

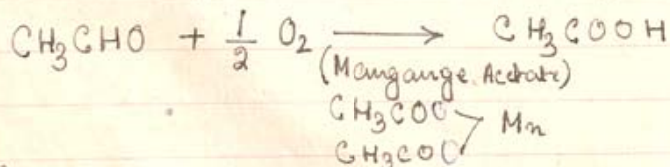
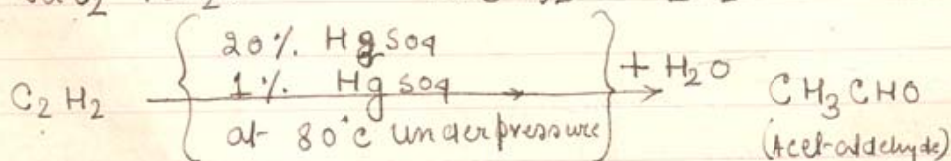


## Acetic acid $\text{CH}_3\text{COOH}$ .

How is acetic acid prepared (1) from Calcium Carbide  
(2) by quick-vinegar process.  
(3) from pyroligneous acid.  
any two. discuss its properties and mention  
the uses.

Preparation of Acetic acid :-

(1) From Calcium Carbide  $\rightarrow$  When  $\text{CaC}_2$  is treated with water at room temperature we get Acetylene gas. This gas is bubbled through 20%  $\text{H}_2\text{SO}_4$ , 1%  $\text{HgSO}_4$  at  $80^\circ\text{C}$  under pressure, due to hydrolysis Acetaldehyde is formed which on Oxidation gives Acetic acid.

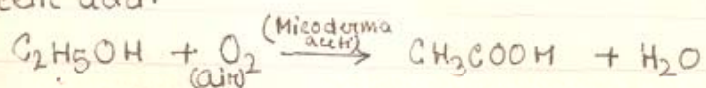


In this method the product is about 97% and this is a cheap method and U.S.A about 75% of Acetic acid required is manufacture from  $\text{CaC}_2$ .



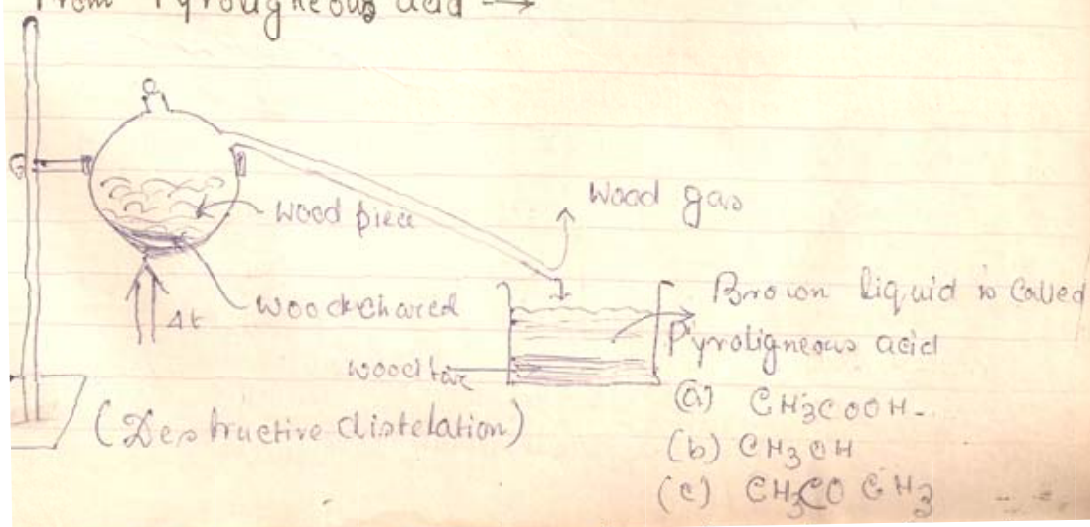
By quick vinegar process  $\rightarrow$  (By the fermentation of Alcohol)

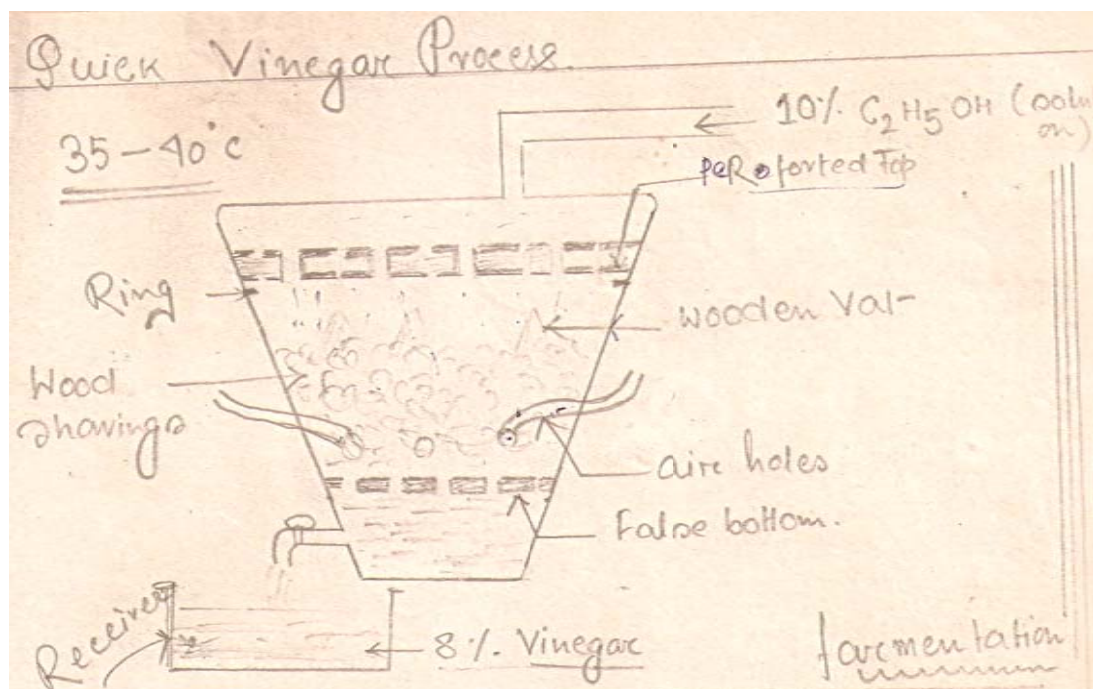
Theory  $\rightarrow$  When Ethyl alcohol is oxidized by air in the presence of Bacteria called *Mycoderma aceti*, we get Acetic acid.



Procedure  $\rightarrow$  In a large wooden vessel, similar to a bucket is fitted with two false bottom that is plank of wood having holes as shown in the figure. Between the two planks of wood sufficient quantity of wood shavings are packed. There are a few air holes near the bottom for incoming of atmospheric air. The wood shavings are moistened with old vinegar containing bacteria. 10% dilute alcohol is poured at the top of the vessel. Drops of Ethyl alcohol comes in contact with wood shavings where bacteria is present due to the above reaction Acetic acid is formed which comes to the bottom through the false bottom and is tapped out. The yield is about 8% of Acetic acid and is known as Vinegar.

From Pyroligneous acid  $\rightarrow$







When wood pieces are subjected to destructive distillation that is in the absence of air we get the following products.

- (1) Wood gas  $\rightarrow$  used for burning purpose.
- (2) Wood tar  $\rightarrow$  A black liquid used in industry.
- (3) Pyroligneous acid  $\rightarrow$  Which is obtained as a distillate brown in colour just above wood tar in the receiver.
- (4) Wood Charcoal - used in industry.

This Pyroligneous acid contains

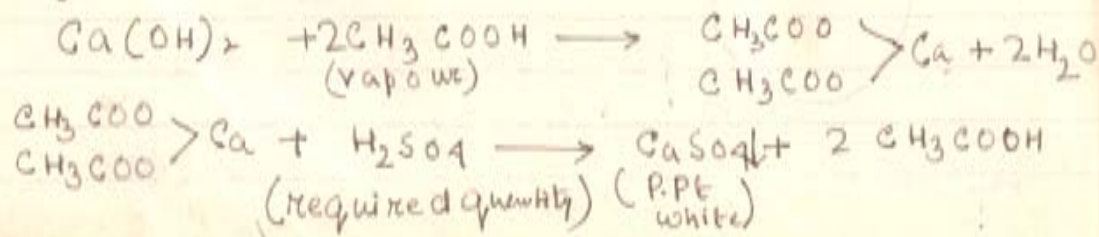
- (a) Acetic acid
- (b) ~~Ethyl~~ <sup>methyl</sup> alcohol
- (c) Aceton

In varying quantities.

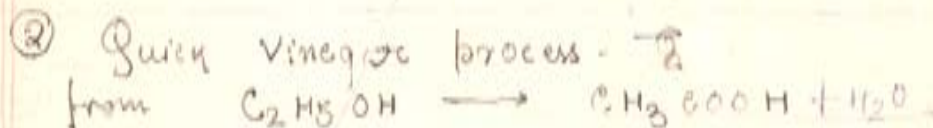
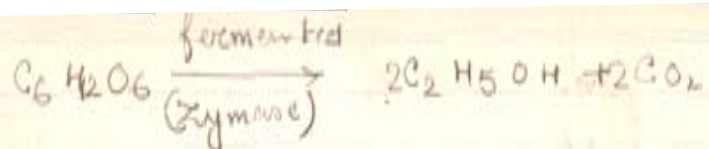
Preparation of Acetic acid  $\rightarrow$  Pyroligneous acid is heated to get the vapour of 3 substances. The vapour mixture is passed through  $\text{Ca(OH)}_2$  solution where only Acetic acid vapour is absorbed giving white ppt of Calcium Acetate which are filtered out.

The unreacted vapour mixture is condensed by passing through water condenser to get  $\text{CH}_3\text{OH}$  &  $\text{CH}_3\text{COCH}_3$ .  
(b.p.  $65^\circ\text{C}$ ) (b.p.  $56^\circ\text{C}$ )

They are separated by fractional distillation. The Calcium Acetate ppt is treated with  $\text{H}_2\text{SO}_4$  to get Acetic acid.



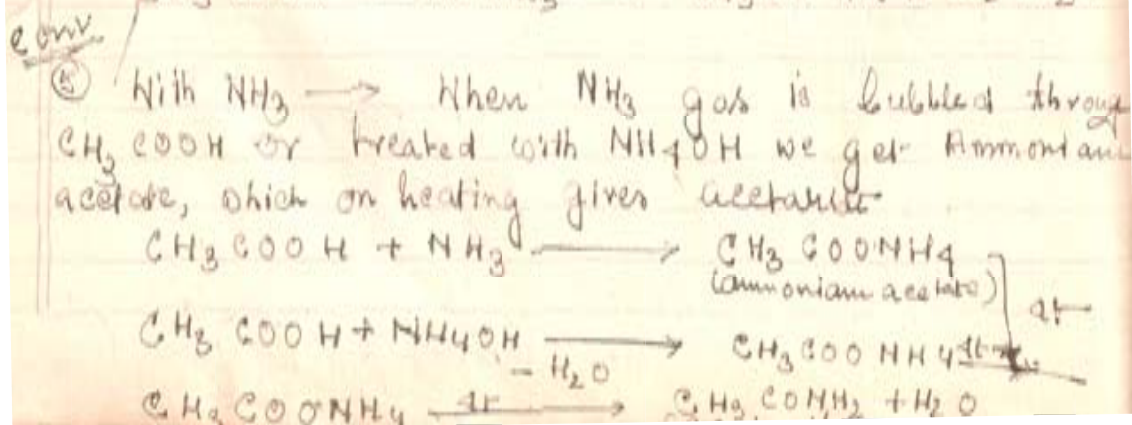
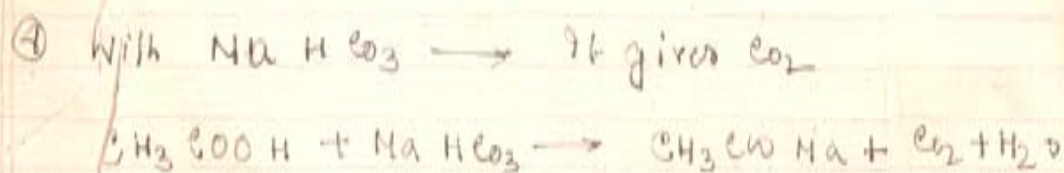
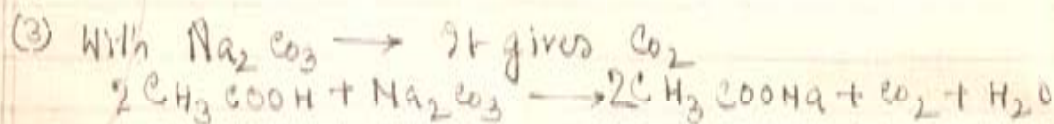
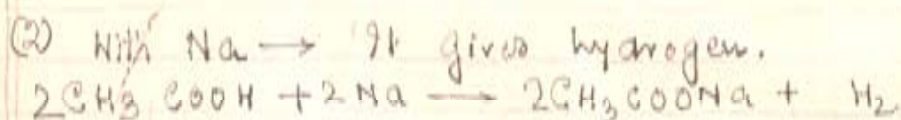
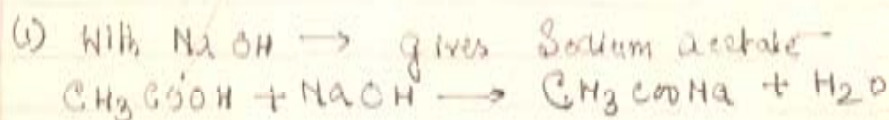




### Physical properties

It is a colourless liquid, highly soluble in water, non poisonous, low in taste. It can dissolve Iodine and Sulphur, b.p =  $118^\circ C$  freezing point  $18^\circ C$

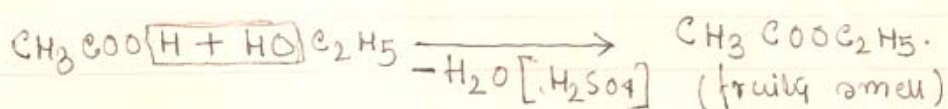
### Chemical properties





N.H

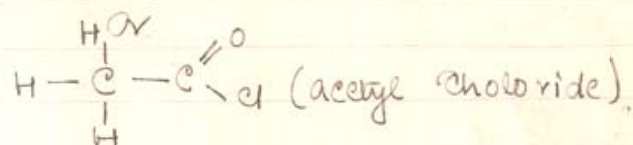
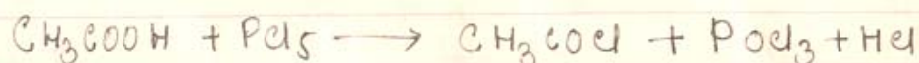
- ⑥ With  $C_2H_5OH \rightarrow$  When a mixture of acetic acid and  $C_2H_5OH$  is heated with one or two drops of con.  $H_2SO_4$  (catalyst) we get very good ester / fruity smell of ester, Ethyl acetate.



N.B Test of acetic acid.

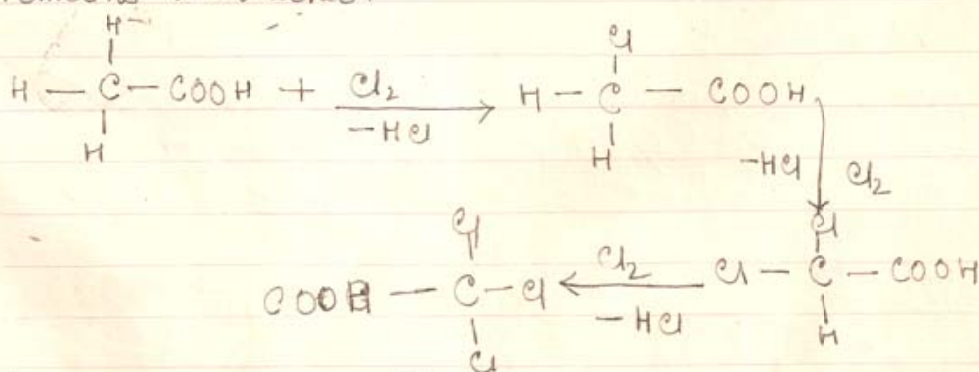
Conv

- ⑦ With  $PCl_5 \rightarrow$  When acetic acid is added with  $PCl_5$  (solid) we get acetyl chloride.

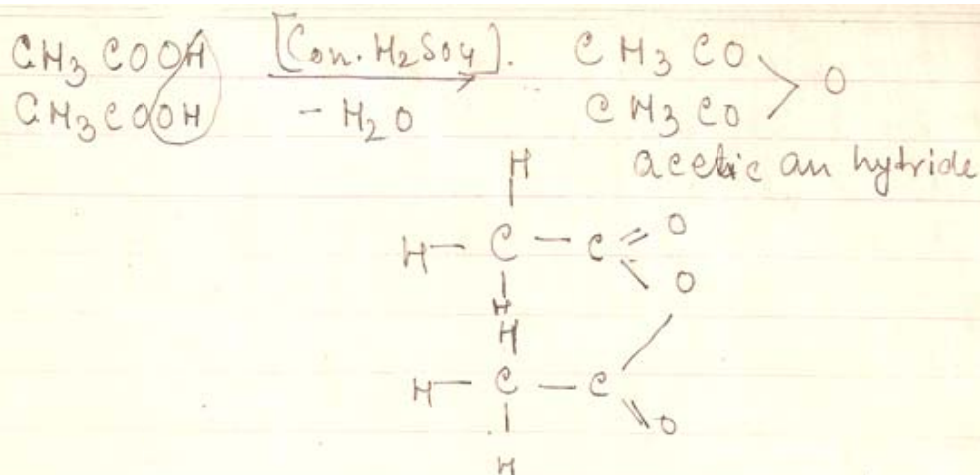


N.H

- ⑧ With  $Cl_2 \rightarrow$  When  $Cl_2$  gas is bubbled through con.  $CH_3COOH$ , we get gradually mono chloro acetic acid, dichloroacetic acid and trichloroacetic acid. Due to substitution at  $\alpha$ -carbon atom. Carboxylic group remains untouched.



- ⑨ With con.  $H_2SO_4 \rightarrow$  When it is heated with con.  $H_2SO_4$  we get acetic anhydride / derivative of acetic acid.

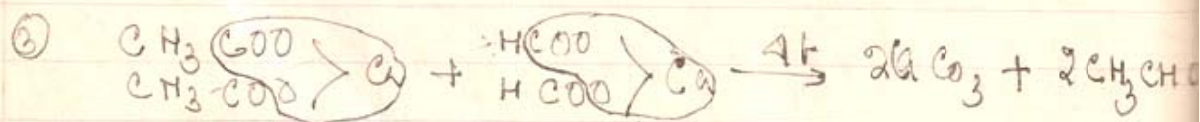
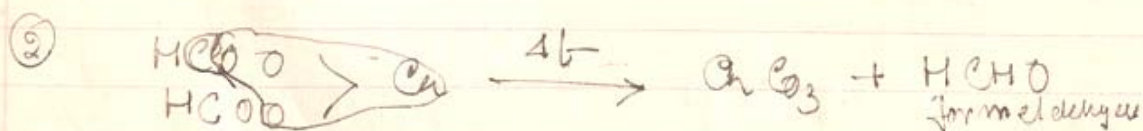
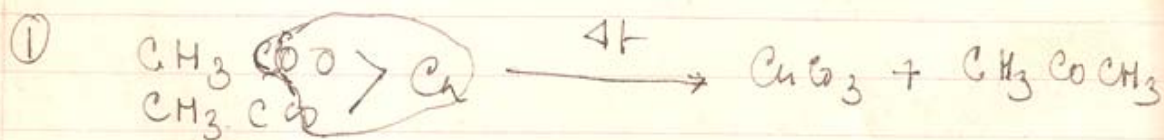


### Uses of Acetic acid

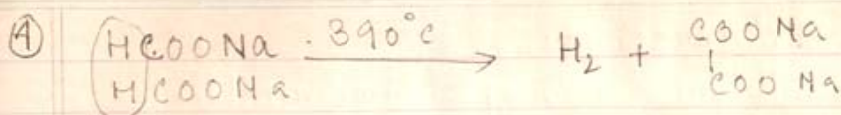
- (1) For preserving pickles, soups, etc.
- (2) To prepare Acetic anhydride, acetamide etc.
- (3) In rubber industry, paper industry and in dye industry, it is highly used.

### Action of heat

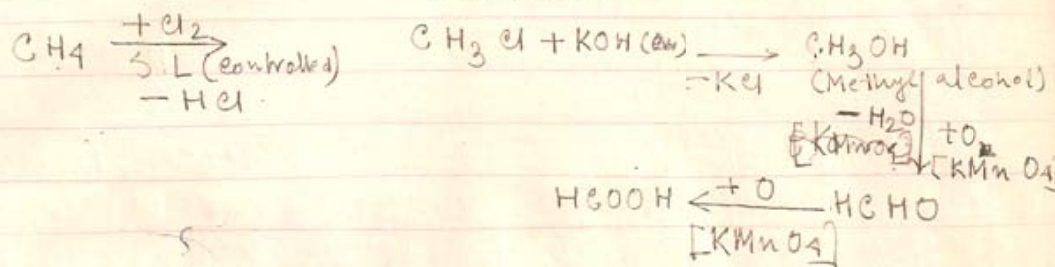
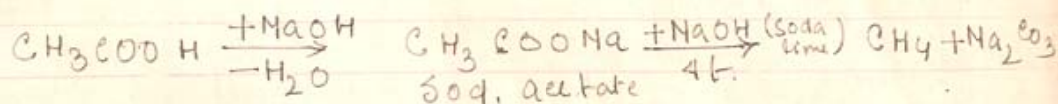
- (1) Calcium acetate.
- (2) Calcium formate.
- (3) Mixture of Calcium acetate + Calcium formate.
- (4) Sodium formate.







① Conv Acetic acid to Formic acid.



✓ Formic acid to Acetic acid

