



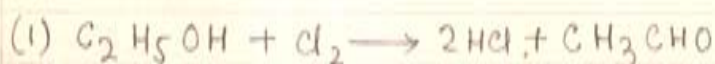
R.C.

Chloroform (CHCl_3) (Try ChloroMethane)

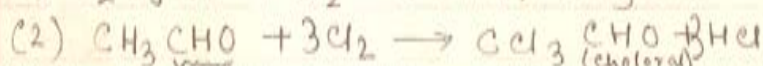
Qr. How is chloroform prepared in the laboratory in dry and pure form?

Ans Preparation

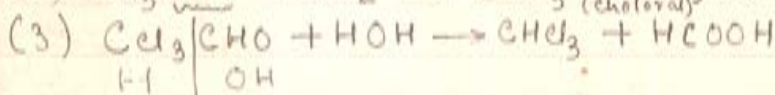
Theory \rightarrow When a paste of Bleaching powder is boiled with Ethanol we get chloroform. Bleaching powder supplies Cl_2 and Ca(OH)_2 in the reaction.



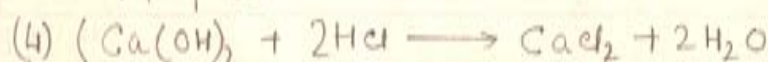
(1) Oxidation



(2) Chlorination

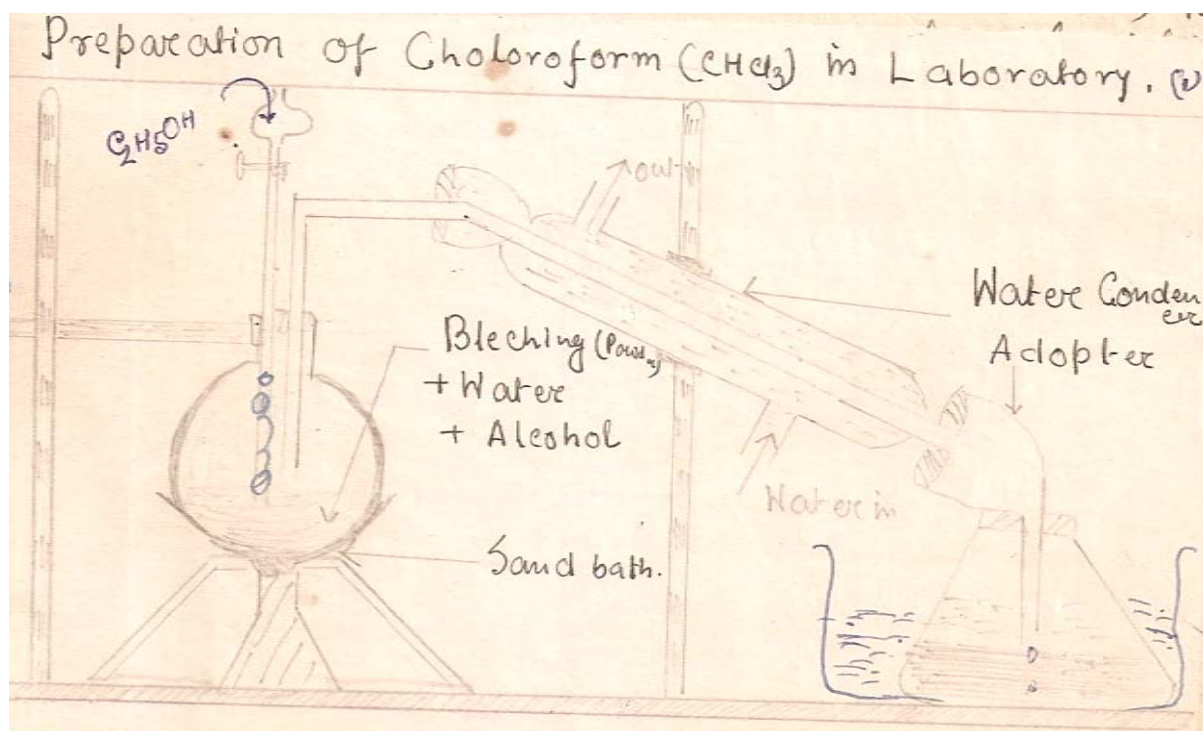


(3) Hydrolysis



(4) Ordinary reaction

Procedure \rightarrow In a round bottom flask about 100 gms of Bleaching powder is taken. It is mixed with about 200 cc of water with shaking to get thin paste. It is fitted with a dropping funnel through which about 25 cc of Ethanol is poured into the flask. The flask is fitted with a water condenser (Liebig condenser) as shown in the figure. On heating the mixture first slowly and then strongly, over sand bath. Vapour of chloroform thus formed, passes into the condenser and being cooled is collected in the receiver. The receiver is kept immersed in ice cooled water.





Precaution → Heating should be done first slowly and then strongly as foam is formed.

Purification → The content of the receiver is taken in a separating funnel. The oily layer of chloroform is separated. It is then washed with dilute solution of Na_2CO_3 to neutralized HCl impurity. It is then washed with distilled water in the same separating funnel to remove impurities.

To get 100% pure, this chloroform is re-distilled.

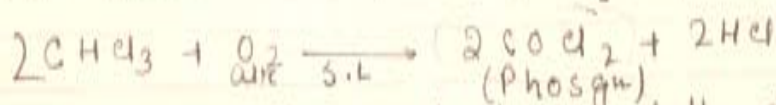


Discuss the properties of CHCl_3 and mention its uses.
Physical properties :-

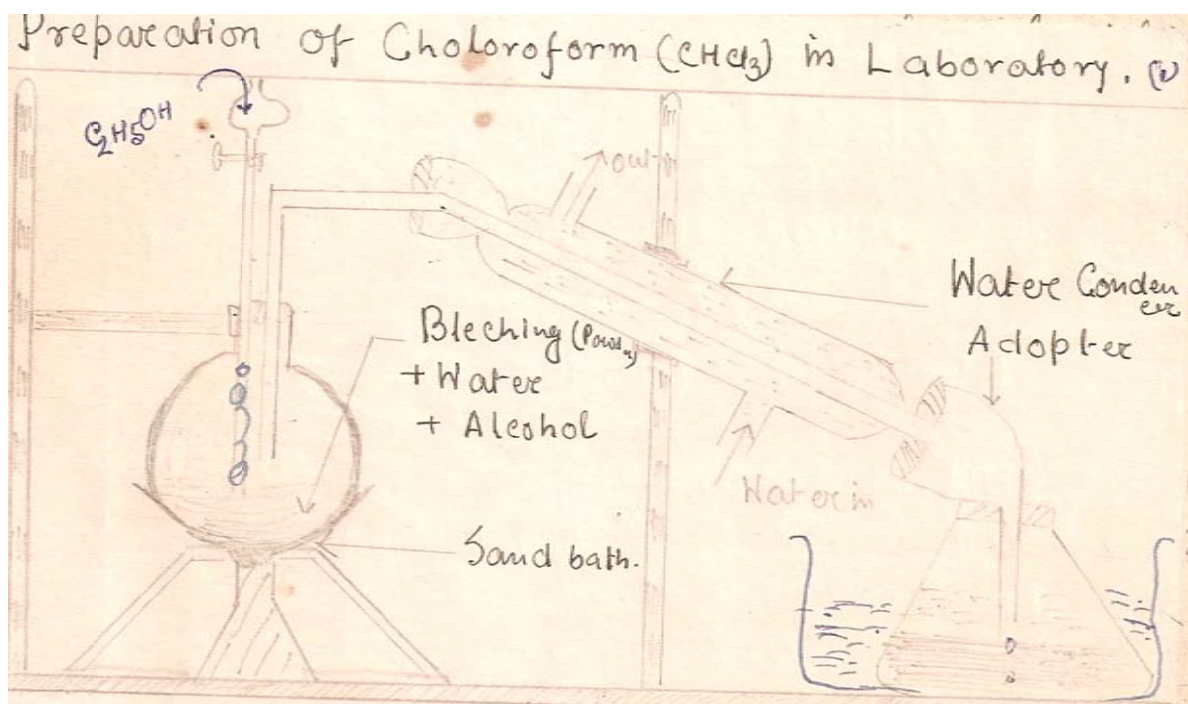
It is a colourless, mobile liquid, it has a sweet-smell and sweet-taste. It boils at 61°C , specific gravity 1.5, insoluble in water but soluble in ether and alcohol. It is a good solvent for fat, oil and resin. If its vapour is inhaled it causes unconscious temporarily (anaesthetic)
(Unconsciousness)

Chemical properties :-

Oxidation — When chloroform is exposed in air and sunlight it decomposes into an extremely poisonous substance called Phosgen / Carbonyl Chloride.



This is the reason why CHCl_3 is kept in the dark in

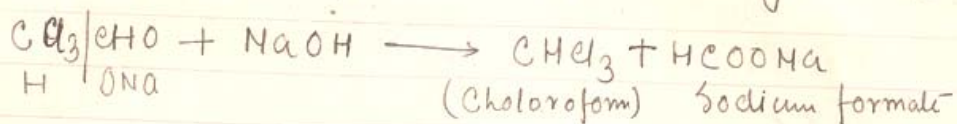




in the
 colourless bottle and absence of air.

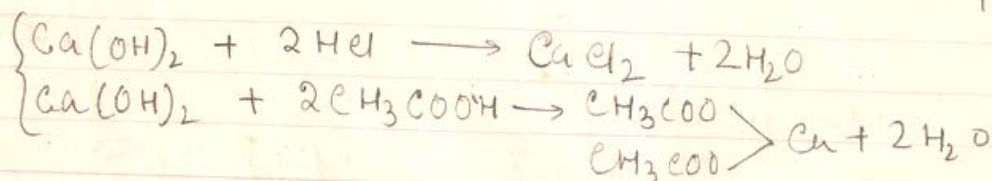
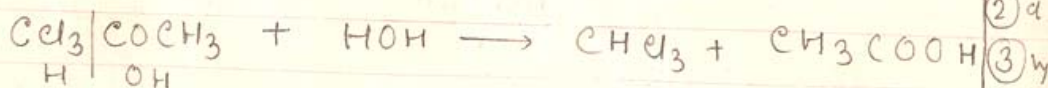
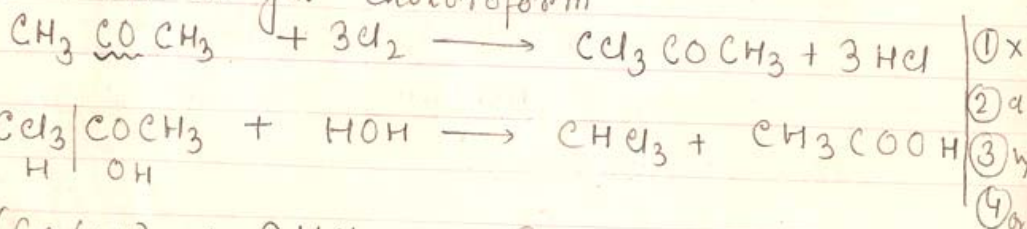
Other methods of preparation

(2) ^{W.H} When chloral is boiled with NaOH we get CHCl_3



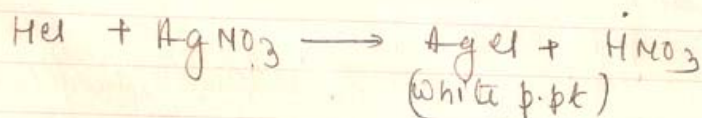
* ^{W.H} ^{comp}
 (3) ^{use}

When a paste of bleaching powder is boiled with Acetone we get chloroform



Qr. How the doctors test the purity of chloroform given to a patient.

Ans Pure chloroform does not give white ppt with AgNO_3 solution (as it is a covalent compound) but impure chloroform gives white ppt with AgNO_3 solution due to HCl formed.

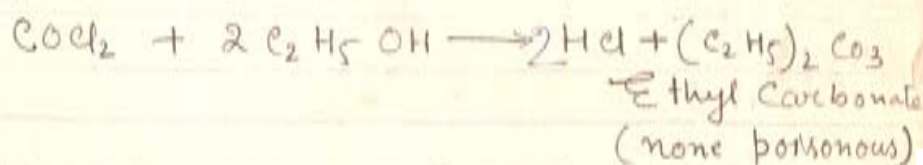




PRESERVATION OF CHOLOROFORM.

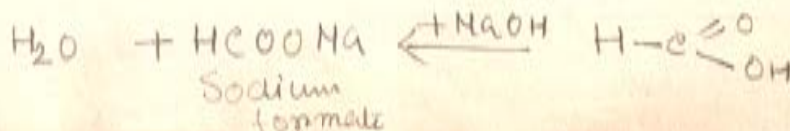
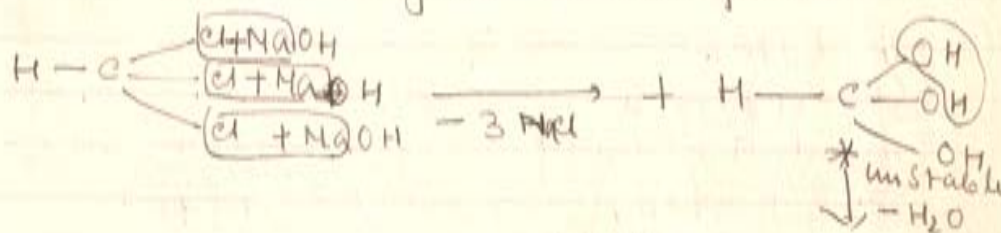
Choloroform is preserved in hospital or in the Laboratory by the following methods -

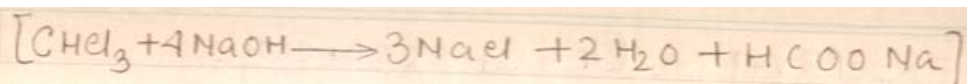
- (1) It is kept in brown or amber coloured bottle so that sunlight cannot pass inside it.
- (2) It is completely filled in the bottle, so that air should not be present inside it.
- (3) It is filled in small bottle but not in big bottles because once it is partly use, it is thrown.
- (4) It is kept in the dark and low temperature because sunlight acts as a catalyst during oxidation. The boiling point of CHCl_3 is 61°C .
- (5) It is mixed with nearly 1% of $\text{C}_2\text{H}_5\text{OH}$ to react with phosgin, if formed, to change into a none poisonous substance called Ethyl Carbonate.



CHEMICAL PROPERTIES

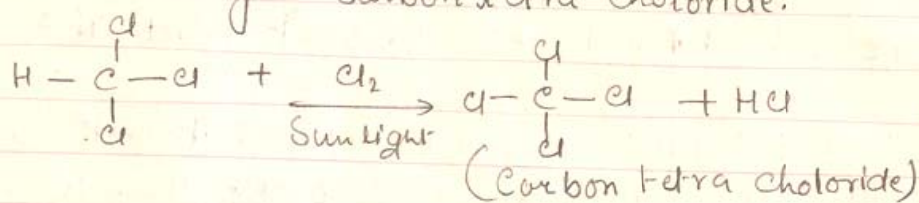
(2) With NaOH solution \rightarrow When CHCl_3 is boiled with NaOH solution it gives sodium formate





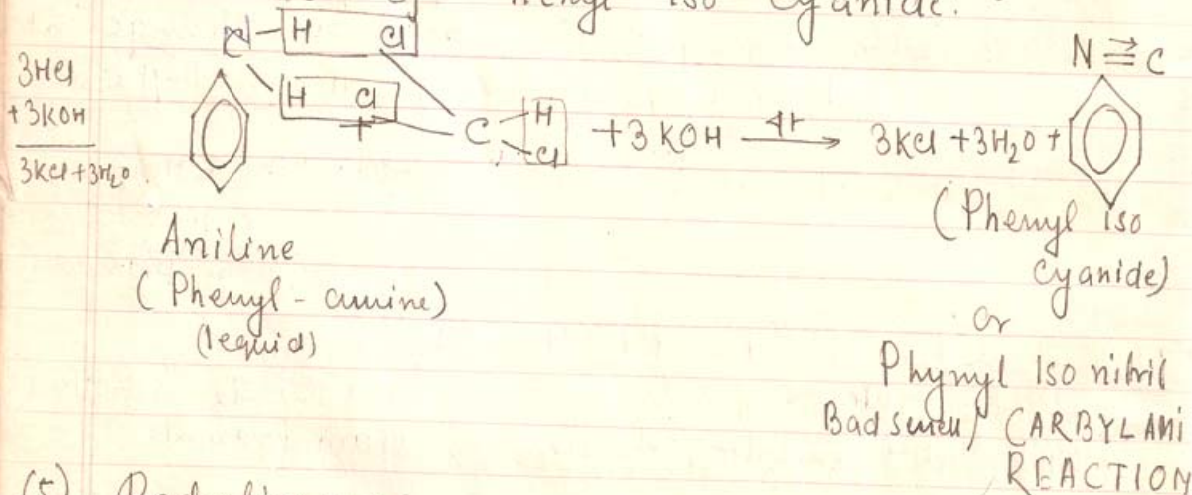
* Any Organic Compound having carbon atom linked with more than one -OH group is unstable. Water is removed from it automatically.

(3) With Cl_2 in S.L \rightarrow When CHCl_3 and Cl_2 gas mixture is kept in sunlight, due to substitution reaction we get Carbon tetra chloride.



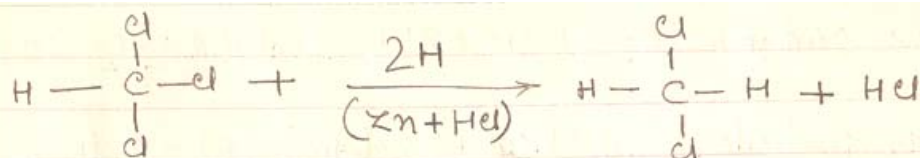
W.H

(4) With Aniline \rightarrow When a mixture of Aniline chloroform & KOH solution is heated we get bad smell of Phenyl iso cyanide.

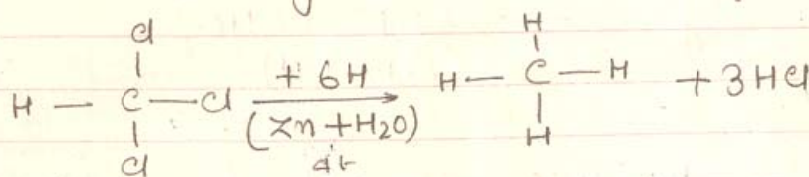


(5) Reduction \rightarrow

(a) Acid medium \rightarrow When CHCl_3 is treated with nascent H obtained from $\text{Zn} + \text{HCl}$, due to reduction we get Methyl chloride / ^{chloro}Di methane.

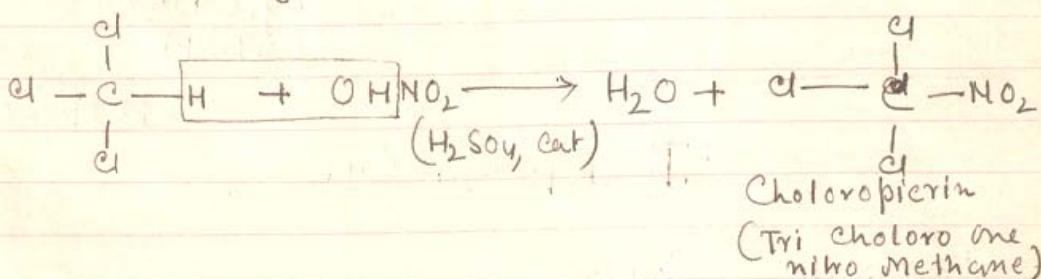


(b) In neutral medium \rightarrow When CHCl_3 is boiled with Zinc powder and water present H thus formed reacts with CHCl_3 to give Methane.



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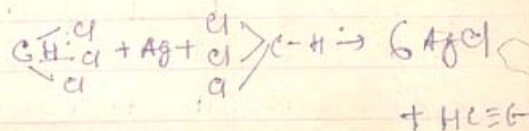
(6) With con. $\text{HNO}_3 \rightarrow$ When CHCl_3 is heated with con. HNO_3 in the presence of few dropps of con. H_2SO_4 (catalyst) we get Chloroform which is used in tear gas.



Uses of CHCl_3

- (1) It is used in hospital as anaesthetic.
- (2) In the laboratory it is used (in zoology) as a reagent.
- (3) It is a solvent for fat, oil and resins, to prepare tear gas.

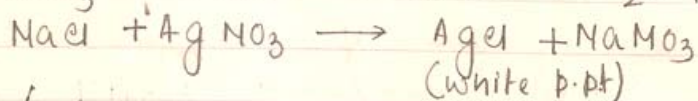
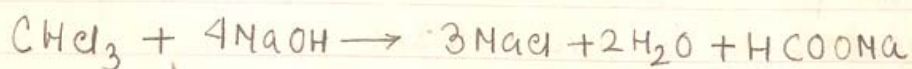
11/12/17
Sol. in water
Silver powder
HNO₃





Comp How can you prove that CHCl_3 contains Cl atoms

CHCl_3 is boiled with NaOH solution this is then added with HNO_3 & AgNO_3 solution to get white p.p.t of AgCl



Hot [HNO_3 was added to neutralized excess of NaOH added]

