

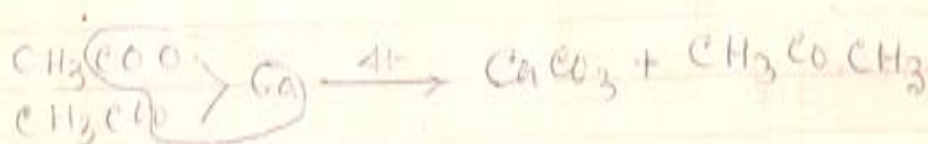


Distillation without air (in the absence of air)

How is Acetone prepared in the lab. in pure form give the outline of the industrial method of its preparation. Mention the properties and uses of Acetone.

PREPARATION OF Acetone

Theory → When calcium acetate is subject to dry distillation / destructive distillation we get acetone



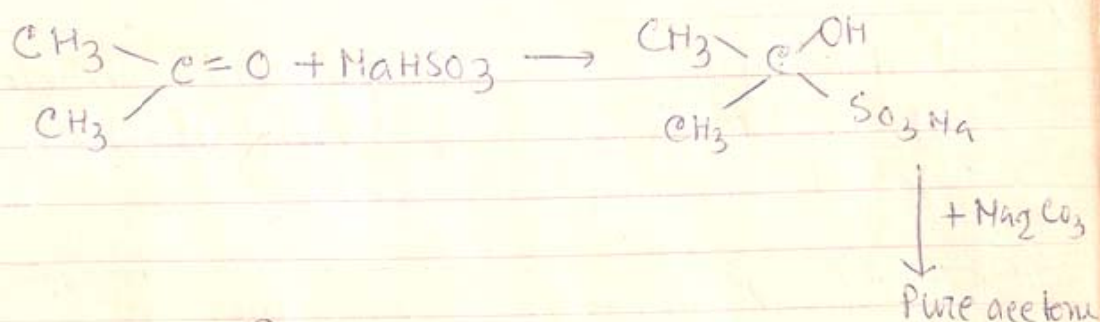
Procedure → In a retort about 50 gm of Calcium acetate, dry sample is taken. It is fitted with a water condenser as shown in the figure. The water condenser is connected with an adapter to receive acetone in the form of a liquid. A little Sodium acetate is used as a catalyst to get uniform decomposition of calcium acetate.

On heating Calcium acetate we get a vapour of acetone which being cooled converted to a liquid and is collected in the receiver, kept immersed in cold water. (B.P of acetone 56°)

Precaution → A little Sodium acetate catalyst is added to get a most yield.



Purification \rightarrow This sample of acetone is added with NaHSO_3 and stirred to get white crystals of acetone-sodium bisulphite which are filtered, dried and redistilled with saturated solution of Na_2CO_3 to get pure acetone as a distillate.



Industrial Preparation

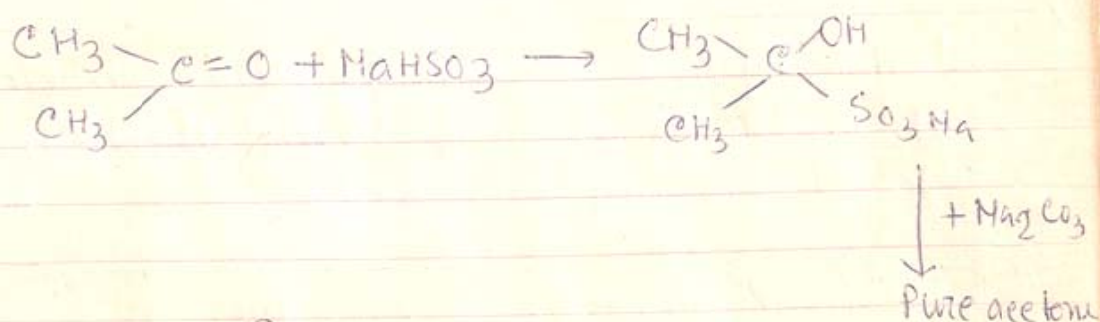
When wood is subjected to destructive distillation we get (a) wood gas (b) wood tar in the receiver and above that (c) pyroligneous acid containing CH_3COOH , CH_3OH , CH_3COCH_3 and (d) wood charcoal in the retort.

Now this pyroligneous acid is distilled and the vapour is passed in hot-milk of lime to get ppt of calcium acetate which are separated, treated with H_2SO_4 to get acetic acid.

The residual vapour are condensed to get a mixture of CH_3OH & CH_3COCH_3 . They are separated by fractional distillation. (BP of CH_3COCH_3 is 56°C and BP of CH_3OH is 65°C). So acetone is distilled first.



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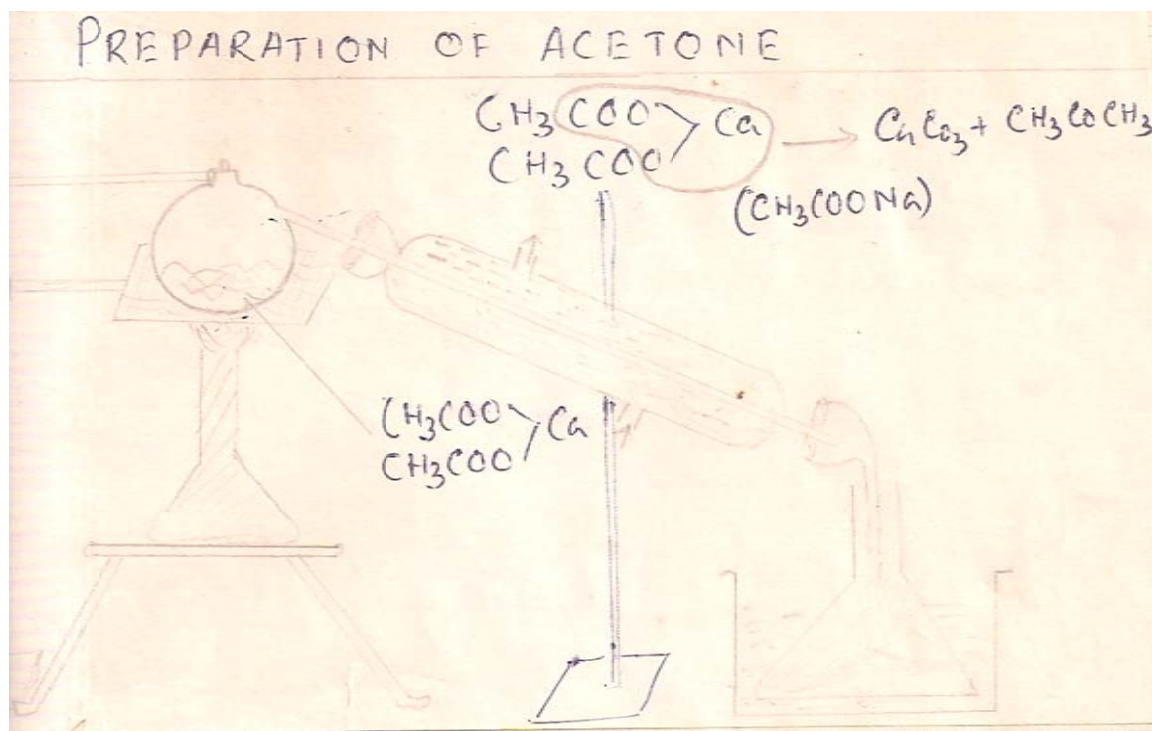


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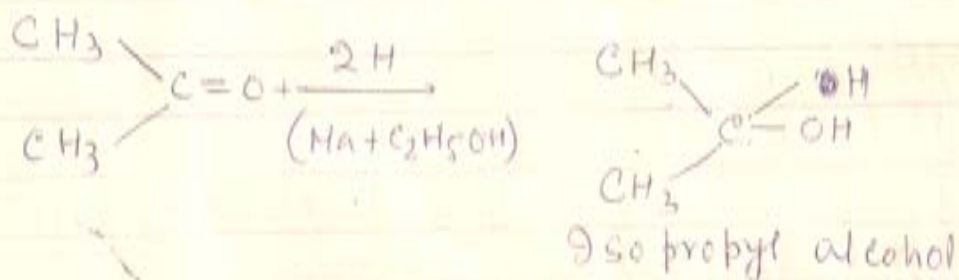


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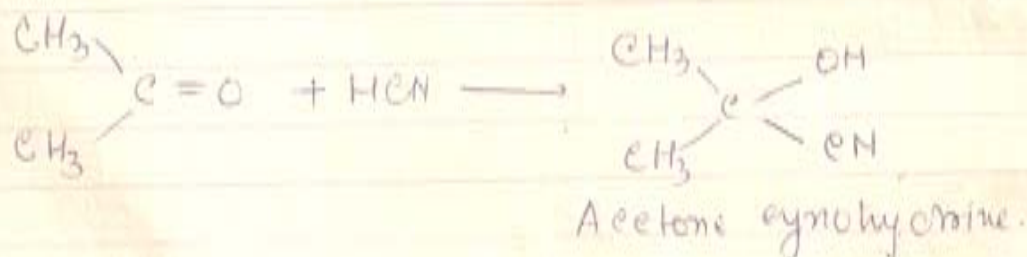
Acetone is a colourless inflammable, pleasant smelling liquid. B.P 56°C Soluble in water alcohol and also in ether.

CHEMICAL PROPERTIES

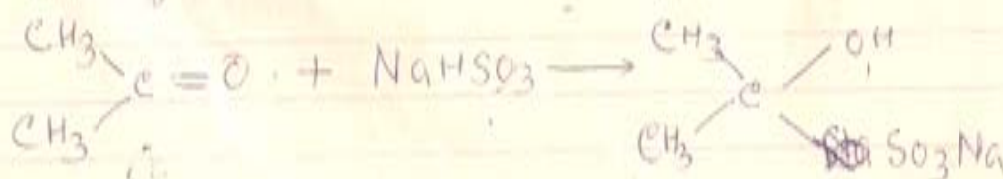
① With Hydrogen \rightarrow When acetone is treated with H_2 in the presence of heated NiCl / $\text{Na} + \text{C}_2\text{H}_5\text{OH}$ we get Iso propyl alcohol.



② With HCN \rightarrow It forms addition compound called acetone cyanohydrine.



③ With $\text{NaHSO}_3 \rightarrow$ It forms crystalline solid with NaHSO_3



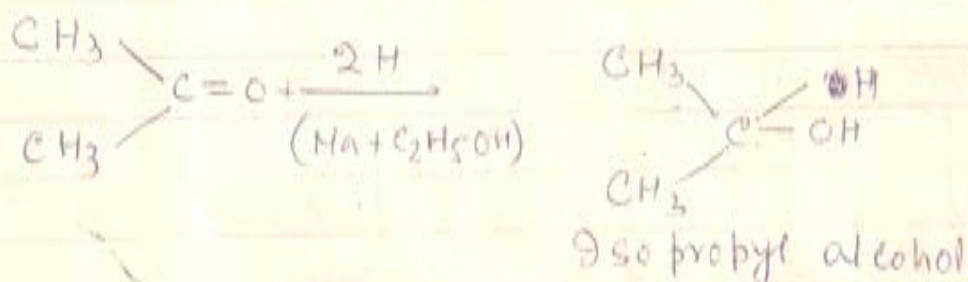


PHY

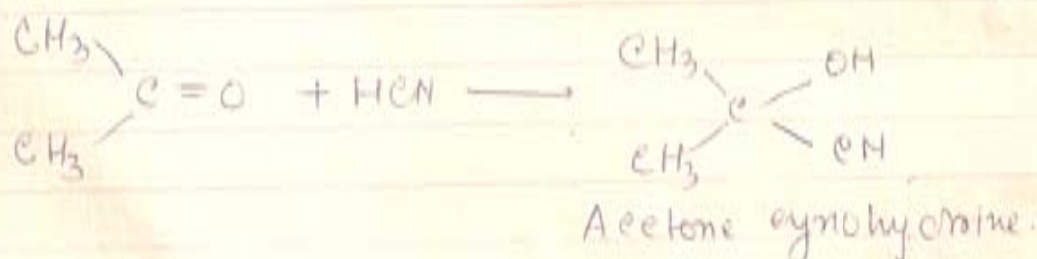
Acetone is a colourless inflammable, pleasant smelling liquid. B.P 56°C Soluble in water, alcohol and also in ether.

CHEMICAL PROPERTIES

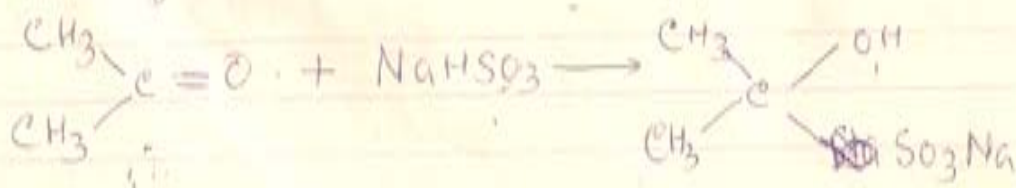
① With Hydrogen \rightarrow When acetone is treated with H_2 in the presence of heated $\text{NiCl}_2 / \text{Na} + \text{C}_2\text{H}_5\text{OH}$ we get Isopropyl alcohol.



② With HCN \rightarrow It forms addition compound called acetone cyanohydrine.

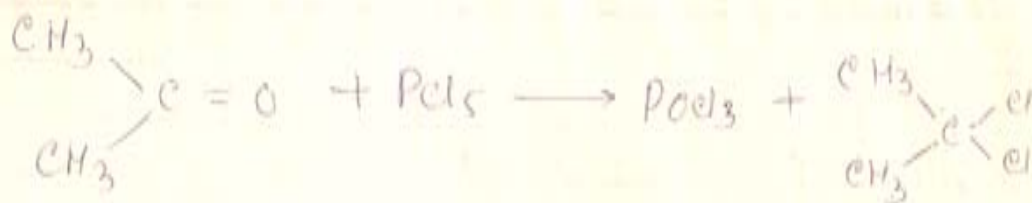


③ With NaHSO_3 \rightarrow It forms crystalline solid
With NaHSO_3

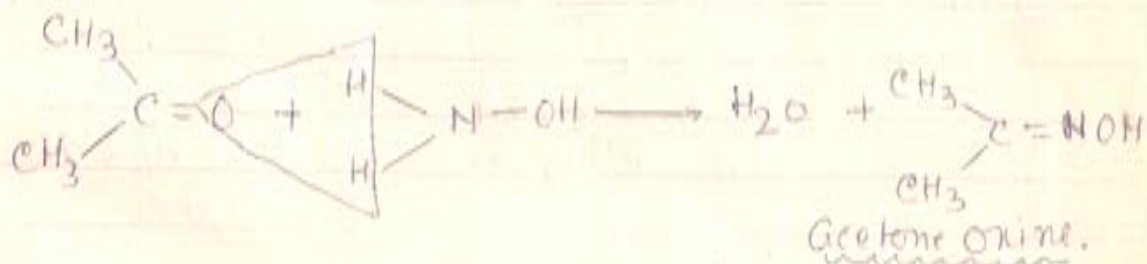




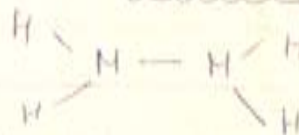
④ With $\text{PCl}_5 \rightarrow$ It forms acetone di chloride / 2,2 dichloro propane.



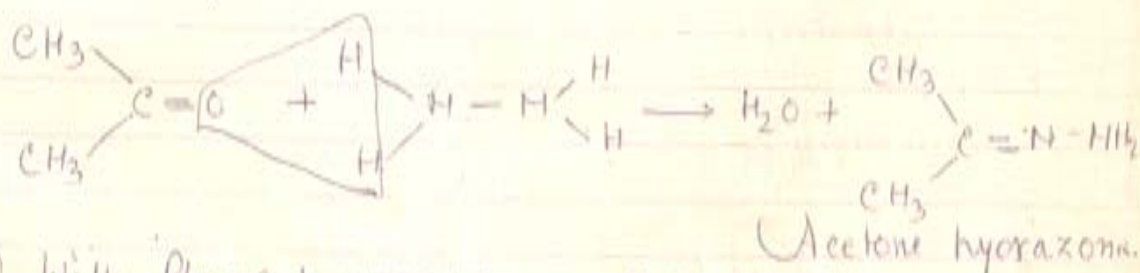
⑤ With hydroxyl amine (NH_2OH) - When Acetone is treated with hydroxyl amine it forms acetone oxime.



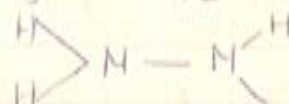
⑥ With hydrazine $\rightarrow (\text{NH}_2\text{NH}_2)$



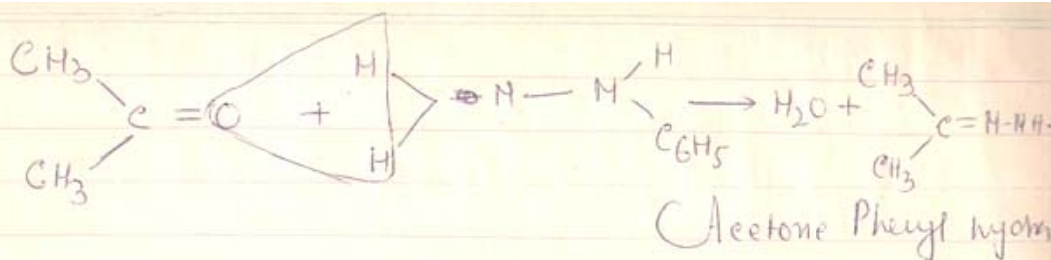
When acetone is mixed with hydrazine it forms Acetone hydrazone



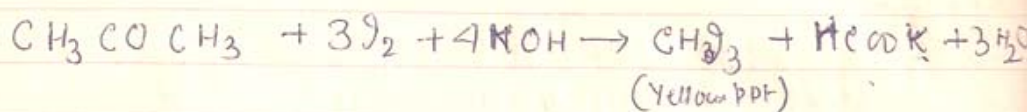
⑦ With Phenyl hydrazine $\rightarrow \text{C}_6\text{H}_5\text{NH} \cdot \text{NH}_2$



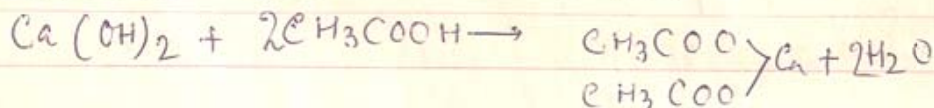
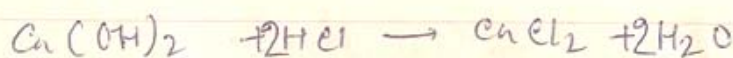
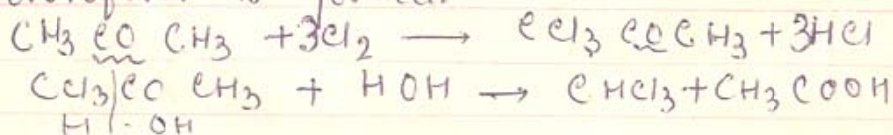
When it is treated with Phenyl hydrazine at ordinary temperature we get Acetone Phenyl hydrazone



⑧ With KOH and I₂ → On warming nearly 60°C acetone gives Iodoform.

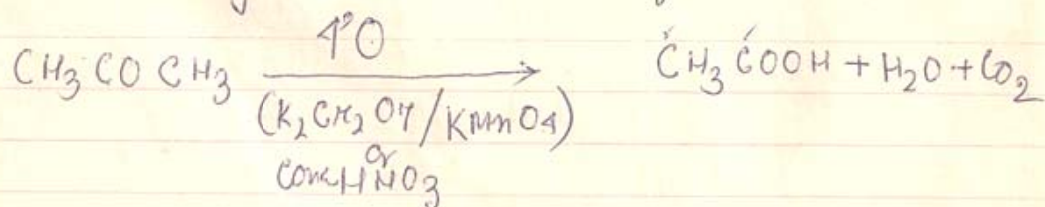


⑨ With paste of Bleaching powder → When a paste of bleaching powder is heated with acetone chloroform is formed.



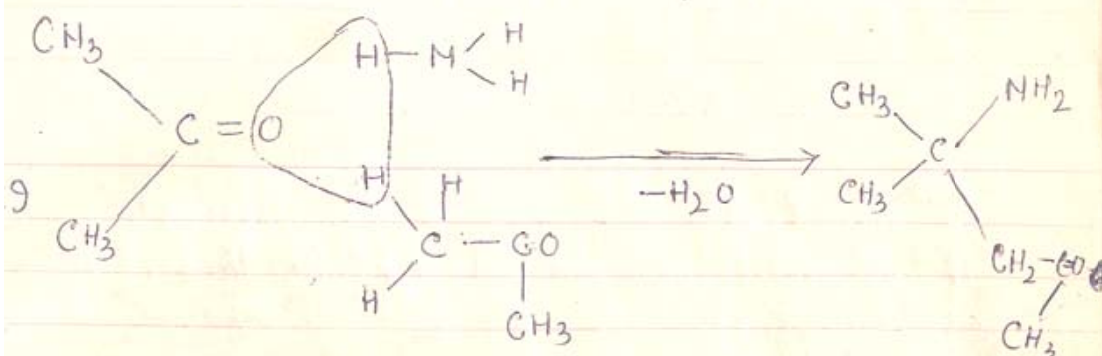
(10) Oxidation → F/C When aldehyde is oxidised we get acid having same number of Carbon Where as when ketone is oxidised we get acid having less no. of Carbon atom.

When acetone is oxidised by K₂Cr₂O₇ or KMnO₄ it gives acetic acid having less number of Carbon atom.

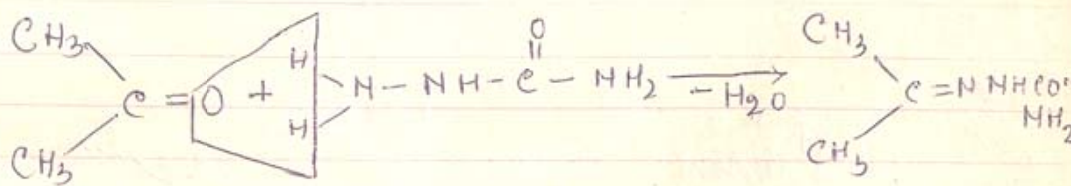




(ii) With Ammonia \rightarrow When Ammonia gas is bubbled through acetone we get a Condensation. (जिनिता) Compound called diacetone amine which is a complex type of compound

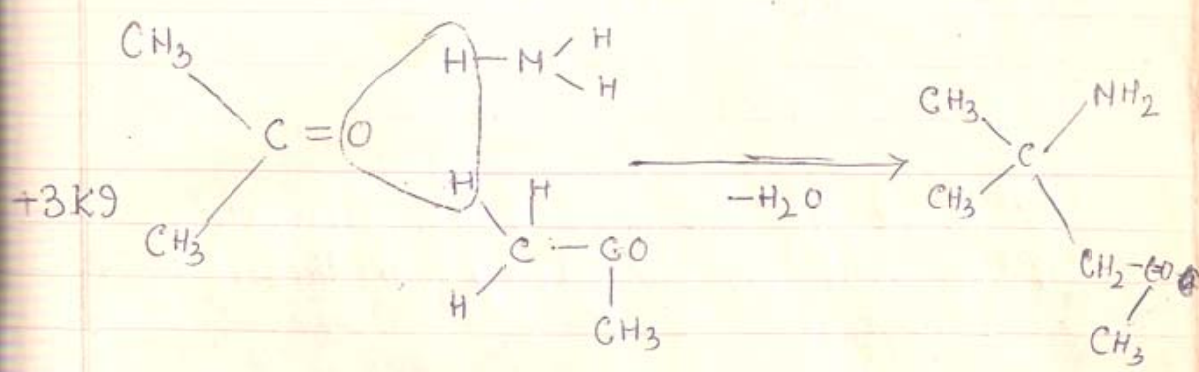


With Semi Carbazide \rightarrow When Acetone / Formaldehyde / Acetaldehyde is treated with Semi Carbazide we get respective Semi Carbazone

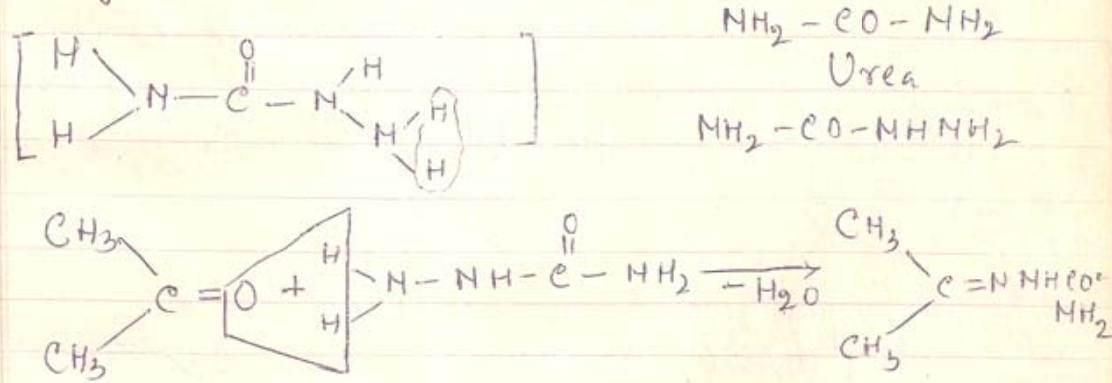




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 11 With Ammonia \rightarrow When Ammonia gas is bubbled through acetone we get a Condensation. (2:1 ratio) Compound called diacetone amine which is a complex type of compound



Hot in ISC
 With Semi Carbazide \rightarrow When Acetone / Formaldehyde / Acetaldehyde is treated with Semi Carbazide we get respective Semi Carbazone





Uses of Acetone

- (1) To prepare Iodoform, Chloroform etc.
- (2) To prepare artificial silk
- (3) Lab. reagent.
- (4) Since it absorbs much acetylene gas, it is used for preserving or transportation of C_2H_2 gas.