

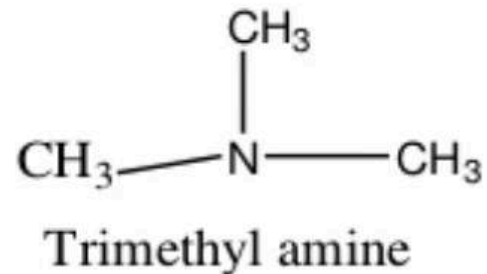
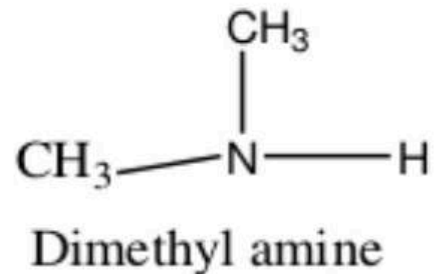
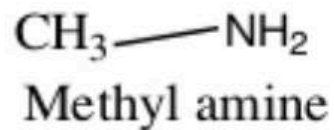
AMINES

Submitted by:

Deepshikha

What are Amines?

- Amines are derivatives of ammonia in which one or more hydrogen atoms have been replaced by alkyl group.

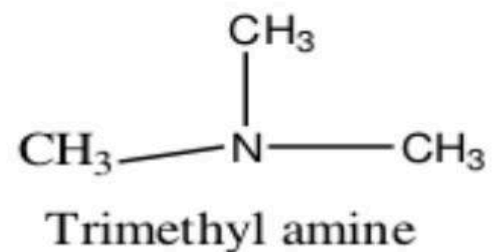
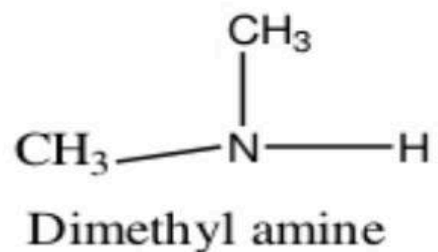
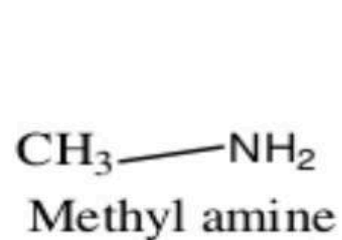


Physical properties of Amines

1. Lower amines are liquid in nature.
2. IR stretch for N-H $3300-3500\text{cm}^{-1}$
3. Amines water insoluble because of N-H bonds they are not forming hydrogen bond with water, but soluble in organic solvents.
4. $^1\text{H NMR}$ shows peak between $0.5-5.0 \delta$

Classification

- Primary amines: A amine has only one alkyl group directly attached to the nitrogen.
- Secondary amines: A amine has two alkyl group directly attached to the nitrogen.
- Tertiary amine: A amine has three alkyl group directly attached to the nitrogen.



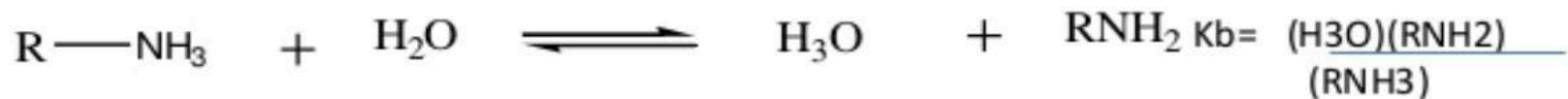
Basicity of Amines

- Amines act as Lewis bases because they donate a lone pair of electrons to form a new bond with a hydrogen atom.



$$K_b = \frac{(\text{RNH}_3^+)(\text{OH}^-)}{(\text{RNH}_2)}$$

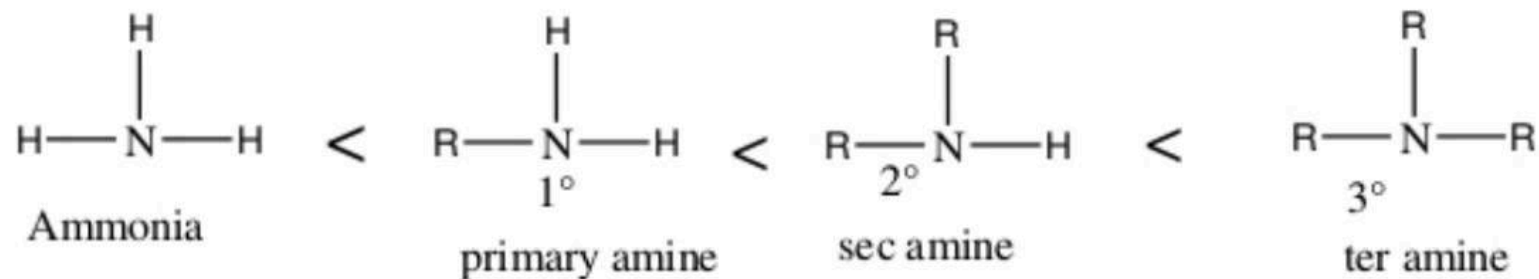
If the base is strong, the equilibrium shifts to the right and the K_b value is higher. The strength of a base is measured in terms of its pK_a value; a higher pK_a value indicates a stronger base.



Measurement of amine basicity through the acidity of conjugate acids. Equilibrium shifts to the right and the pK_a value will be greater for the conjugate acid.

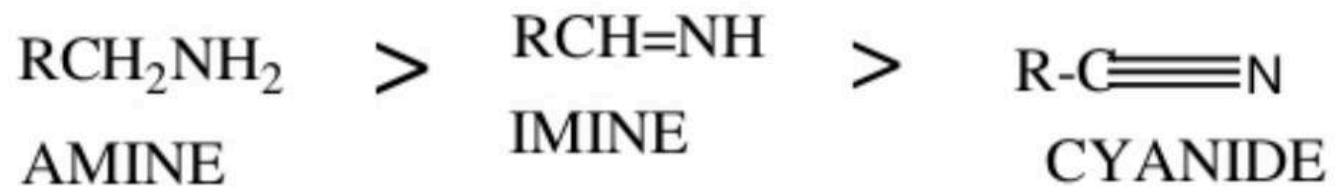
Substituent effect of basicity

- Alkylation effect:
- Any factor that increases electron density on the N atom increase an amine basicity.
- E. g. ammonia is least basic , alkyl group having electron density hence alkyl group adds electron density means alkylated ammonia is strong base



Substituent effect of basicity

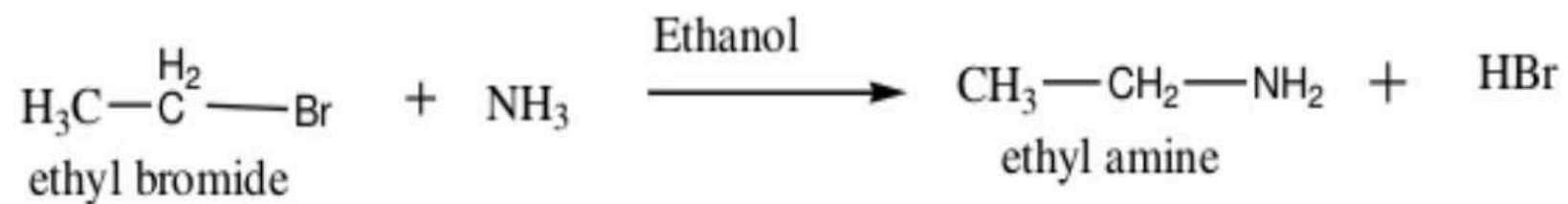
- Nature of amine:
- Any factor that decreases electron density on N atom, decreases basicity.
- E.g the amine containing sp^3 hybrid orbital having more electron density but when carbon is sp^2 and sp hybrid at that time electron density on nitrogen decreases hence alkyl cyanides are least basic than imines and amines.



Preparation of **AMINES**

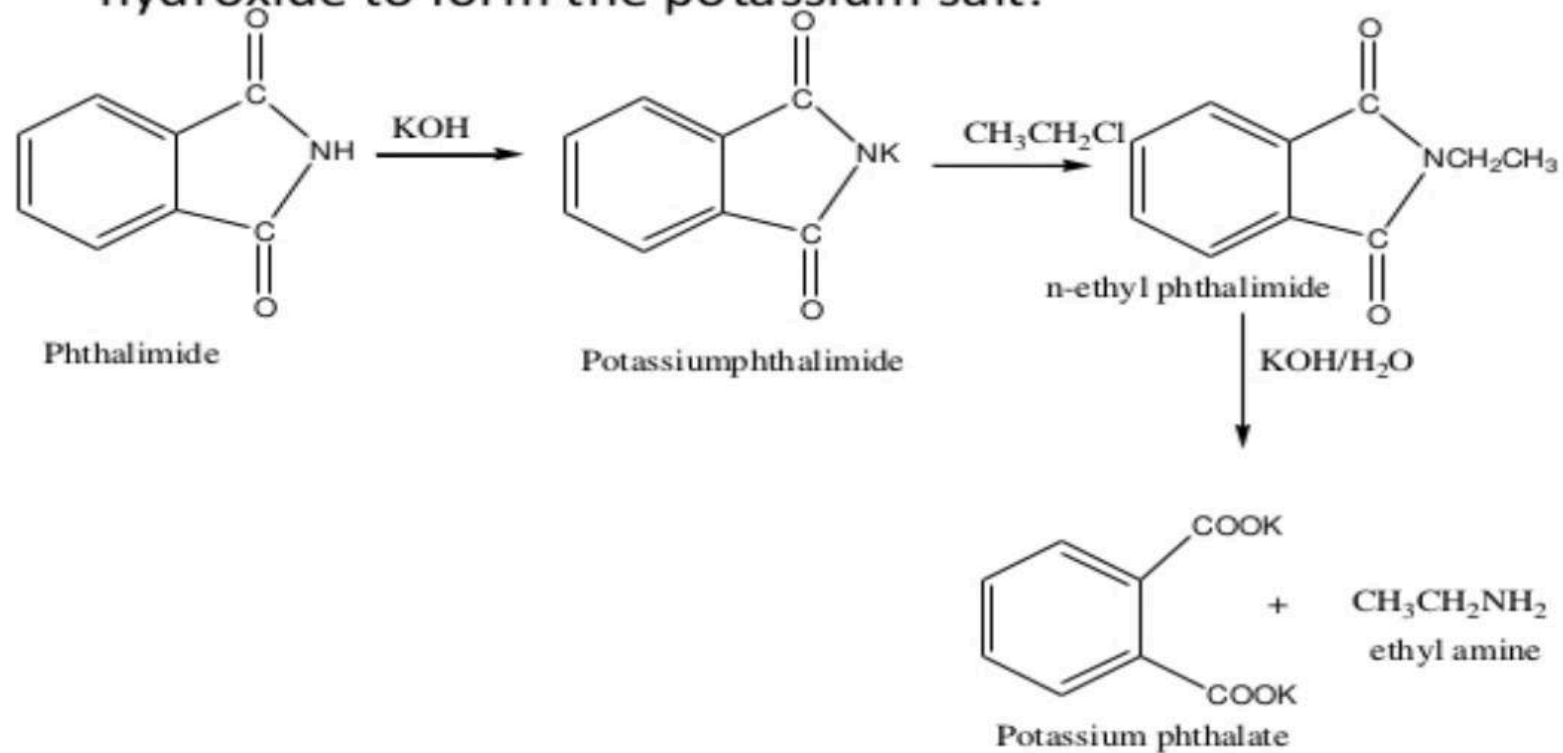
1. Reaction of alkyl halides with ammonia to form amine

- Alkyl halides react with alcoholic solution of ammonia to form amines.



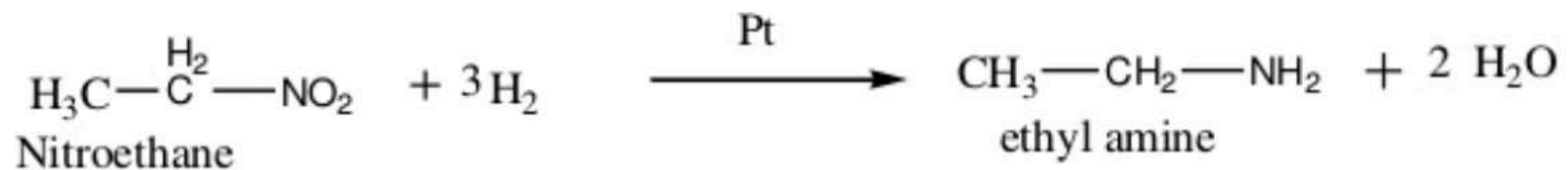
2. Gabriel phthalimide method

- This involves the treatment of phthalimide with potassium hydroxide to form the potassium salt.



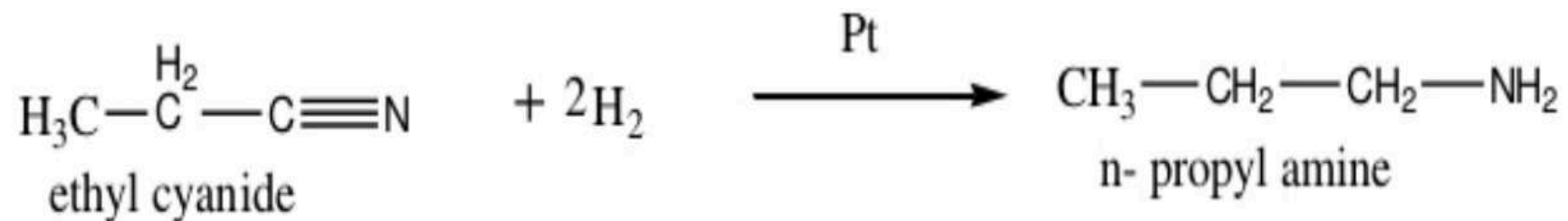
3. Reduction of nitroalkanes

- Primary amines can be obtained by reduction of nitroalkanes with Ni or Pt.



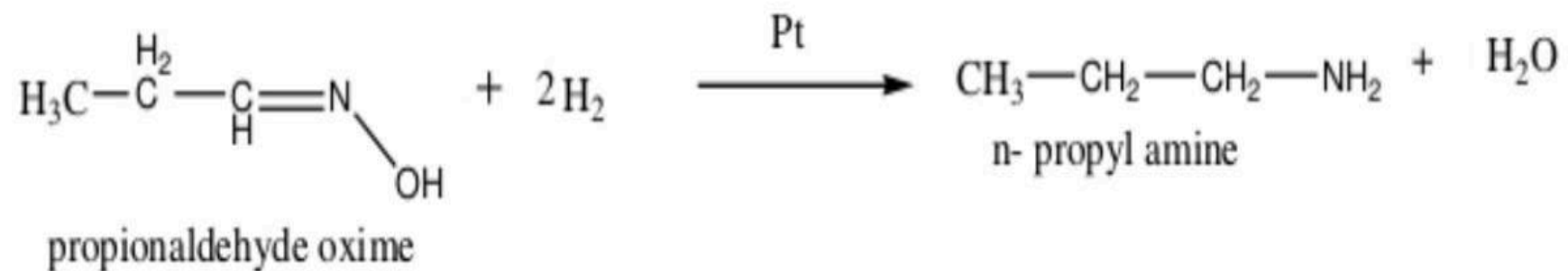
4. Reduction of nitriles

- Primary amines can be obtained by reduction of nitriles with Ni or Pt.



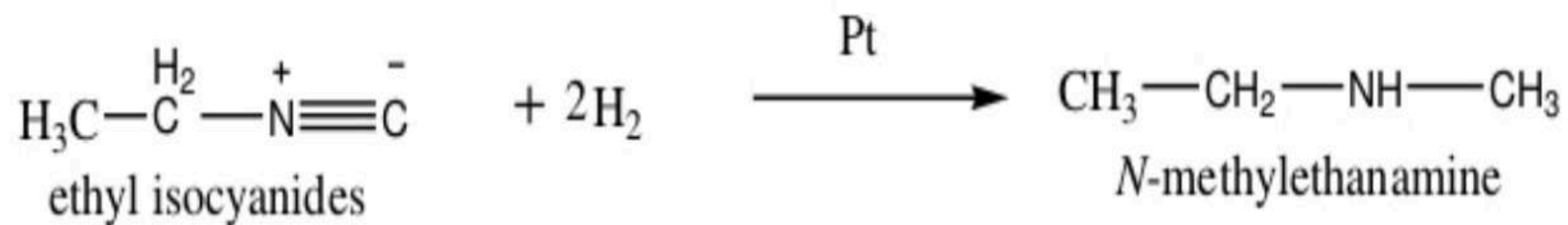
5. Reduction of oximes

- Primary amines can be obtained by reduction of nitriles with Ni or Pt.



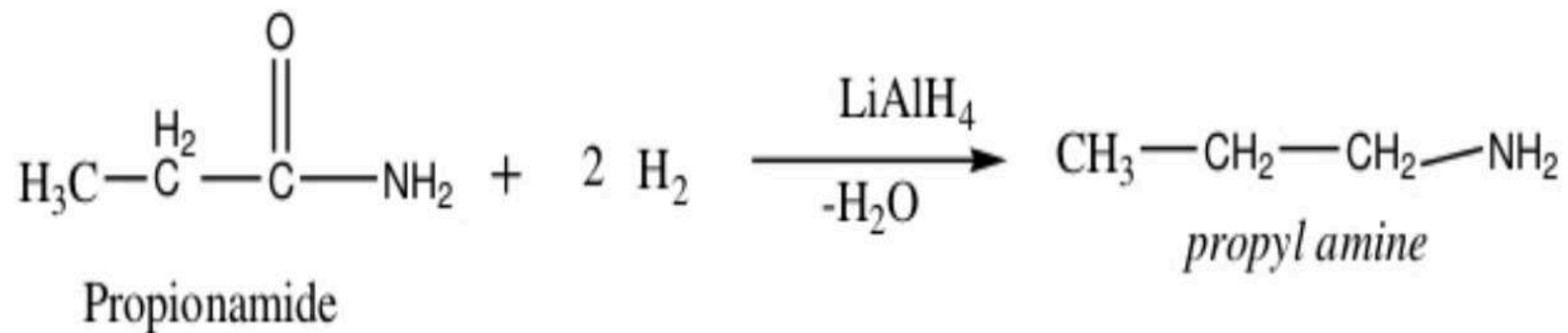
6. Reduction of isonitriles

- Secondary amines may be obtained by reduction of isonitriles with Pt.



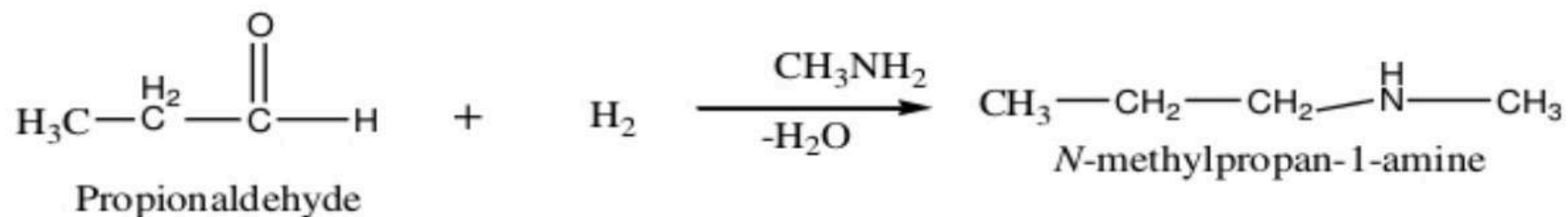
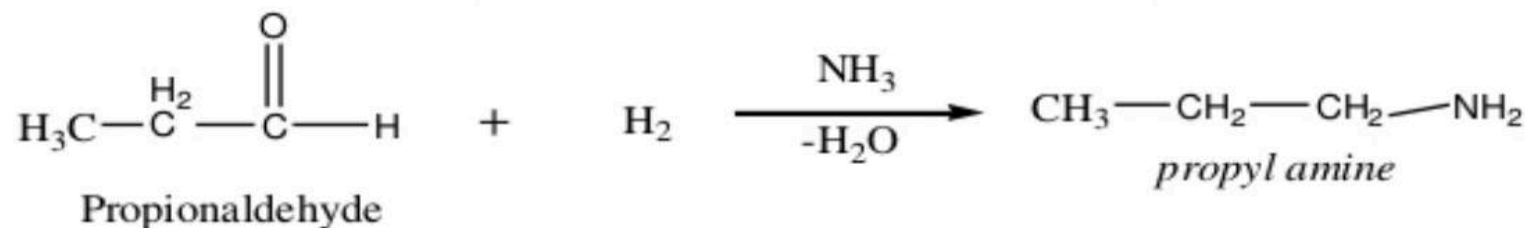
7. Reduction of amides

- Primary amines can be obtained by reduction of simple amides with lithium aluminium hydride



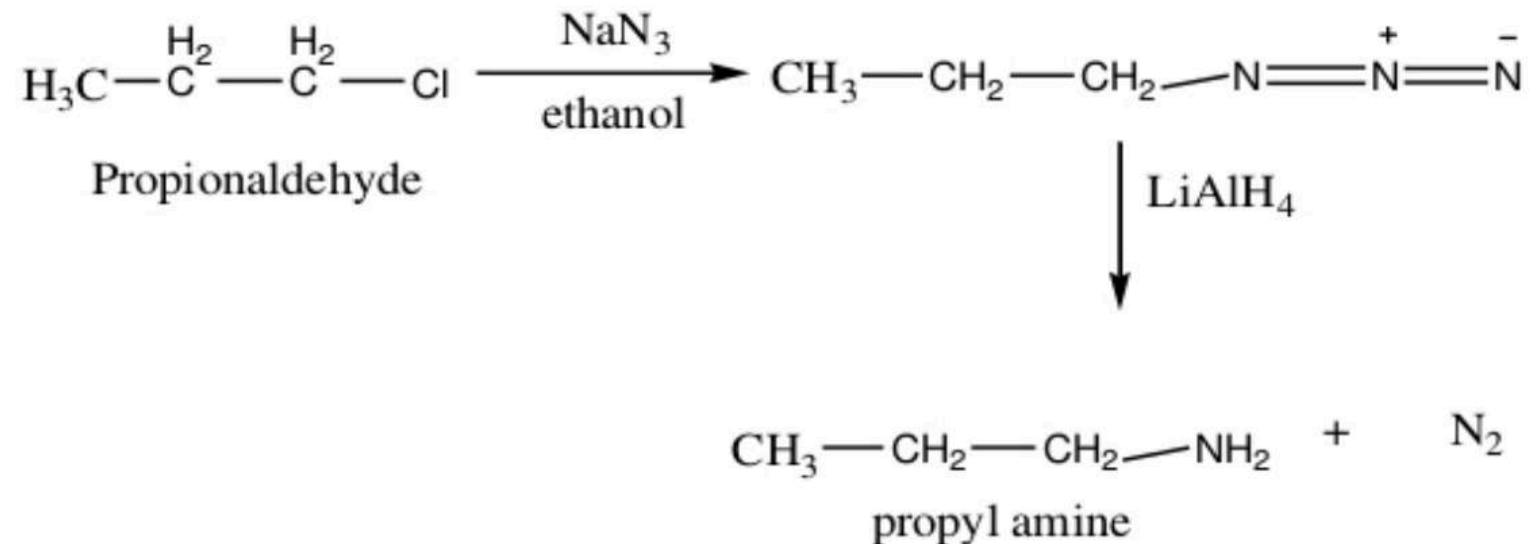
8. Reductive amination of aldehyde and ketone

- Primary amines can be obtained by reduction of aldehyde with ammonia with Ni or Pt.
- Secondary amine produced with treatment with primary amines



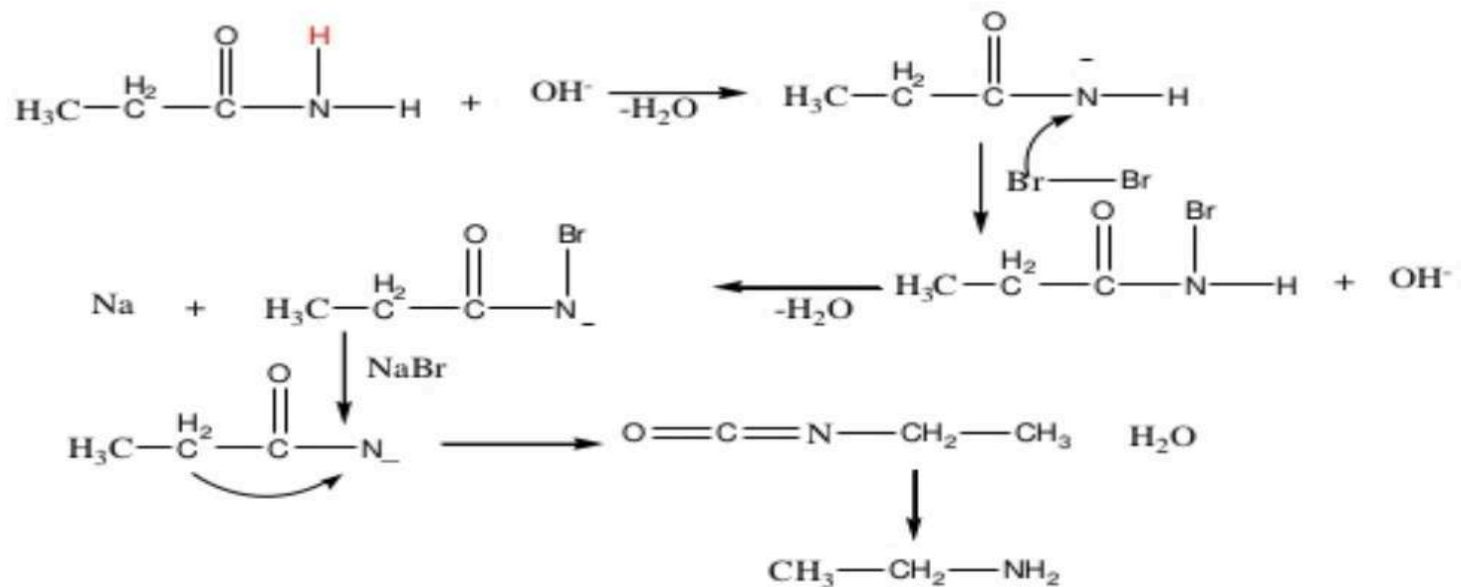
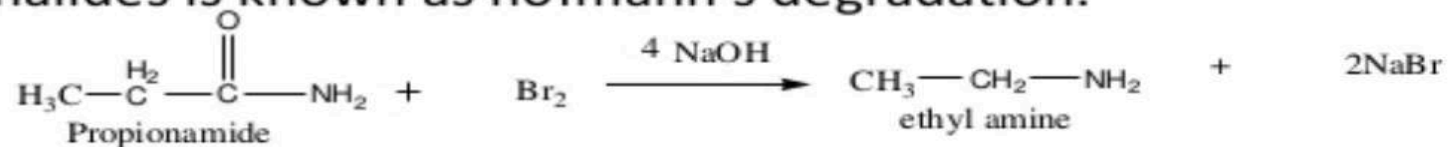
9. Reduction of alkyl azides

- Primary alkyl halides react with sodium azide to form alkyl azides and further reduction with lithium aluminium hydride to give primary amines.



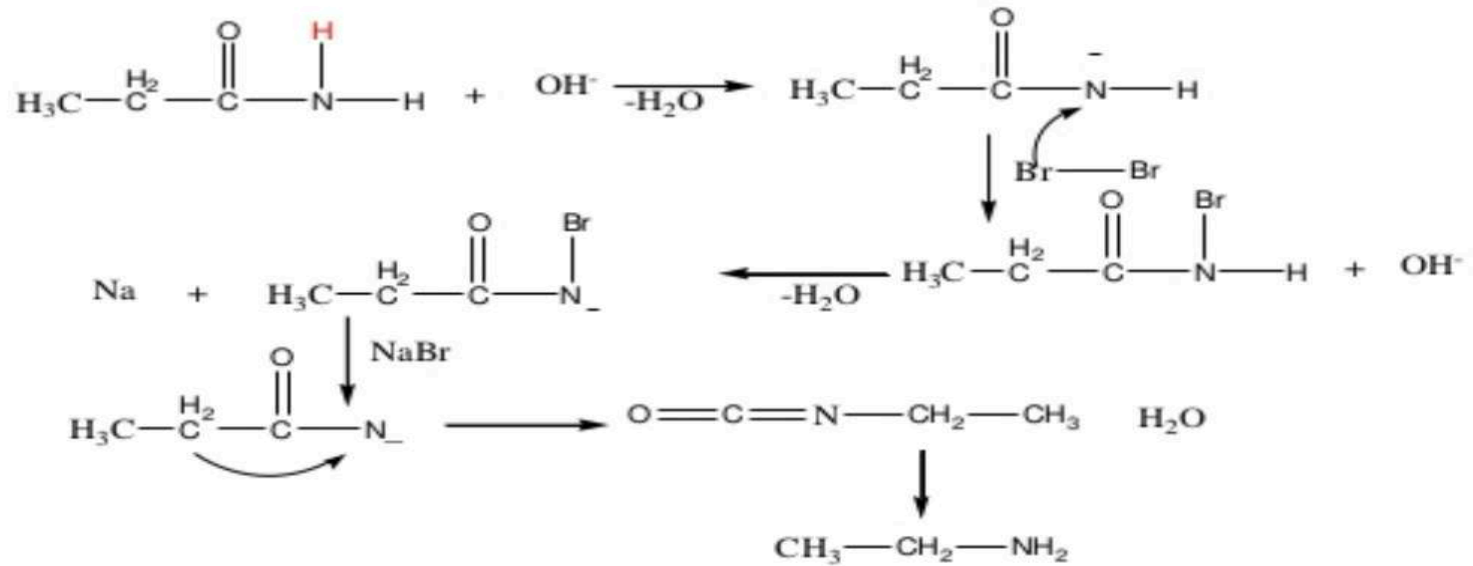
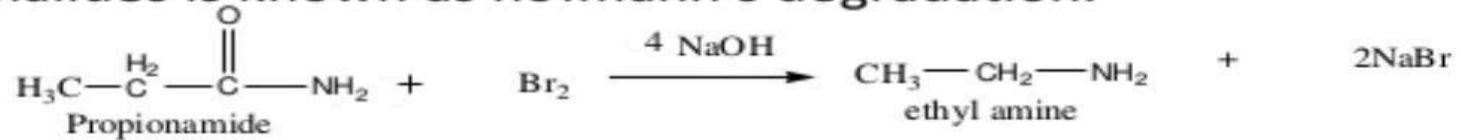
10. Hofmann's degradation of amides

- Conversion of an amide into an amine with the help of sodium hypohalides is known as Hofmann's degradation.



11. Curtius rearrangement

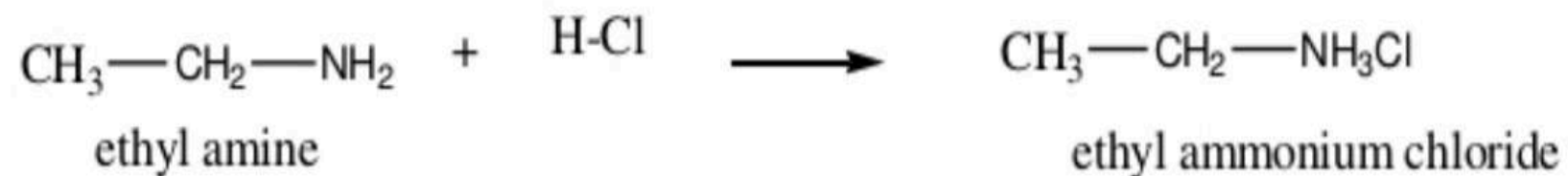
- Conversion amide into amine with the help of sodium hypo halides is known as hofmann's degradation.



Reactions of **AMINES**

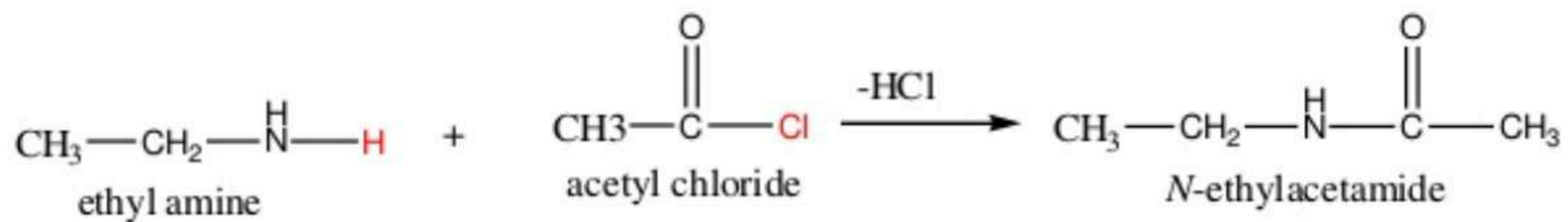
1. Salt formation

- Amines are bases and react with mineral acid to form ammonium salt.



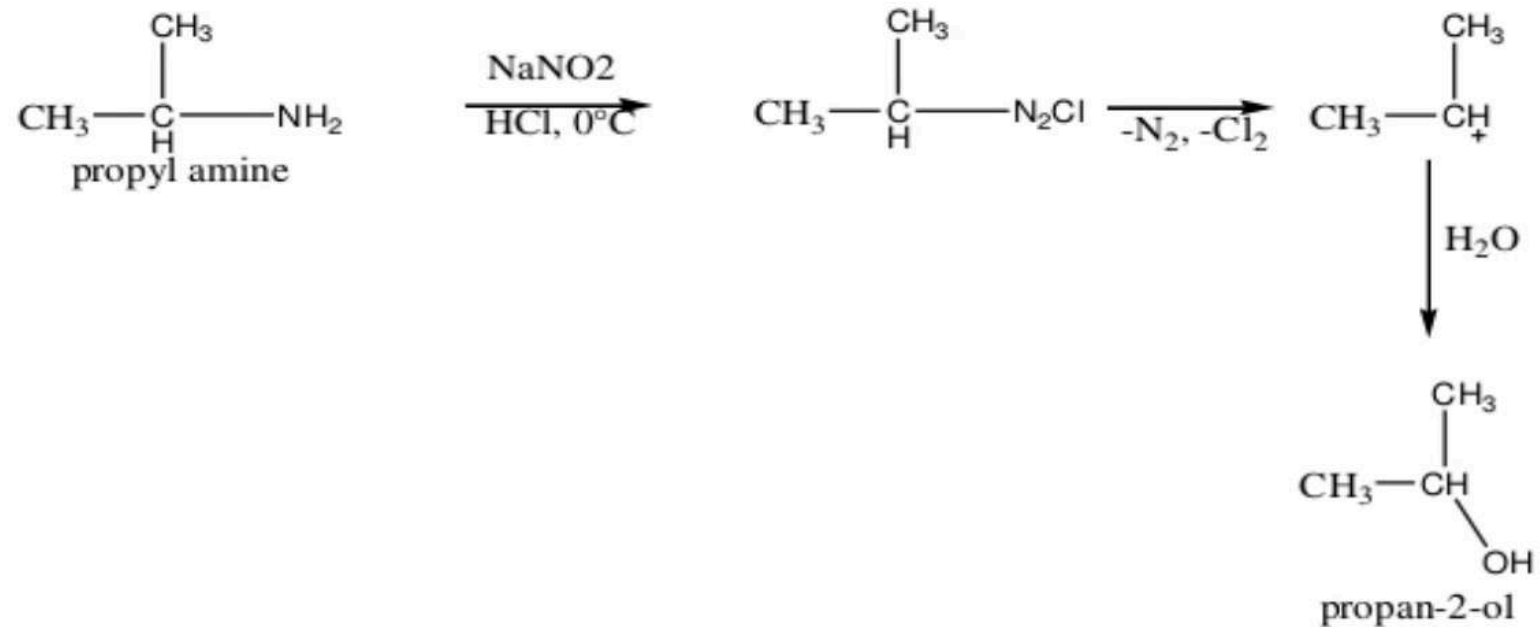
3. Reaction with acid chlorides

- Primary amines react with acid chloride to form N-substituted amides



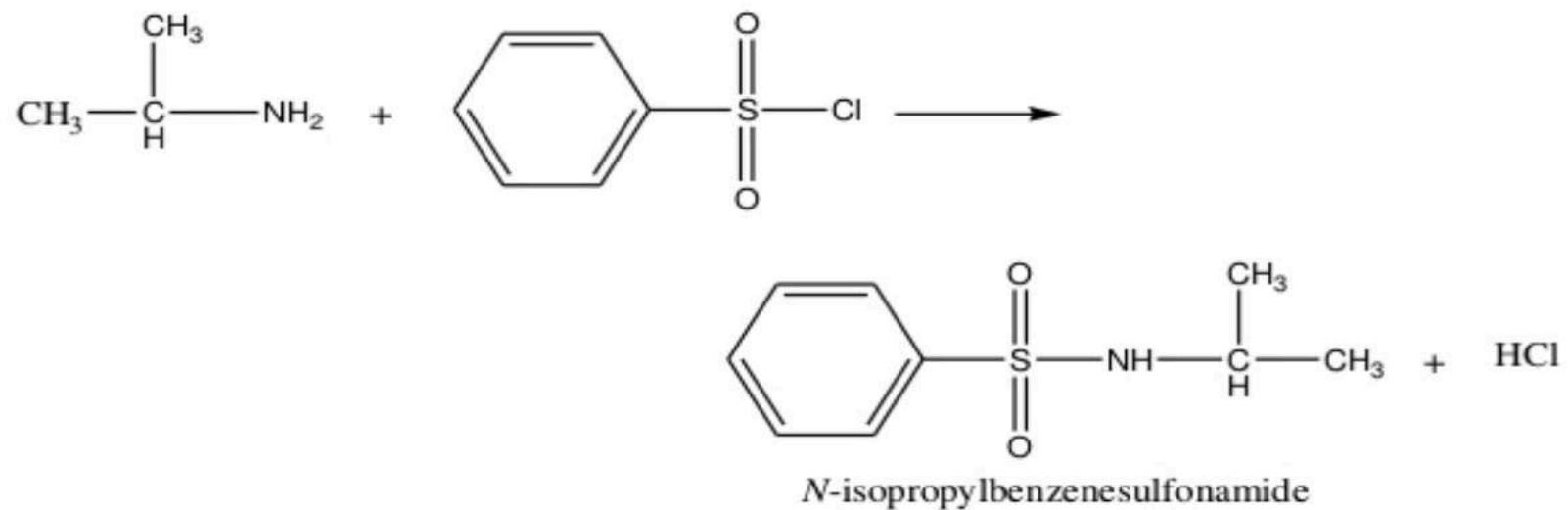
4. Reaction with nitrous acid

- Primary amines react with nitrous acid to form diazonium salts and salt hydrolyzes to form alcohol



5. Reaction with benzenesulphonyl chloride

- Primary amines react with benzene sulphonyl chloride to form n-alkyl benzene sulfonamide.



6. Carbylamines reaction

- Primary amines react with chloroform and solution of KOH in ethanol to form isocyanides.

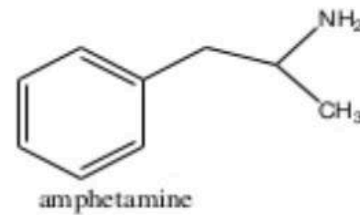
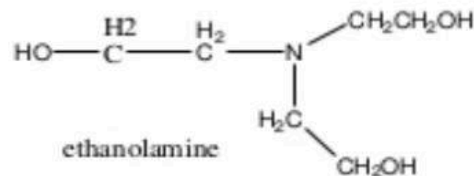
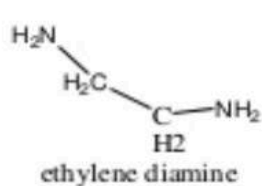


Qualitative tests for amines

Name of test	Observation	Inference
1. Salt test: 0.1 gm sample and 5 ml 10% HCl	Clear solution	Amine present
2. Carbylamines test: 0.1 gm sample+2 drops of chloroform+ 2 ml Alc. KOH	Foul smell of isocyanides	Primary Aliphatic or Aromatic amine
3. Diazotization test: 0.1 gm of sample + 10 Drops of Conc. HCl, boil and cool in ice water + 4-5 drops of NaNO ₂ in water and 2-naphtol in NaOH	Yellow solid	Secondary amine
	Red color	Tertiary amine
	Orange ppt	Primary amine
4. Hinsberg Test: 0.1 gm sample+ 0.3 gm of benzene sulfonyl chloride+ 5-10 ml ice cold water	Yellow ppt dissolves in 5% NaOH	Primary amine
	PPT insoluble in 5% NaOH	Secondary Amine
	PPT soluble in 10% HCl	Tertiary amine

Structure and use

- Ethylene diamine: used in manufacturing of fuel additives, bleach activators, chelating agents, corrosion inhibitors.
- Ethanolamine: it is used as feedstock in the production of detergents, emulsifier, polishes, corrosion inhibitors, chemical intermediates.
- Amphetamine: nerve stimulants, it treats attention deficit hyperactivity disorder.



References:

- ▶ www.slideshare.net
- ▶ www.google.com

**Thank
you!**