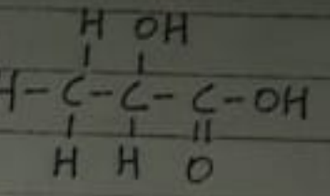
Molecular formula :- $C_3H_6O_3$

Empirical " :- CH_2O

Structural " :-



Rational " :- $CH_3-\underset{\underset{OH}{|}}{CH}-COOH$

It occurs in the lactus (sour milk), gastric juice cucumber.

Methods of Preparation :-

(1) From Canesugar :- Lactic acid is prepared by hydrolysis of canesugar.

$$C_{12}H_{22}O_{11} + H_2O \xrightarrow{\text{Fermentation}} \underset{\text{Glucose}}{C_6H_{12}O_6} + \underset{\text{Fructo}}{C_6H_{12}O}$$

$$C_6H_{12}O_6 \xrightarrow[\text{lactii}]{\text{Bacillus acidii}} 2CH_3-\underset{\underset{O}{||}}{C}-CHO + 2H_2O$$

$$CH_3-\underset{\underset{O}{||}}{C}-CHO \xrightarrow{[O]} \underset{\text{Pyruvic acid}}{CH_3-\underset{\underset{O}{||}}{C}-COOH}$$

$$CH_3-\underset{\underset{O}{||}}{C}-COOH \xrightarrow[2[H]]{LiAlH_4} CH_3-\underset{\underset{OH}{|}}{\overset{\overset{H}{|}}{C}}-COOH$$

$$2CH_3-\underset{\underset{OH}{|}}{\overset{\overset{H}{|}}{C}}-COOH + CaCO_3 \longrightarrow \left(CH_3\underset{\underset{OH}{|}}{CH}-COO\right)_2Ca$$

$$\left(CH_3\underset{\underset{OH}{|}}{CH}-COO\right)_2Ca \xrightarrow{H_2SO_4} 2CH_3-\underset{\underset{OH}{|}}{CH}-COOH + C$$

Lactic acid

(2) From Acetylene :- When acetylene reacts with in presence of 20% H_2SO_4, 1% $HgSO_4$ at 80° give acetaldehyde. It again reacts with HCN give acetaldehyde cyanohydrine and it hydrolyse H_2O in presence of HCl to give lactic acid.

$CH \equiv CH + 2H_2O \xrightarrow[1\%\ HgSO_4 \text{ at } 80^\circ C]{20\%\ H_2SO_4} CH_3-\underset{\underset{OH}{|}}{CH}-OH$

$CH_3\underset{\underset{OH}{|}}{CH}-OH \longrightarrow CH_3CHO + H_2O$

$CH_3CHO \xrightarrow{HCN} CH_3-\underset{\underset{OH}{|}}{\overset{\overset{H}{|}}{C}}-CN \xrightarrow[HCl]{2H_2O} CH_3-\underset{\underset{OH}{|}}{CH}-CO$ +

Lactic acid

(3) From propene :- When propene reacts with cl ne to give 1,2-dichloropropane. The later on hy is with dil. alkali and product is oxidised to gi D.L-lactic acid.

$CH_3CH=CH_2 + Cl_2 \longrightarrow CH_3\underset{\underset{Cl}{|}}{CH}-CH_2Cl$

$CH_3-\underset{\underset{Cl}{|}}{CH}-CH_2Cl \xrightarrow{2N aOH} CH_3-\underset{\underset{OH}{|}}{CH}-CH_2OH$

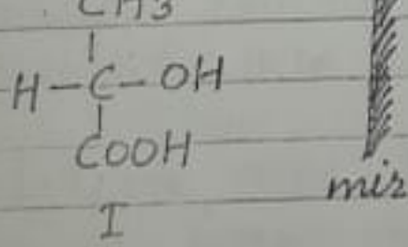
$CH_3-\underset{\underset{OH}{|}}{CH}-CH_2OH \xrightarrow[KMnO_4]{2[O]} CH_3-\underset{\underset{OH}{|}}{CH}-COOH$ Lactic ac

Optical activity of Lactic acid :

Lactic acid have three C-atoms but seco C-atom is asymmetric C-atom. Due to the pr of asymmetric C-atom it shows two types of al isomers in plane polarised light dextro and la rotatory.

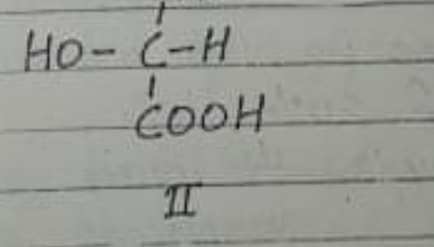
Optical isomers $= 2^n$ where, n = Asymm C-at

$= 2^1 = 2.$



I

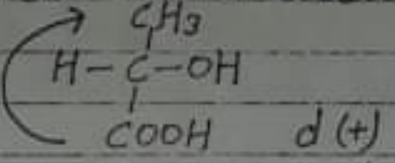
mirror



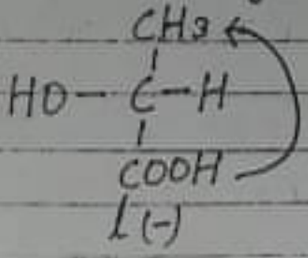
II

Structure II is the mirror image of Str. I. Str. II placed on Str. I they are not superi ble because all Grs. are not coinside to each othe

When plane polarised light brought on str. I then plane polarised light rotate in clock wise direction that is called dextro rotatory and compound is denoted by d (+)



When plane polarised light brought on str. II then plane polarised light rotate in anticlock wise direction that is called Laevorotatory and compound is denoted by l (-)



Equivalent molecular mixture of dextro and Laevo are optically inactive and cannot rotate plane polarised light either clock or anticlockwisedirection known as racemic mixture.

Isomers of Lactic acid

(1) Inactive or dl-Lactic acid : Lactic acid of sour milk are prepared by the above method optically inactive known as racemic form. It melts at 18°C it can be dissolve by suitable method into optically active forms dextro and laevo.

(2) d-Lactic acid : It is also known as sarcogen lactic acid formal from the breakdown of glycogen in muscles. During the muscular activity and rest sarcolactic acid is converted by glycogen.

(3) l-Lactic acid : It may be obtained by the resolution of dl form or may be prepared by the fermentation of sucrose using bacillus acidii laevo lactii.