Dihydric alcohol (Diols)

Class - B.Sc. Part I (Honours)
Subject - chemistry
Paper - IC
Topic - Dihydric alcohol
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The compounds which contain two -OH groups on different carbon atoms are called dihydric alcohol or diols. compounds with two -OH gr. on one carbon atom are seldom encountered, because they are unstable and undergoes spontaneous decomposition to give the corresponding carbonyl compound and water. Diols were commonly known as Glycols, since they have a sweet taste.

Ethylene Glycol
(Ethane - 1,2 - diol)

$$\begin{array}{l} CH_2OH \\ | \\ CH_2OH \end{array}$$

Preparation :- It is the simplest and most important dihydric alcohol which is prepared by the following method :-

(i) (From ethylene) :- ⓐ When ethylene is oxidised with cold dilute alkaline solution of Potassium Permanganate (Baeyer's reagent) Glycol is obtained.

$$\begin{array}{c} CH_2 \\ \| \\ CH_2 \end{array} + [O] + H_2O \xrightarrow{\text{Baeyer's reagent}} \begin{array}{c} CH_2OH \\ | \\ CH_2OH \end{array}$$

Ethylene → Ethylene glycol

b. Ethylene on oxidation with Osmium tetroxide in the presence of $NaHSO_3$ to give ethylene glycol.

$$\begin{array}{c} CH_2 \\ \| \\ CH_2 \end{array} + [O] + H_2O \xrightarrow[NaHSO_3]{OsO_4} \begin{array}{c} CH_2\cdot OH \\ | \\ CH_2-OH \end{array}$$

Ethylene glycol

c. When ethylene is passed through hypochlorous acid, ethylene chlorohydrine is formed. This intermediate is hydrolysed by boiling with Sodium bicarbonate to give Glycol.

$$\begin{array}{c} CH_2 \\ \| \\ CH_2 \end{array} + HOCl \longrightarrow \begin{array}{c} CH_2-OH \\ | \\ CH_2-Cl \end{array}$$

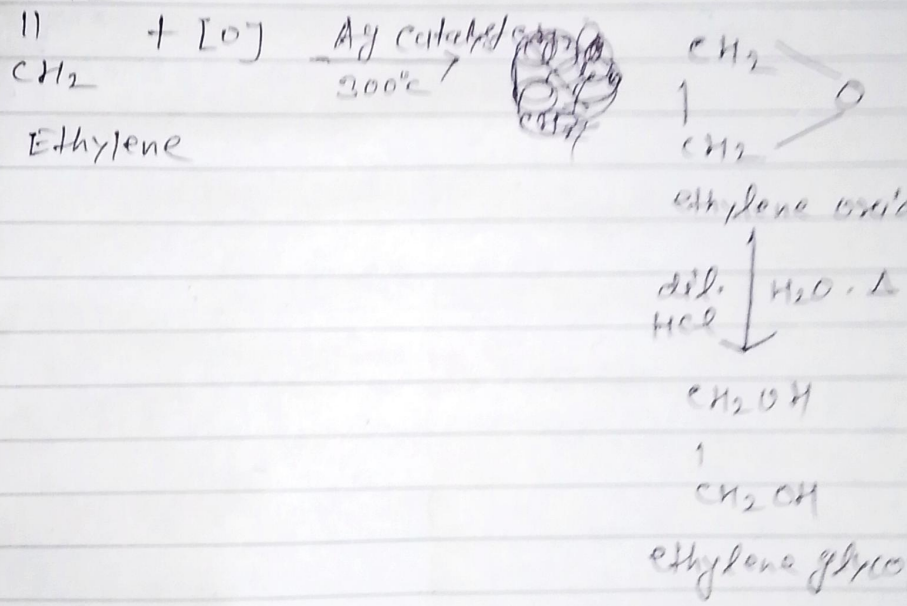
ethylene

$$\Big\downarrow \begin{array}{c} NaHCO_3 \\ \text{Boil} \end{array}$$

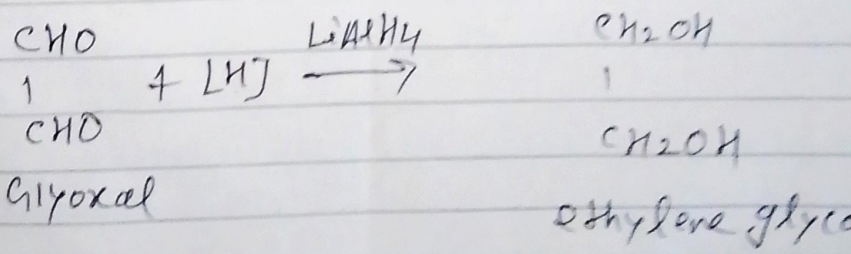
$$\begin{array}{c} CH_2-OH \\ | \\ CH_2-OH \end{array} + NaCl + CO_2$$

Ethylene glycol

d. Ethylene is first converted into ethylene oxide by passing a mixture of ethylene and air under pressure over silver catalyst at 200-400°C. Which undergoes hydrolysis on treatment with dil. HCl to give Ethylene glycol.



(ii) <u>From Glyoxal</u> :→ Glyoxal on reduction with $LiAlH_4$ gives ethylene glycol.



(iii) <u>From 1,2-dibromoethane :-</u>

When 1,2-dibromoethane is hydrolysed with boiling $KHCO_3$ solution to gives Ethylene glycol.

$$\begin{array}{c} CH_2Br \\ | \\ CH_2Br \end{array} + KHCO_3 + H_2O \longrightarrow \begin{array}{c} CH_2OH \\ | \\ CH_2OH \end{array} + 2KBr + CO_2$$

ethylene glycol