

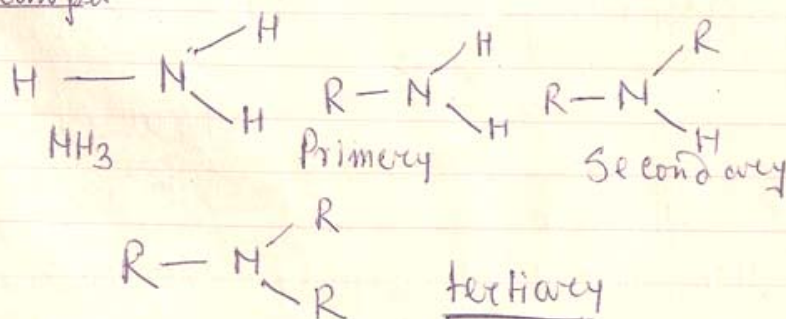


AMINES

Qr. Define amines classify them. How would you prepare ethylamine in the lab. Discuss the properties of ethyl amine. Mention its uses.

Definition → Amines are the derivatives of NH_3 . When 1 atom of H of NH_3 is replaced by alkyl radical ($-\text{CH}_3$, $-\text{C}_2\text{H}_5$, $-\text{C}_3\text{H}_7$ etc) we call it primary amine. When 2 hydrogen atoms of NH_3 are substituted by alkyl group we call it secondary amine and when all the hydrogen atoms of NH_3 are substituted by alkyl group we call it tertiary amines.

As for example





N:B If R is the same then they are called ^{C₃H₇} simple amines but if R is different in any case then it is called mixed amine.

Classification: General formula			
Class	Functional group	Functional group	Examples
1. Primary amine	-NH ₂	$R-NH_2$ $R-N \begin{matrix} H \\ \\ H \end{matrix}$ $C_n H_{2n+1} NH_2$	CH_3-NH_2 Methyl amine. $C_2H_5-NH_2$ (Ethyl amine)
2. Secondary amine	=NH	$R-NH$ $R-NH$	CH_3-NH CH_3 Di Methyl amine CH_3-NH C_2H_5 Ethyl Methyl amine C_2H_5-NH C_2H_5 Di Ethyl amine
3. Tertiary amine	N	$R-N-R$ $R-N-R$	CH_3-N CH_3 Tri Methyl amine. CH_3 CH_3 CH_3 CH_3-N Methyl Ethyl C_2H_5 Propyl amine. C_3H_7



Preparation of Ethyl Amine.

Chem In the lab. Ethyl amine is conveniently prepared by heating a mixture of Propionamide ($C_2H_5CONH_2$), Bromine and KOH. According to Hofmann's reaction the CO part of the amide is knocked out - resulting $C_2H_5NH_2$

Reaction:

Procedure \rightarrow Nearly 20 gms of Propionamide and 18 gms of Br_2 are taken in a round bottom flask about 10%. Solⁿ of KOH is added into it slowly till the brown colour of Br_2 is just discharged. This is then added a little more KOH solⁿ through the dropping funnel and the flask is gently heated $60-70^\circ C$ over a water bath as shown in the diagram. Ethyl amine is thus formed is absorbed in dilute HCl in a receiver.

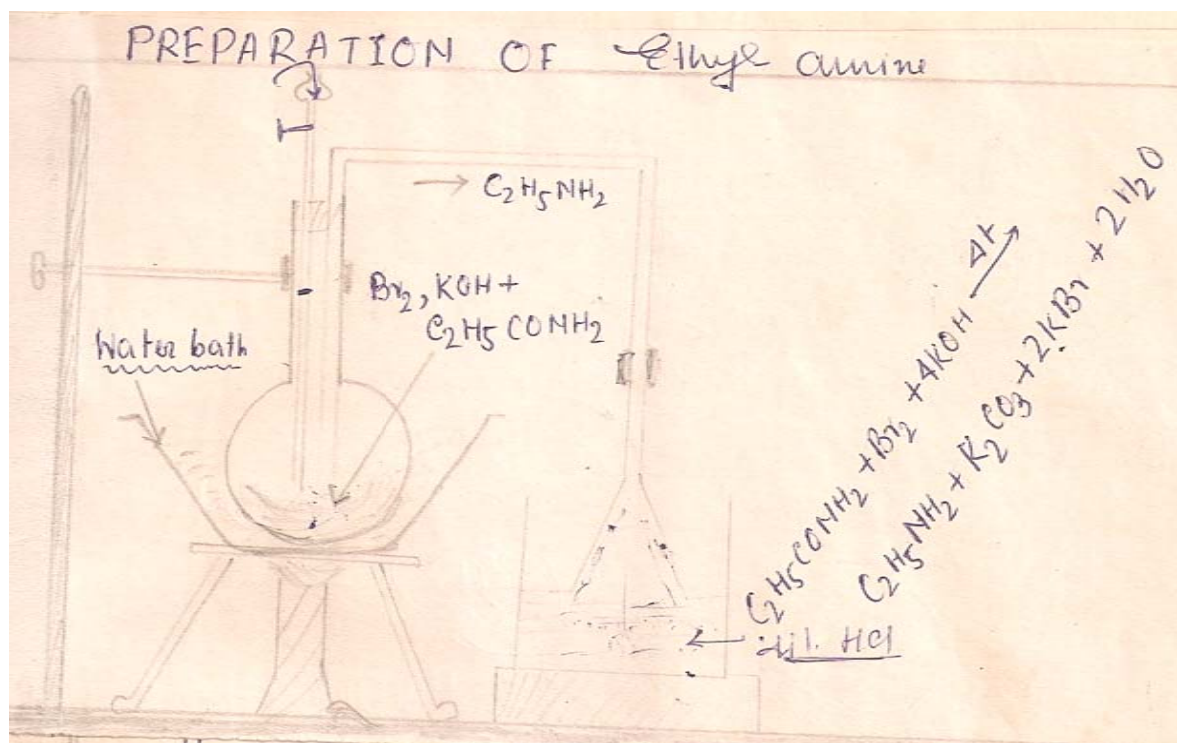
It is continued till no more $C_2H_5NH_2$ comes out. In this way we get: Ethyl amine hydrochloride ($C_2H_5NH_2 \cdot HCl$).

If required the free ethyl amine may be recovered from it by heating with KOH/NaOH.

Precaution \rightarrow ① Anti-suction device is adopted for absorbing the gas.

② As temperature needed ~~is~~ below $100^\circ C$ we should use water bath.

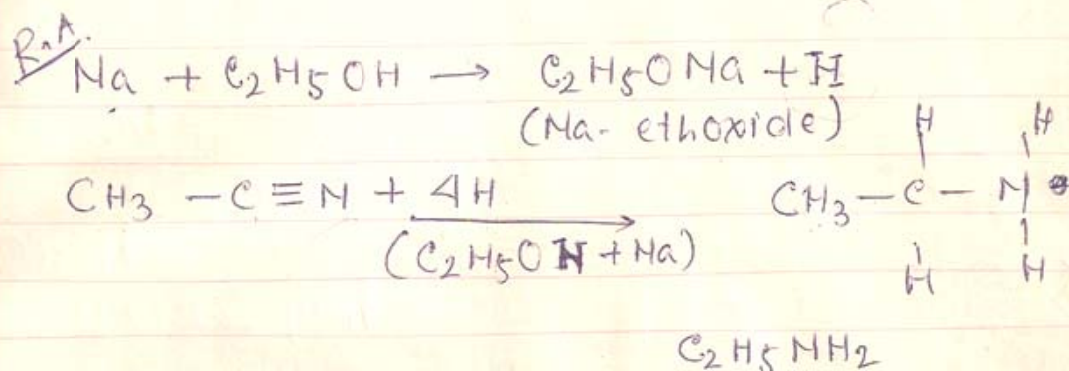
Purification \rightarrow On heating $C_2H_5NH_2 \cdot HCl$ with KOH we get pure $C_2H_5NH_2$.





Other Method Of Preparation.

When Methyl cyanide is reduced by recent H obtained from $\text{Na} + \text{C}_2\text{H}_5\text{OH}$ we get ethyl amine.

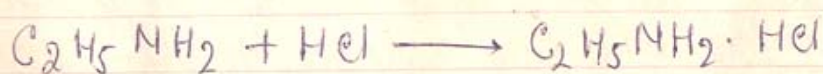


Physical properties.

Ethyl amine is a colourless inflammable liquid boiling point (B.P) 19°C so it is a gas at ordinary temperature. It has fishy and ammoniacal smell, soluble in water like NH_3 gas. The aq. solⁿ of it is basic and turns red litmus blue.

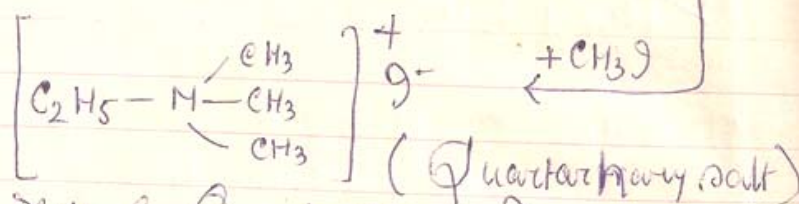
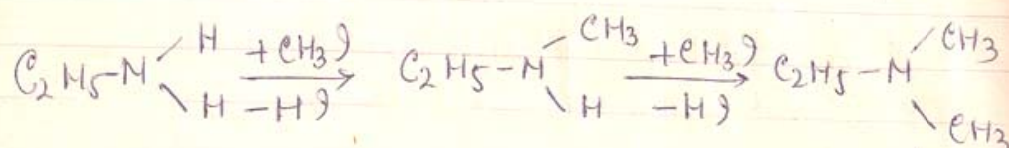
Chemical Properties.

(1) With HCl — It combines with HCl to form ethyl amine hydrochloride salt which may be obtained as a white solid by evaporating the solution.



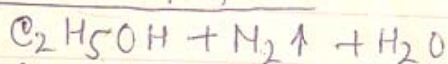
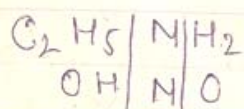
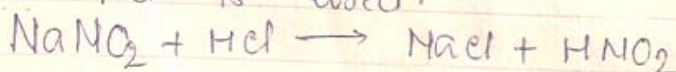


② With Methyl Iodide (CH_3I)



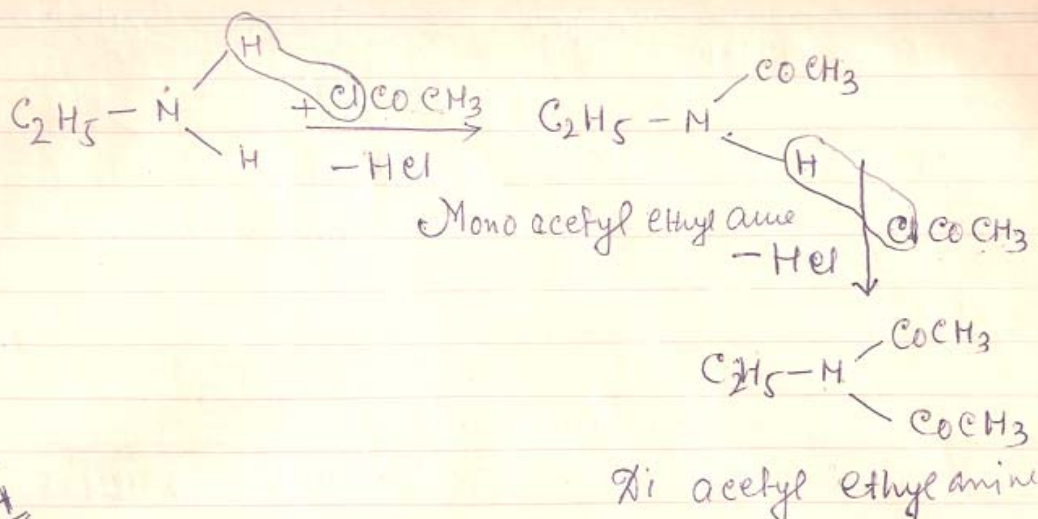
R.V. 87 Ethyl tri Methyl Quaternary Iodide

3. With Nitrous acid $\rightarrow \text{HNO}_2$, or $\text{NaNO}_2 + \text{HCl}$ (dilute)
 HNO_2 acid is never kept in the lab, as it is easily oxidised by air into HNO_3 . So for practical purposes a mixture of $\text{NaNO}_2 + \text{dilute HCl}$ is used.



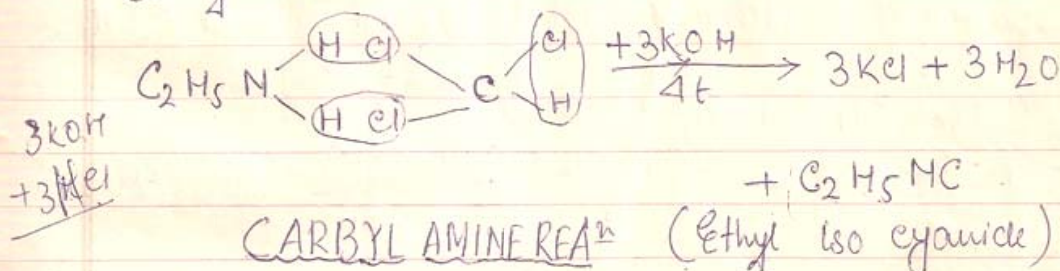
So Ethyl amine on treating with $\text{NaNO}_2 + \text{HCl}$ or HNO_2 gives Ethyl alcohol and Nitrogen gas.

(A) With Acetyl Chloride CH_3COCl - When it is treated with acetyl chloride it forms gradually Mono acetyl and Di acetyl derivatives as follows

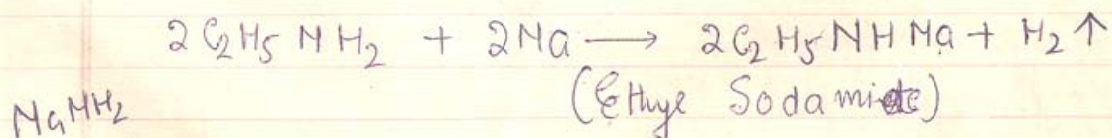


R.V.
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W.H

5. With Chloroform and KOH → When Ethyl amine is warmed with Chloroform and caustic potash solution a highly offensive (bad smell) smell of Ethyl isocyanide is formed this is known as Carbyl amine reaction

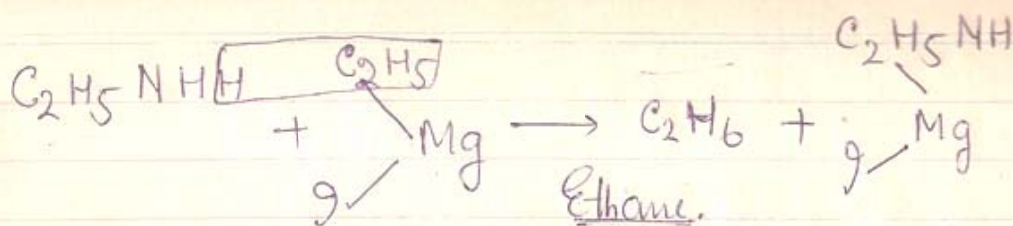


6. With metallic Na → On heating with metallic Na it gives H₂ gas.



NaNH₂
Sodamide

- (7) With Grignard reagent → When it is treated with Grignard reagent ethane is formed.



Uses of Ethyl amine

- (1) In colour photography.
- (2) In soap industry, it is used as emulsifying agent ()

P. Methyl Amine CH_3NH_2

Theory \rightarrow In the lab. Methyl amine is prepared by Hofmann's method that is treating acetamide with Bromine and KOH .

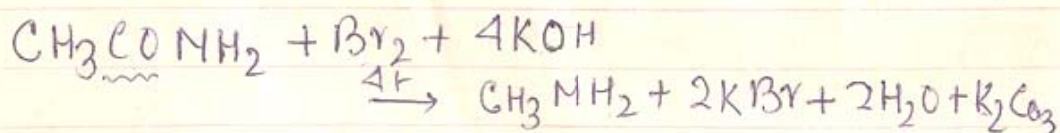


figure is same as in ethyl amine.

Rest the same.

