine with acid halide:-

R-C(=O)-Cl + R'-NH₂ → R-C(=O)-NH-R' + HCl

CH₃-C(=O)-Cl + CH₃-CH₂-NH₂ → CH₃-C(=O)-NH-CH₂CH₃ + HCl

② Reaction of amine with R-X:-

C₂H₅-I + C₂H₅-NH₂ → C₂H₅NH-C₂H₅ + HI

C₂H₅-I + C₂H₅-NH-C₂H₅ → C₂H₅-N(C₂H₅)₂ + HI

(C₂H₅)₃N + C₂H₅I → [(C₂H₅)₄N]⁺I⁻

③ Reaction with nitrous acid:-

R-NH₂ + HNO₂ + HCl → R-N≡N⁺Cl⁻ + 2H₂O

Nitrous acid Diazonium salt

below 10°C

C₆H₅N₂Cl + C₆H₅OH → C₆H₅-N≡N-C₆H₄OH + HCl

Benzene diazonium chloride Phenol orange red dye