

B.Sc Part II Paper ORGANIC

TOPIC: - **ALCOHOLS**

COLLEGE: - PATNA SCIENCE COLLEGE, PATNA
DEPARTMENT OF CHEMISTRY

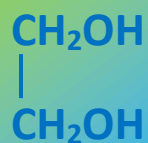
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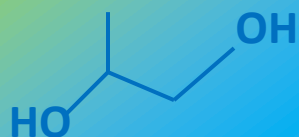
MOB NO: - 9097705750

NOMENCLATURE

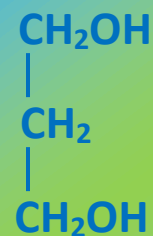
Diols have both common and IUPAC names. The IUPAC names are obtained by adding the suffix diol to the name of the parent alkane. Numbers are used to indicate the position of the two -OH groups. For example.



1,2-Ethanediol
(Ethylene glycol)



1,2-Propanediol
(Propylene glycol)



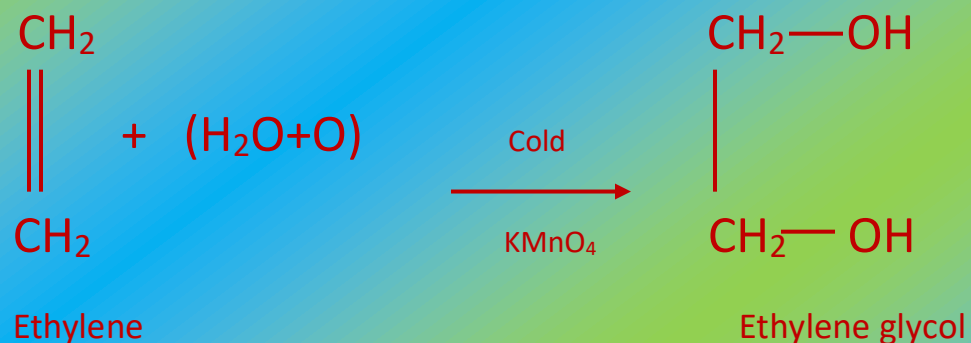
1,3-Propanediol
(Trimethylene glycol)

ETHYLENE GLYCOL, 1,2-Ethanediol, HO-CH₂-CH₂-OH

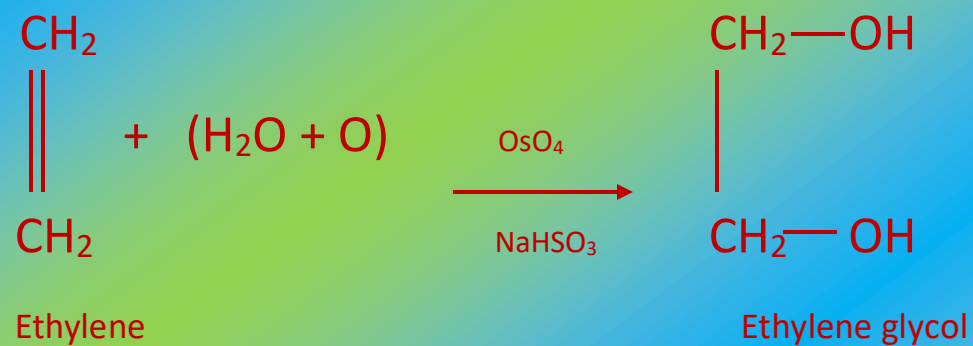
Ethylene glycol is the important member of the class. It is often referred to as Glycol.

Preparation. It is prepared as follows :

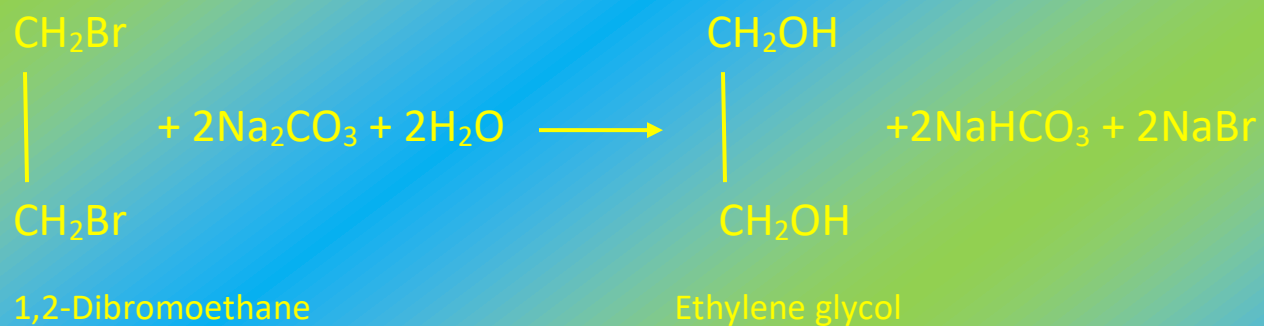
- (1) By oxidation of ethylene with old dilute potassium permanganate solution.



- (2) By oxidation of ethylene with osmium tetroxide in the presence of sodium bisulfide.

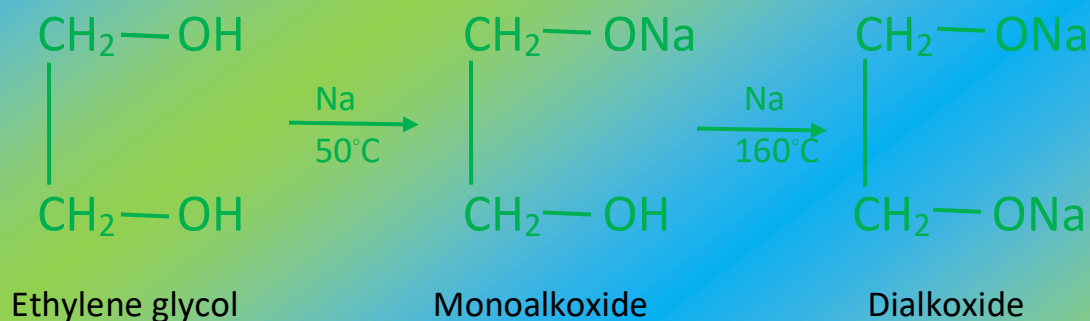


(3) By oxidation of 1,2-dibromoethane with aqueous sodium carbonate solution.

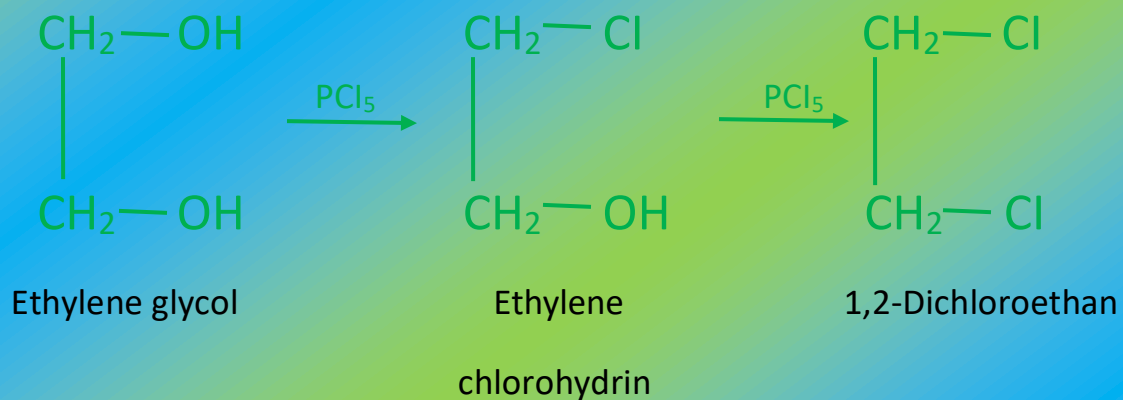


CHEMICAL

- (1) **Reaction with sodium.** Ethylene glycol reacts at with sodium at 50°C to form monoalkoxide and dialkoxide when temperature is raised.

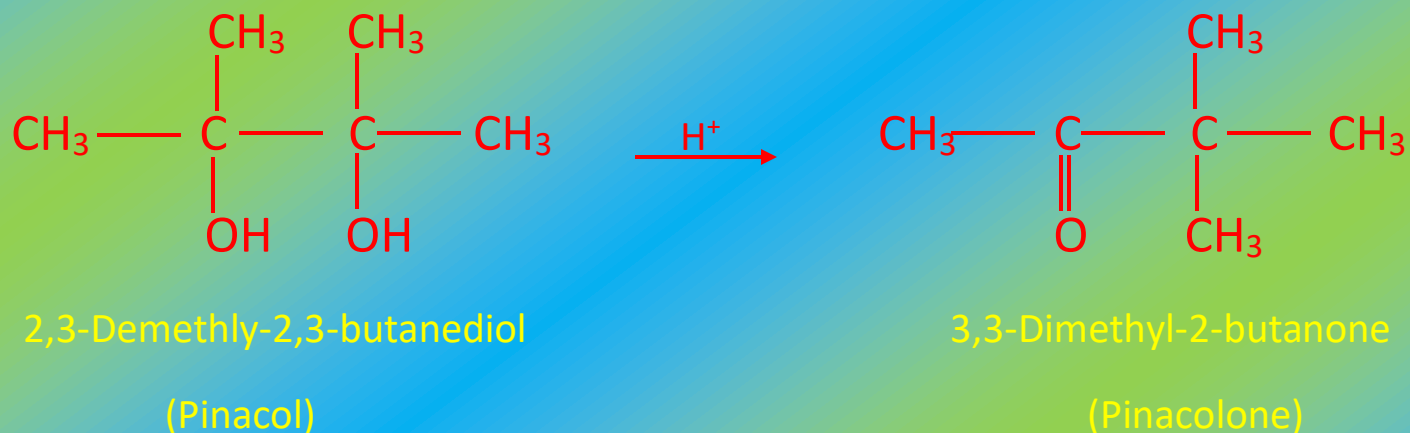


- (2) **Reaction with Phosphorus Pentahalides.** Ethylene glycol reacts with PCl_5 first to form ethylene chlorohydrins and then 1,2-dichloroethane. PBr_5 reacts in the same way.



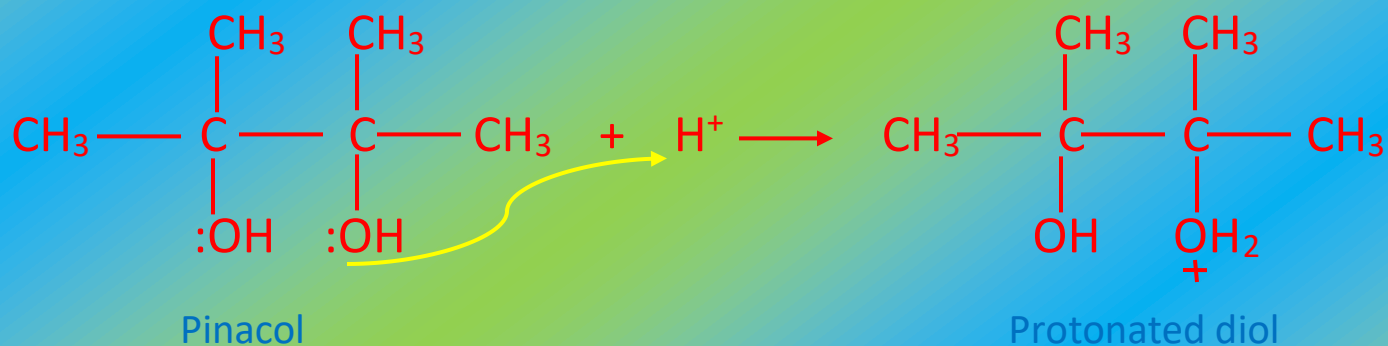
PINACOLS

Completely substituted 1,2-diols, such as 2,3-dimethyl-2,3-butanediol, are called **Pinacols**. On treatment with mineral acids (HCL) they undergo dehydration and rearrangement to form ketones. This reaction is called **Pinacol-Pinacolone Rarrangement** (or simply **Pinacol Rearrangement**). For example,

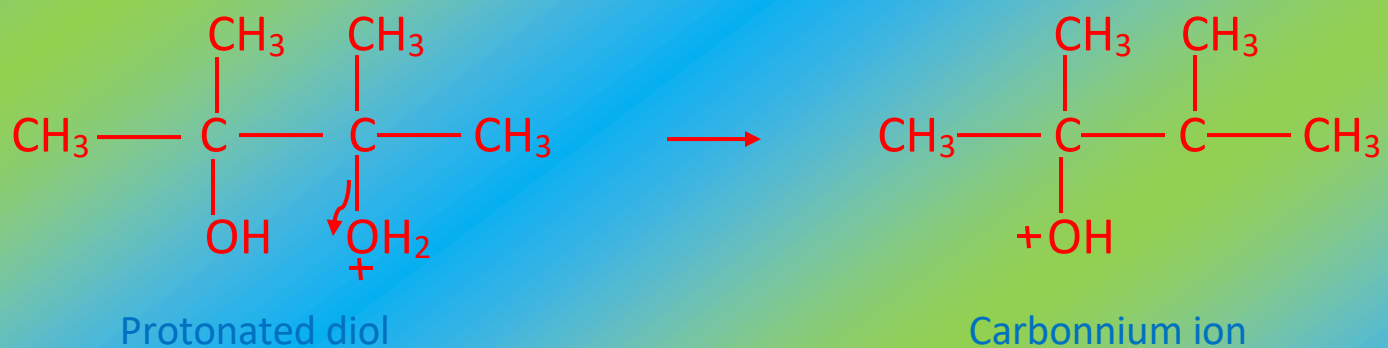


MECHANISM. The mechanism of the above reaction involves the following four steps:

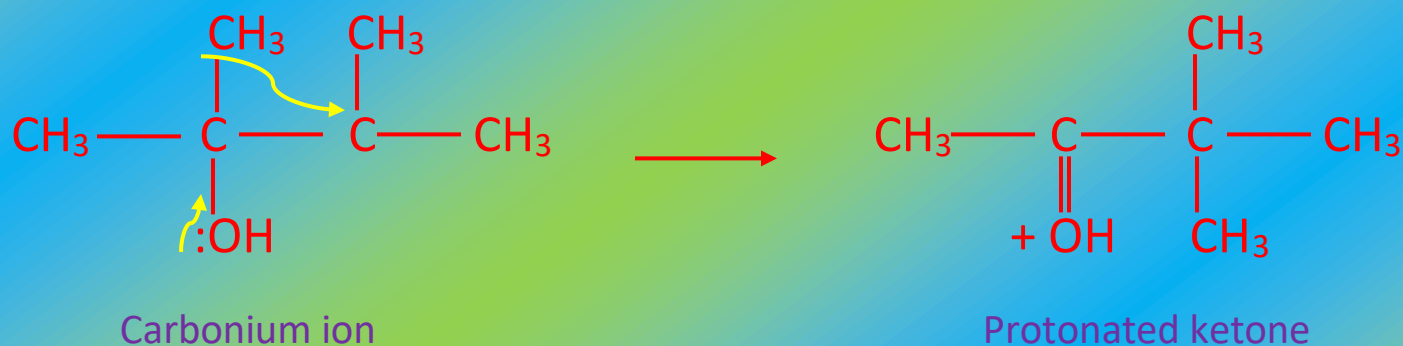
Step 1. Protonation of the 1,2-diol.



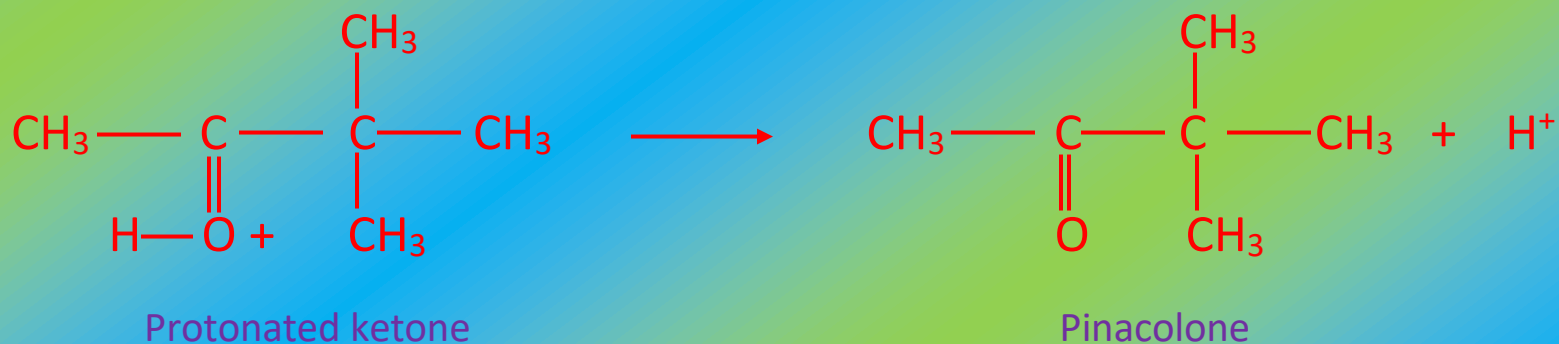
Step 2. Formation of carbonium ion by loss of water form the protonated diol.



Step 3. Rearrangement of carbonium ion by 1,2-shift to give protonated ketone.

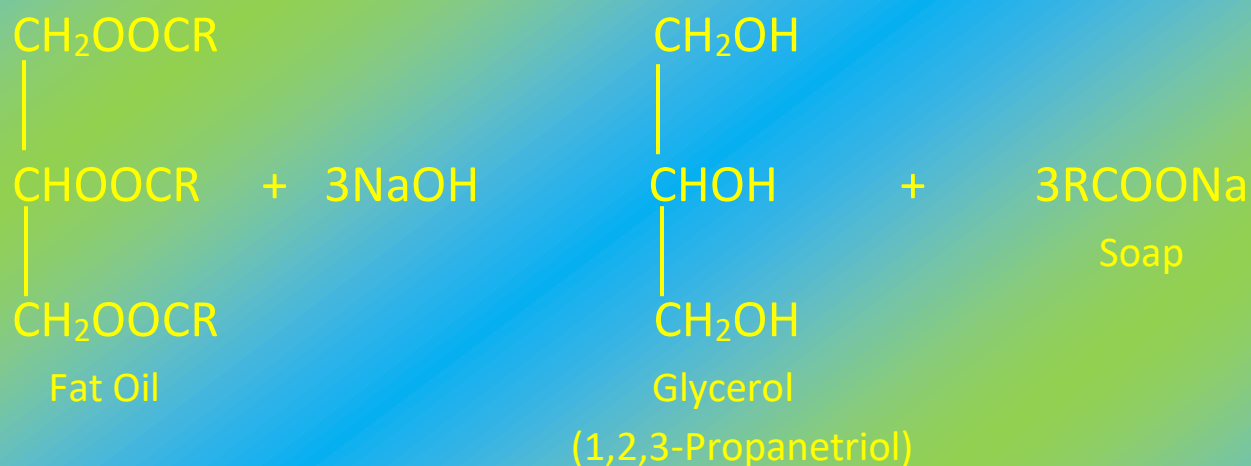


Step 4. Formation of ketone by loss of proton form the protonated ketone.



Manufacture. Glycerol is manufactured :

(1) Form Fats and Oils. Natural oils and fats are trimesters of glycerol and long-chain carboxylic acids (mainly palmitic, stearic, and oleic acids). On hydrolysis with alkali, the facts and oils produce glycerol and the salts of the long-chain acids which are called soaps.



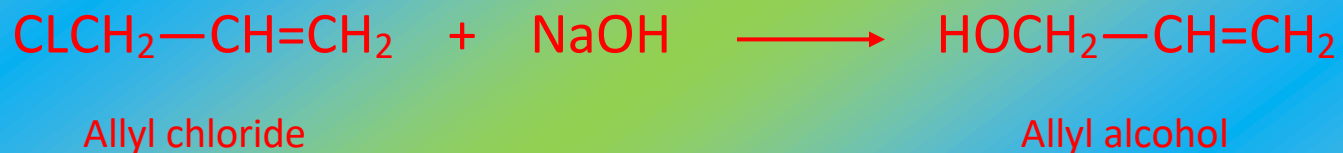
In the above equation, R is 9 to 17 carbons. The hydrolysis of facts and oils is carried originally for soap manufacture, and glycerol is obtained as a by-product. This is still a commercial source of glycerol.

(2) **From propene.** Large quantities of glycerol as a by-product in the manufacture of soap. However, this supply is not sufficient. Today much of glycerol is manufactured from propene obtained by the catalytic cracking of petroleum. Following four steps are involved :

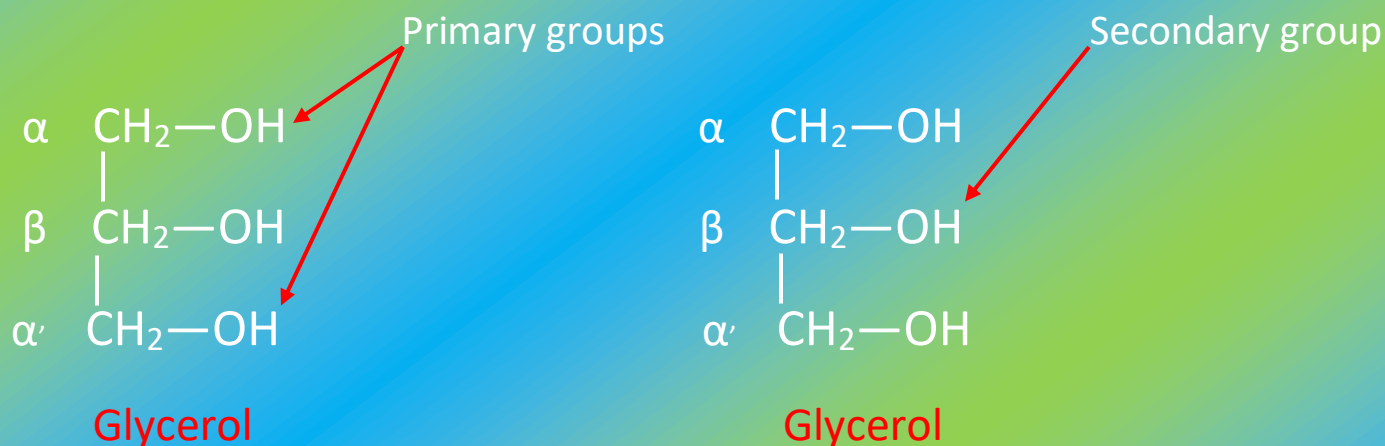
Step 1. Propene is treated with Cl_2 at 600°C to give allyl chloride.



Step 2. Allyl chloride is treated with dil. NaOH to give allyl alcohol.



(CHEMICAL). Glycerol molecule contains two primary **-OH** groups and one secondary **-OH** group. It undergoes many of the reactions to be expected of these types of alcohols. The carbon atoms in glycerol are indicated as α , β , and α' .



In general, the two primary **-OH** groups are more reactive than the secondary **-OH** groups. Some of the reactions that are characteristic of monohydroxy compounds are modified to a certain extent by the presence of three **-OH** groups.

Thank you