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Chemical Property

(1) Effect of temp. on β-hydroxy Carboxylic acid

When β-hydroxy Carboxylic Acids are heated then different products are obtained.

By β-hydroxy Carboxylic acids - unsaturated Carboxylic acids whereas γ and δ Carboxyl acid give lactone.

$$CH_3-\underset{(OH}{\overset{\beta}{CH}}-\underset{H)}{\overset{\alpha}{CH}}-COOH \xrightarrow[-H_2O]{\Delta} CH_3-CH=CH-COOH$$

[β-hydroxy Carboxylic acid] — Crotonic acid

$$CH_2-CH_2-CH \xrightarrow[-H_2O]{\Delta} CH_2-CH_2-CH_2$$
$$OH \quad H-C=O \qquad\qquad O-C=O$$

δ-lactone

(2) Reduction →

$$CH_3-\underset{OH}{\overset{H}{C}}-COOH + 2HI \longrightarrow CH_3-CH_2-COOH + H_2O + I_2$$

(3) Reacn with dil H_2SO_4 →

$$CH_3-\underset{OH}{\overset{H}{C}}-COOH \xrightarrow[\Delta]{dil\ H_2SO_4} CH_3-\underset{O}{\overset{H}{C}} + HCOOH$$

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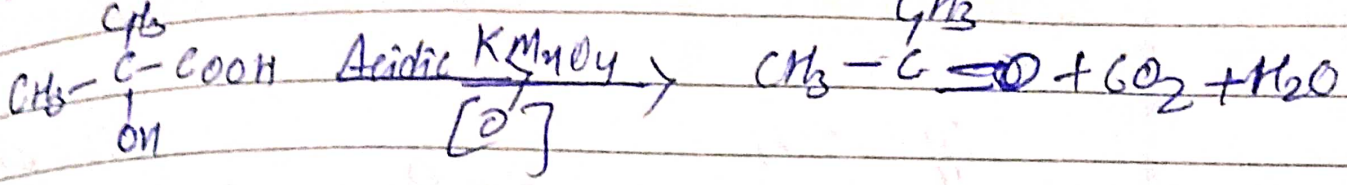
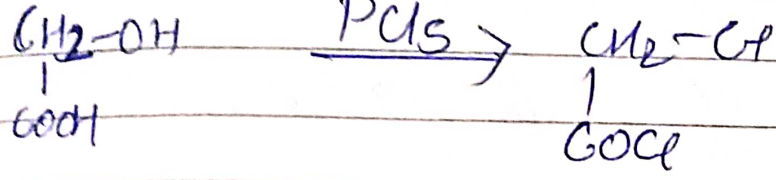
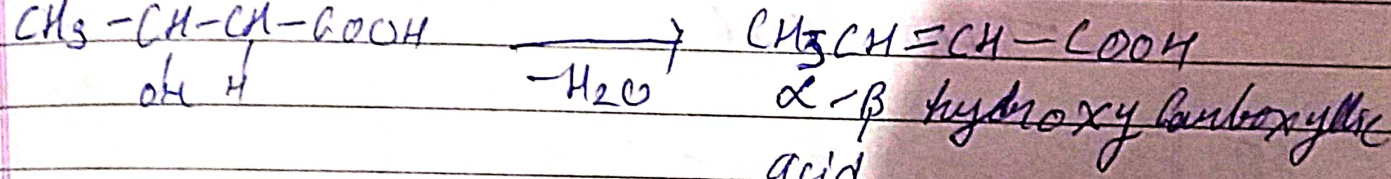
(A) Oxidation →



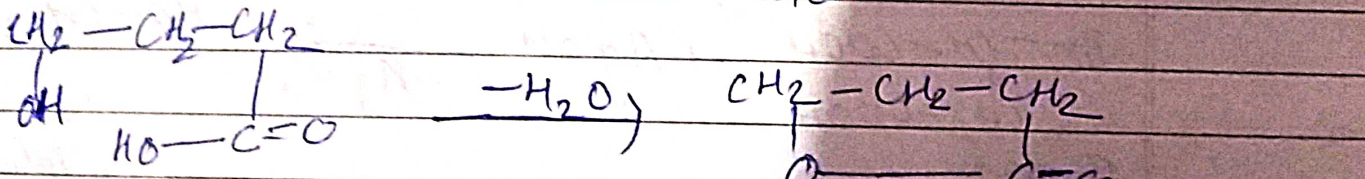
(B) By PCl_5



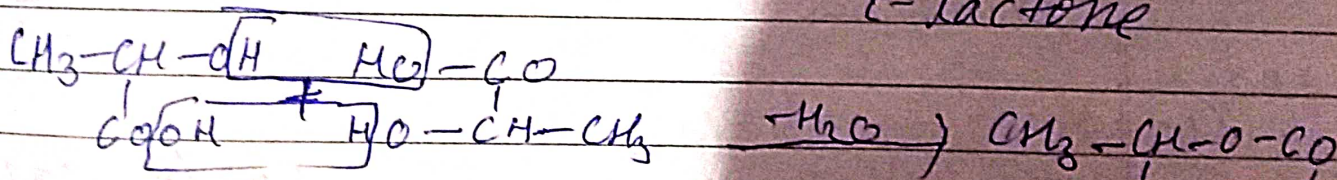
Effect of temp on α-hydroxy carboxylic acid



α-β hydroxy carboxylic acid



γ-lactone



α-hydroxy carboxylic acid

Lactide

Monohydroxy dicarboxylic acid

Malic acid

2 hydroxy Buta 1,4 dioic acid

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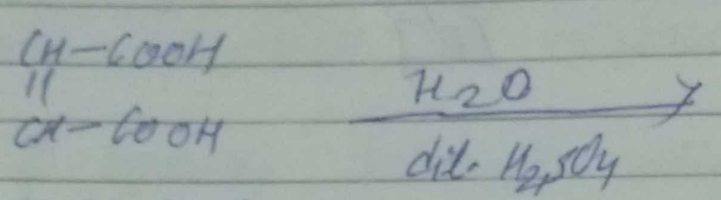
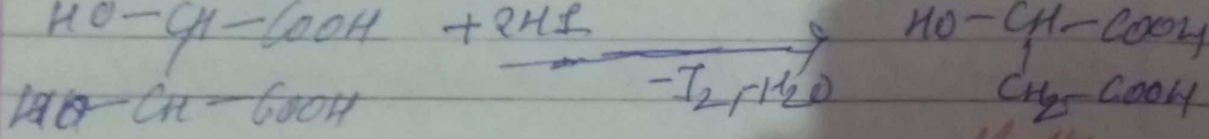
Method of Preparation

(1) Preparation of Malic acid from maleic acid



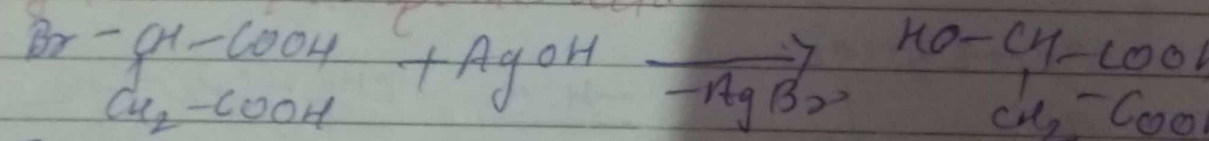
Maleic acid — Malic acid

(2) Preparation of Malic acid from Tartaric acid



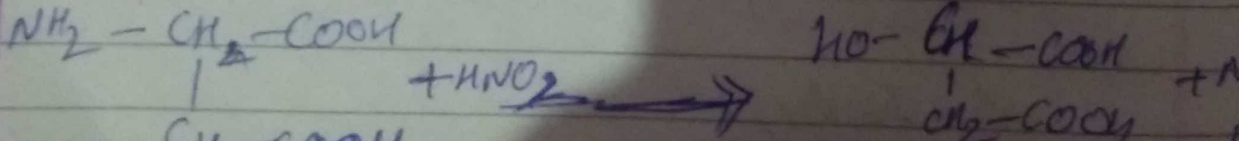
Tartaric acid — Malic acid

(3) By Bromo Succesanic acid



Bromo Succesanic — Malic acid

(4) By Aspartic acid

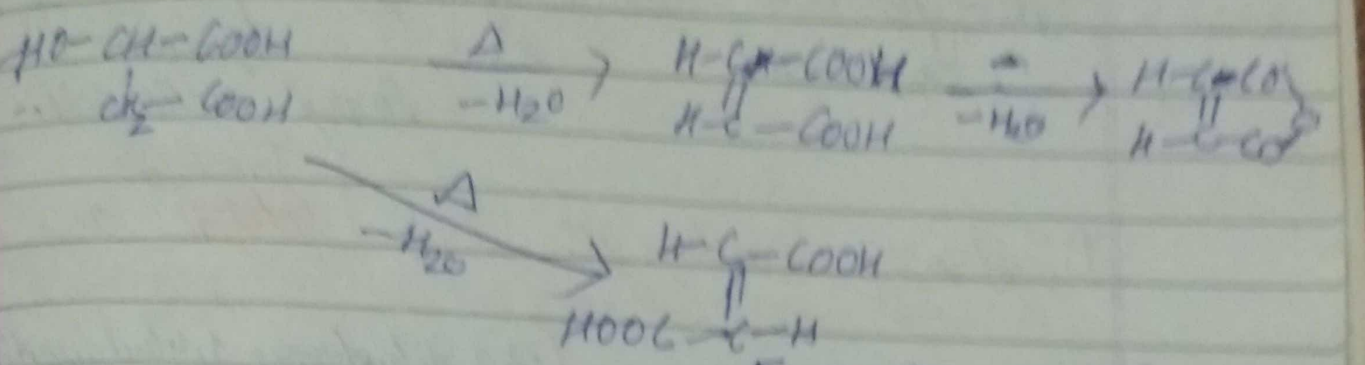


Aspartic acid — Malic acid

Chemical Properties of Malic acid

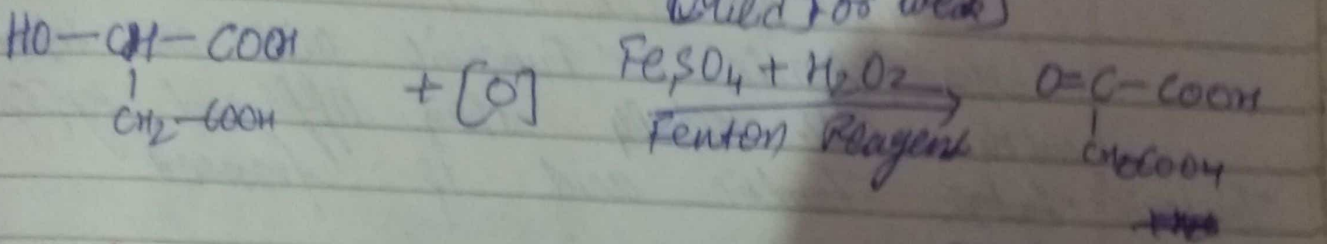
(c) Temp? Effect

When Malic acid is heated the mixture of maleic & fumaric acid is obtained.

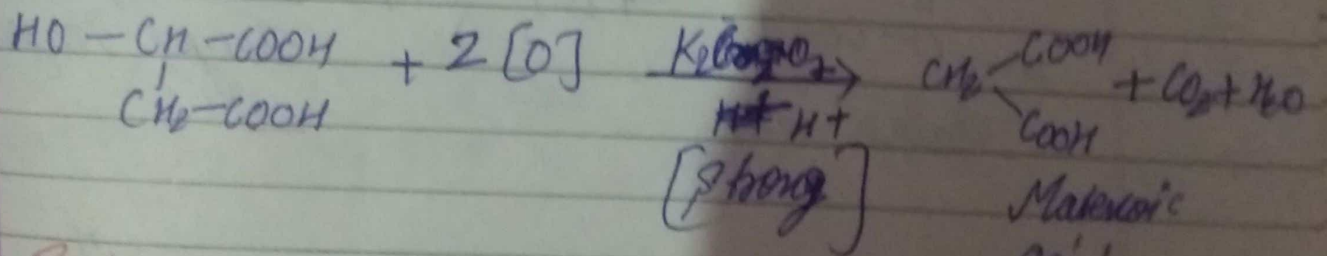


② Oxidation of Malic acid

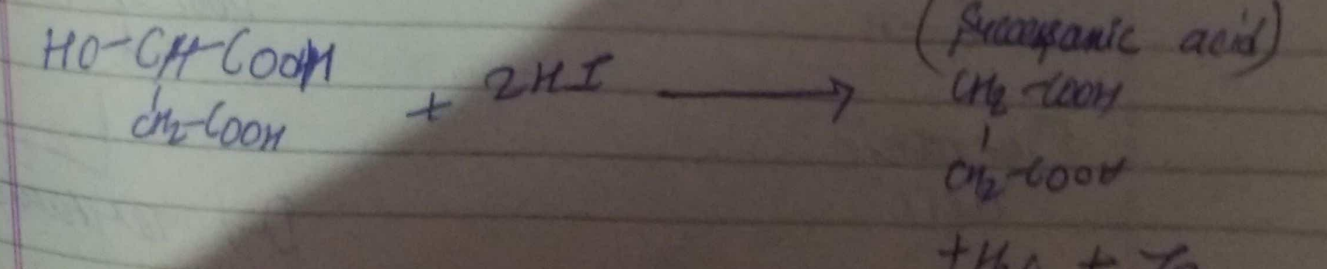
① By Fenton Reagent



② By $K_2Cr_2O_7$



③ Reduction



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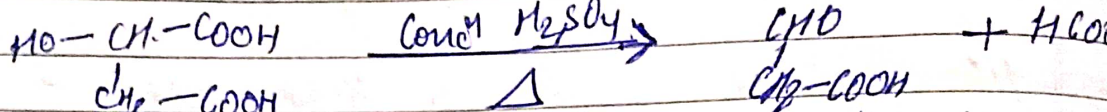
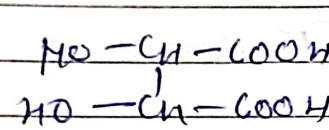
(4) Effect of Conc^{n} H_2SO_4 [Dissociation]



Dihydroxy dicarboxylic acid [Tartaric acid]

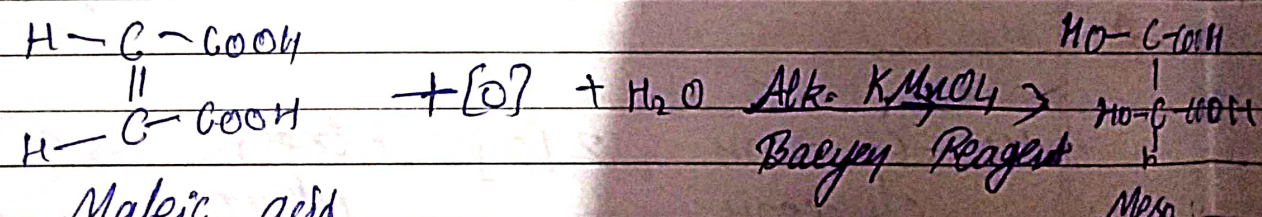


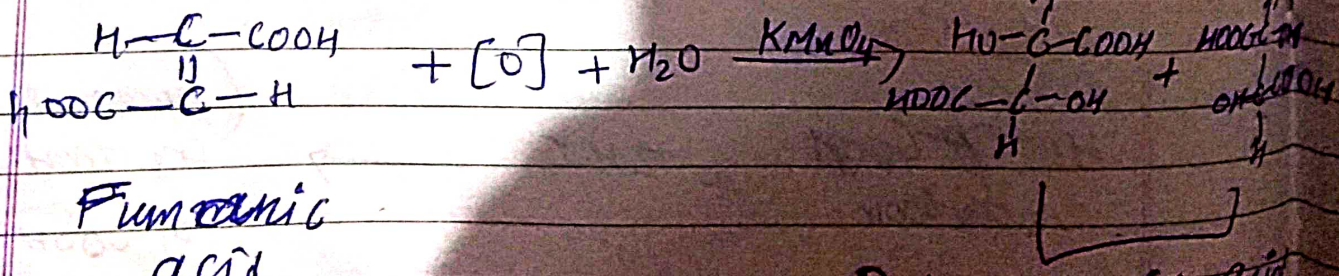
[2,3 dihydroxy-1,4 butanedioic acid]

Method of Preparation

(1) By Maleic & Fumaric acid

When Maleic or Fumaric acid are treated with Alk. $KMnO_4$ then different types of Tartaric Tartaric acid is formed





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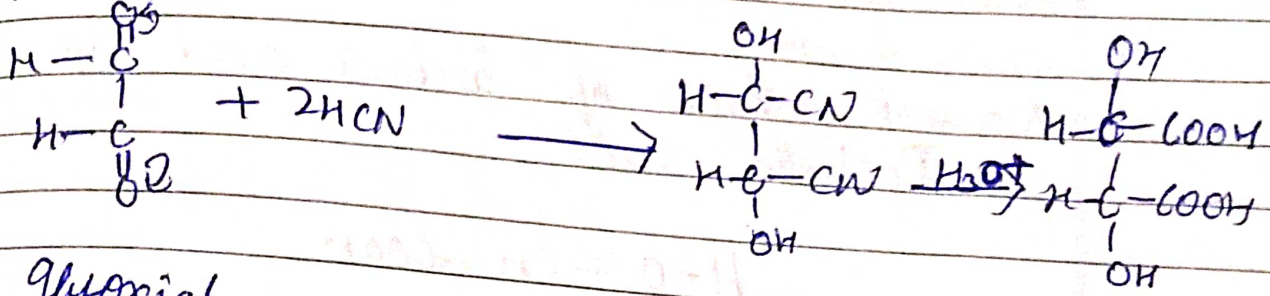
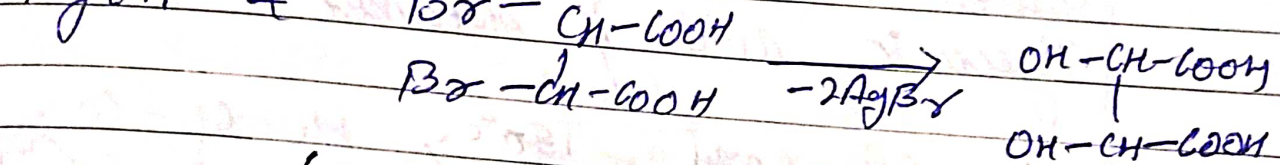
(2) By Glyoxial



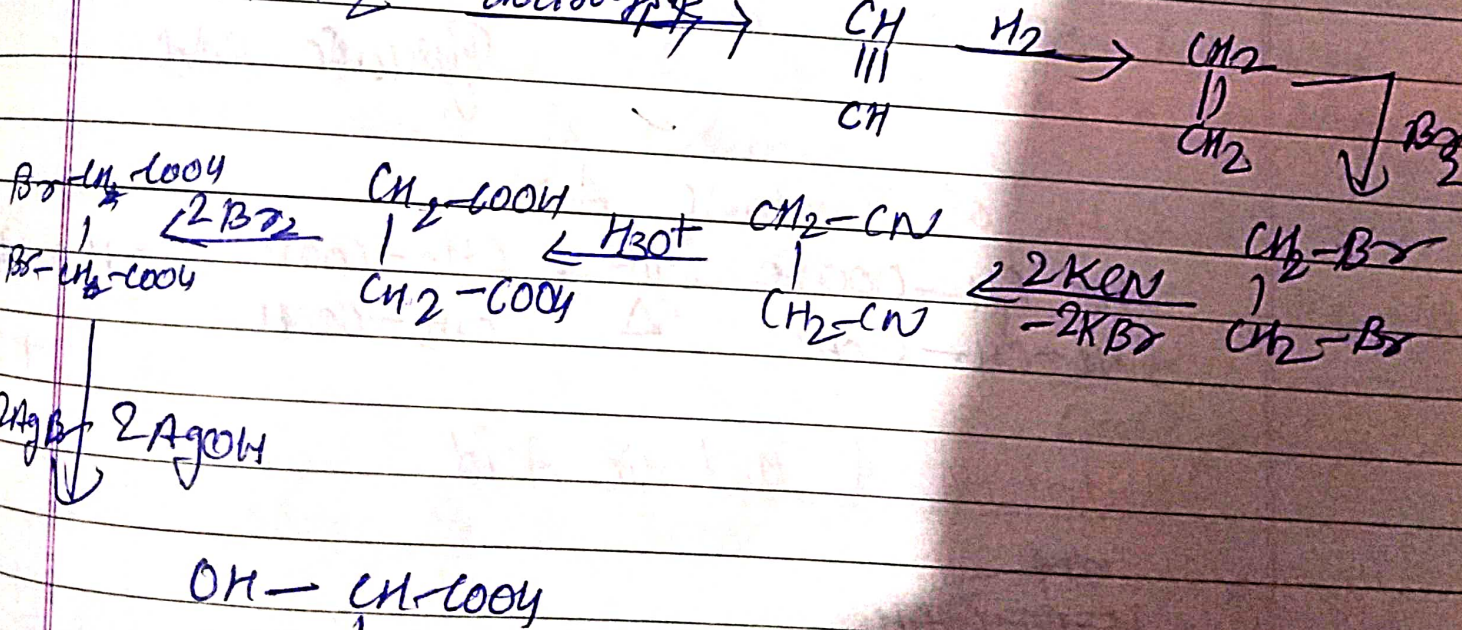
glyoxial

(3) ~~Synthesis~~ By α α dibromosuccesanic acid



(α-α dibromosuccesanic acid)

Synthesis of Tartaric acid



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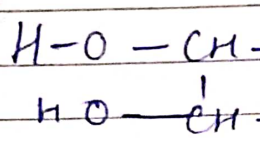
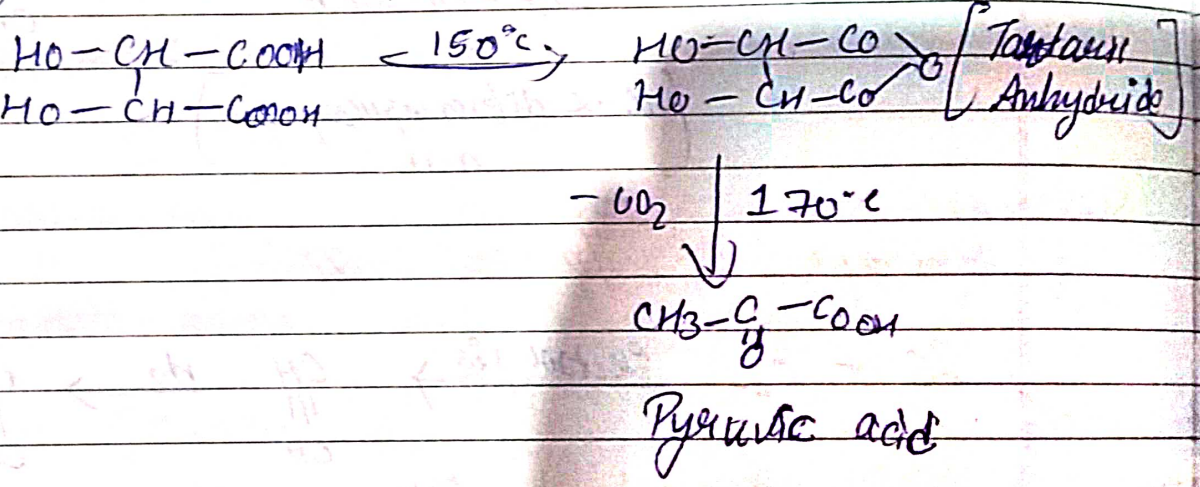
Chemical Properties of Tartaric Acid

Na - K Salt of Tartaric acid is known as Rochelle salt

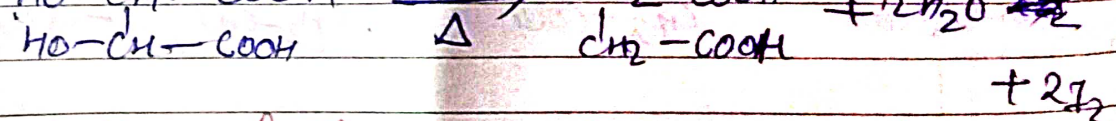


(1) Temp° Effect

When it is heated upto 170°C temp° then Pyruvic acid is obtained

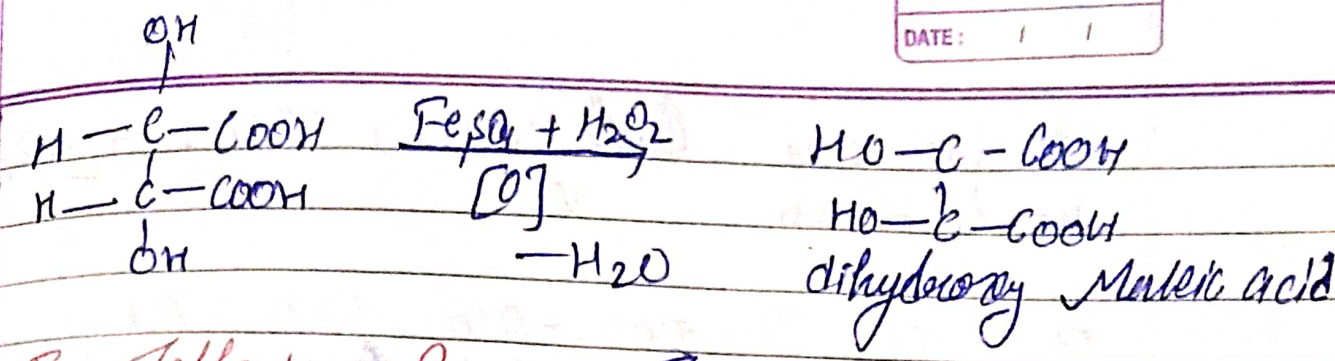


(2) Reduction of Tartaric Acid

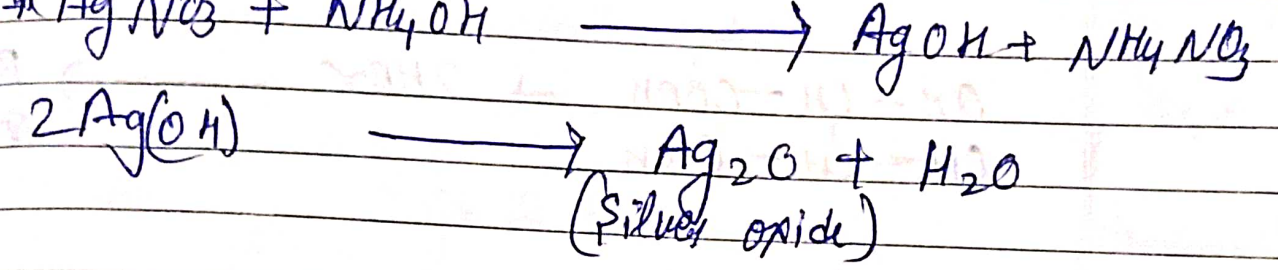


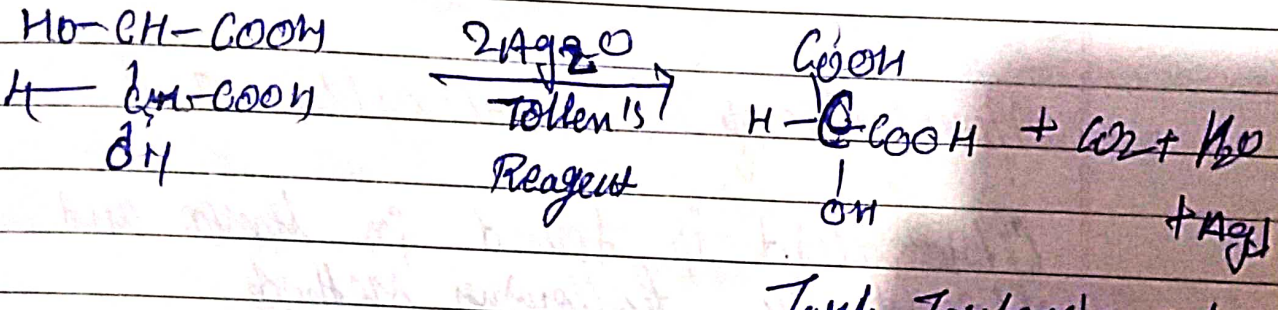
(3) Oxidation of Tartaric Acid

(a) By Fenton Reagent



(b) By Tollen's Reagent [

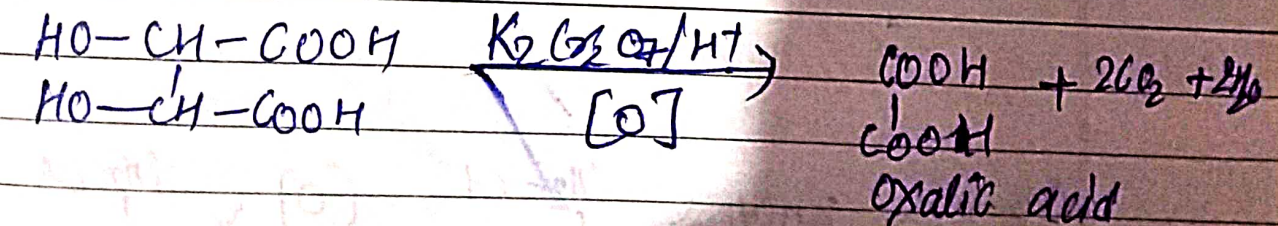




Tartonic acid

(c) By strong oxidising Agent

When tartaric acid is oxidised by strong oxidising agent like acidic $K_2Cr_2O_7$ then oxalic acid is obtained



(4) Dissociation of Tartaric acid

When Tartaric acid is heated with Conc^n H_2SO_4 then Tartaric acid is dissociate

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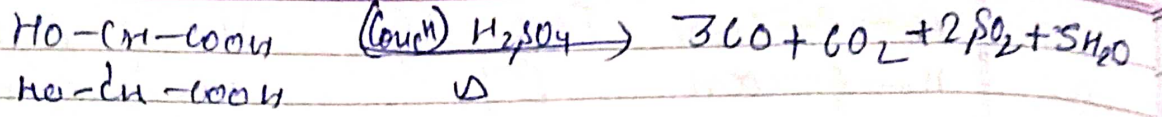
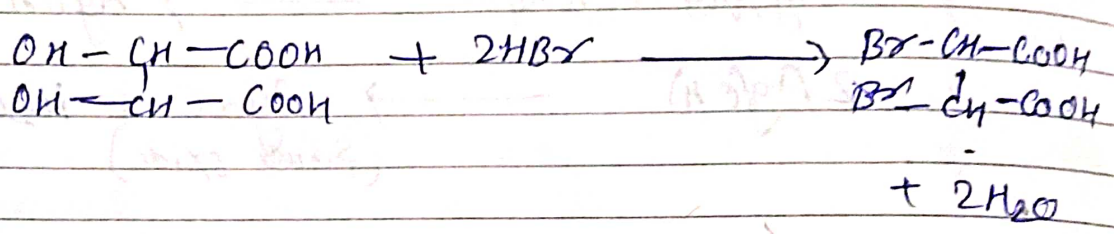


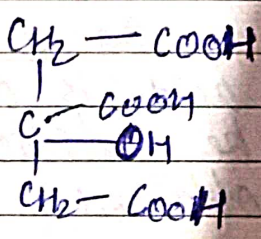
(5) Reaction of Tartaric acid with HBr

When Tartaric acid is ~~heated~~ heated with HBr then α, α di Bromo Succesanic acid is obtained.

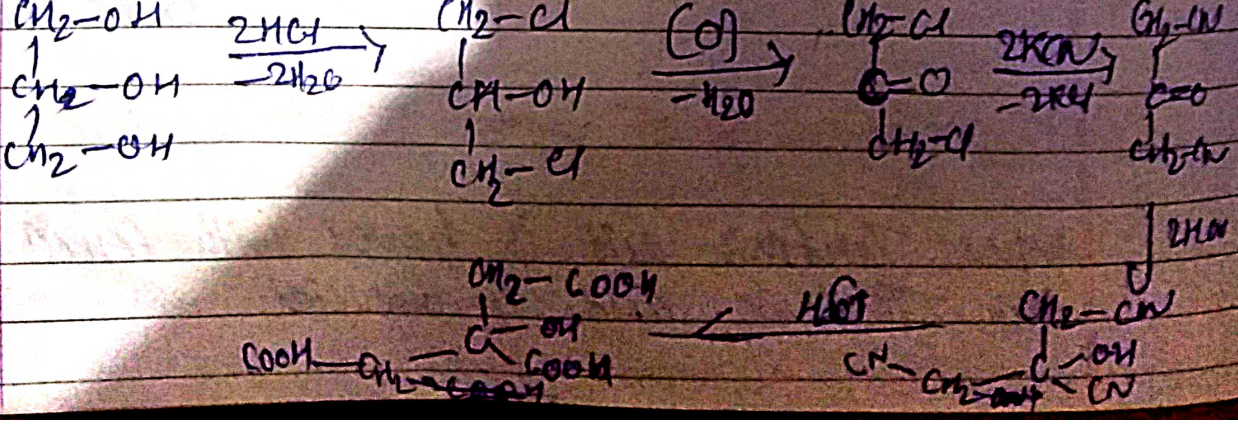


Monohydroxy tri Carboxylic acid [Citric Acid]

Citric acid is found in lemon and it can be obtained by following Methods



(1) By Glycerol



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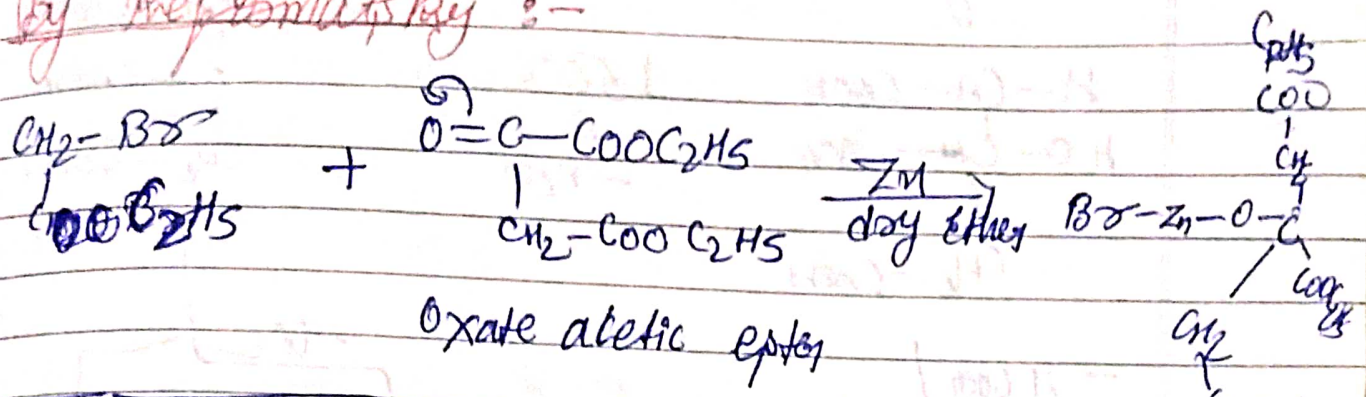
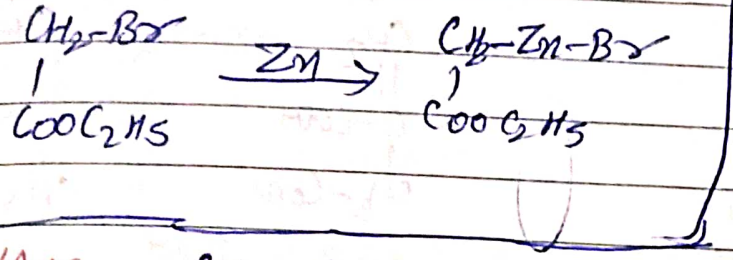
2) By Reformatsky :-



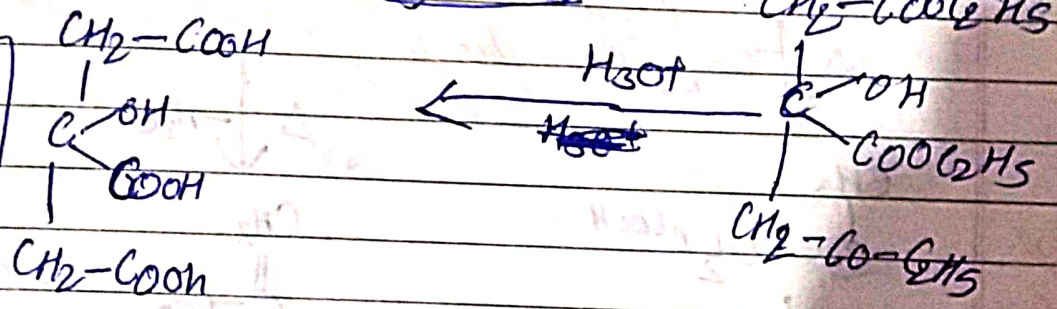
Oxate acetic ester

Mechanism



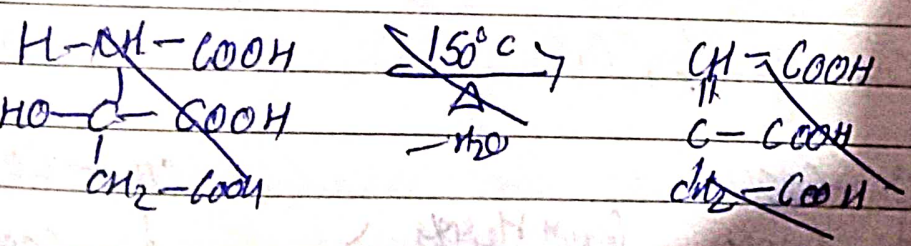
IUPAC NAME

3-Carboxylic
3-Hydroxy
pent-1,5-dioic
acid



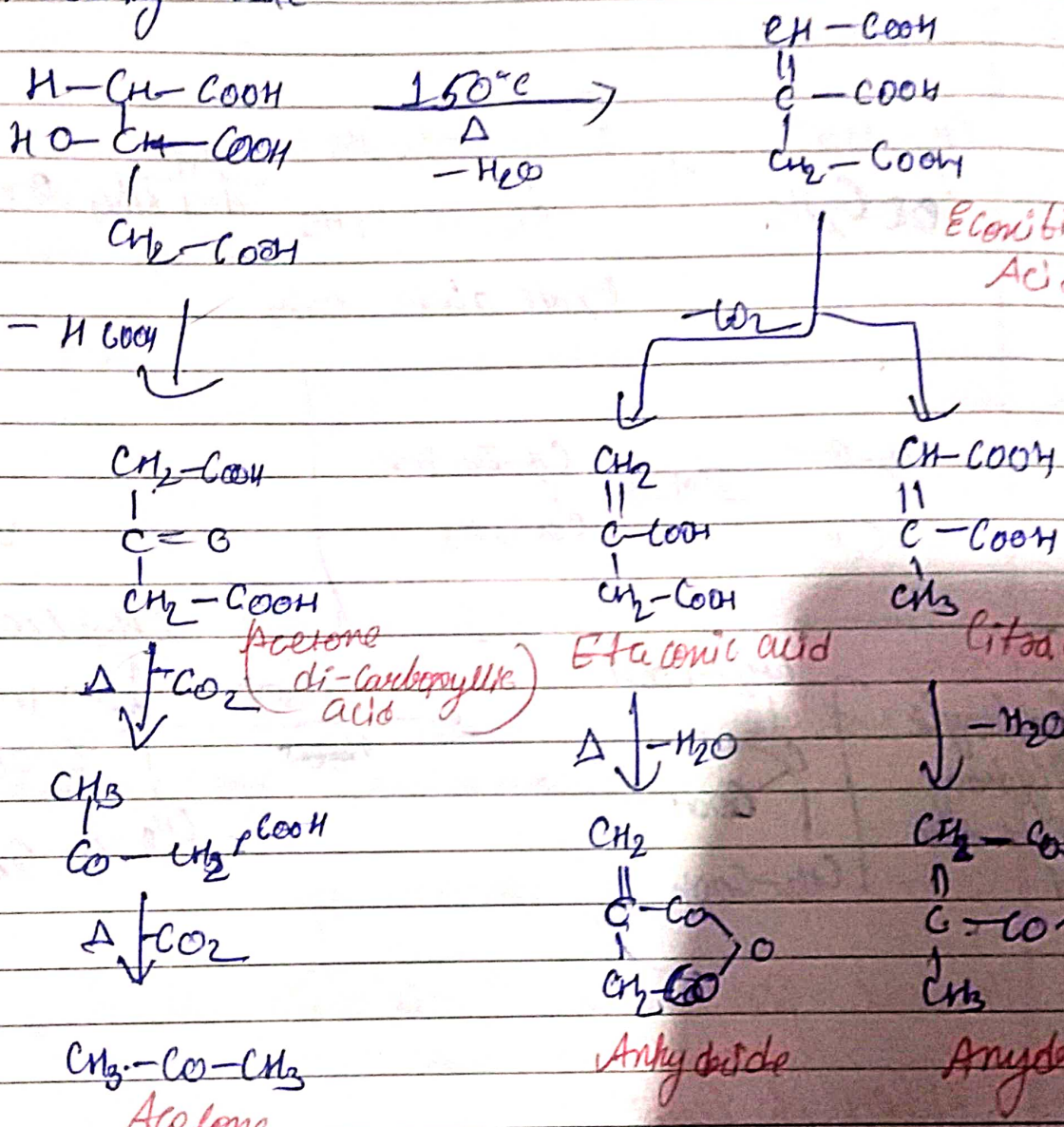
Chemical properties of Citric Acid

1) Effect of Temp

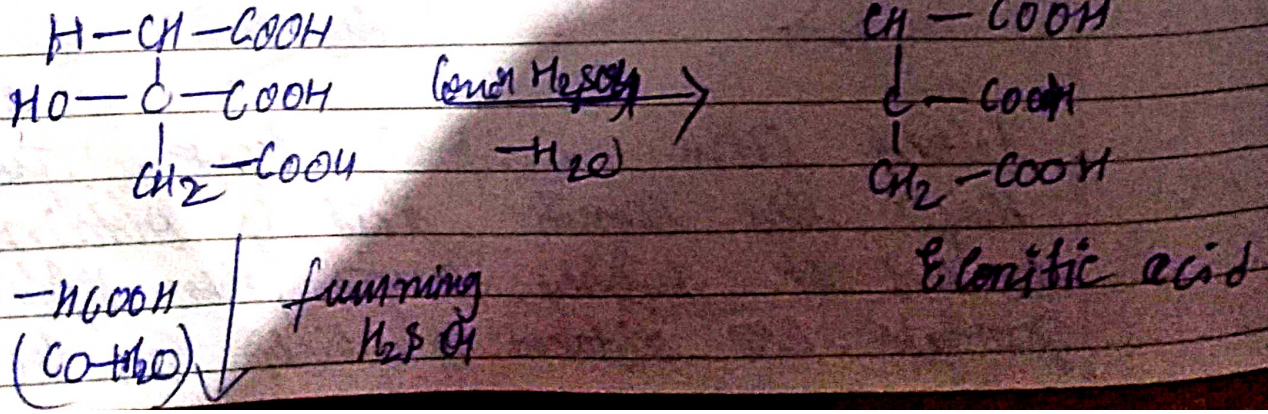


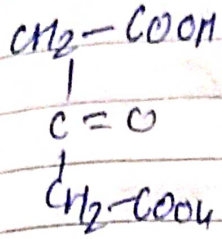
When citric acid is heated upto 150°c temp then aconitic acid is obtained when it heated at higher temp, then different products are obtained; which can be given by

Following reacⁿ

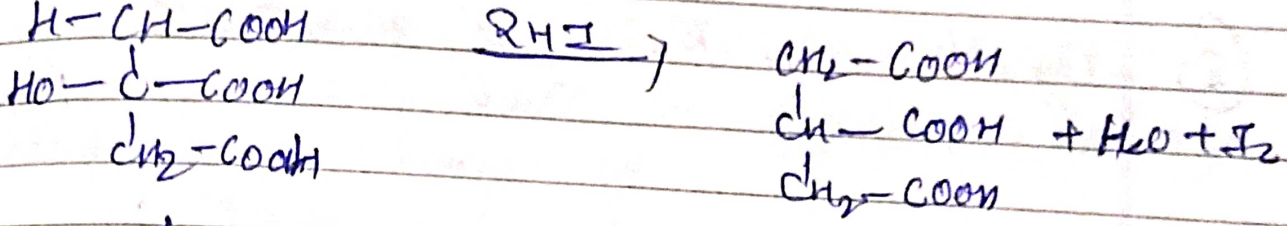


(2) Effect of H_2SO_4

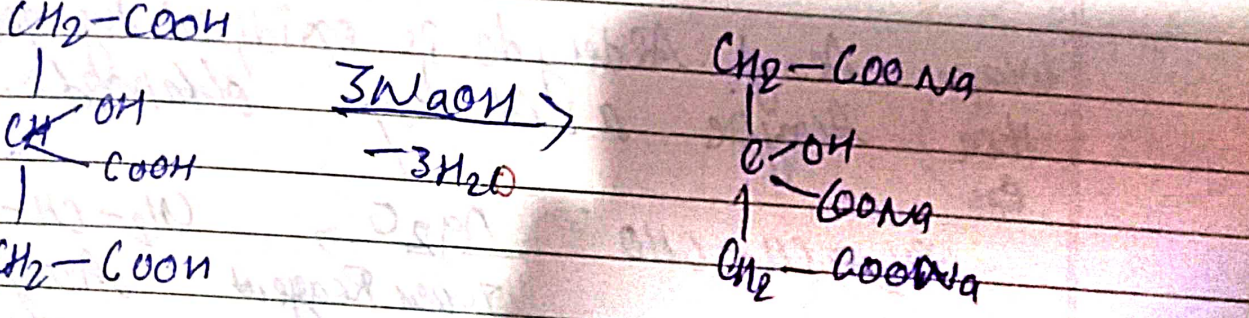




(3) Reacn by HI →



(4) Reacn with NaOH



Unsaturated Carboxylic Acid

When unsaturation and COOH group are present in the molecule then such acids are known as unsaturated carboxylic acid.

$CH_2=CH-COOH$ Acrylic acid [Propenoic]
$CH_3-CH=CH-COOH$ Crotonic acid [2-Butenoic]
$C_6H_5-CH=CH-COOH$ Cinnamic acid [3-Phenyl propenoic]