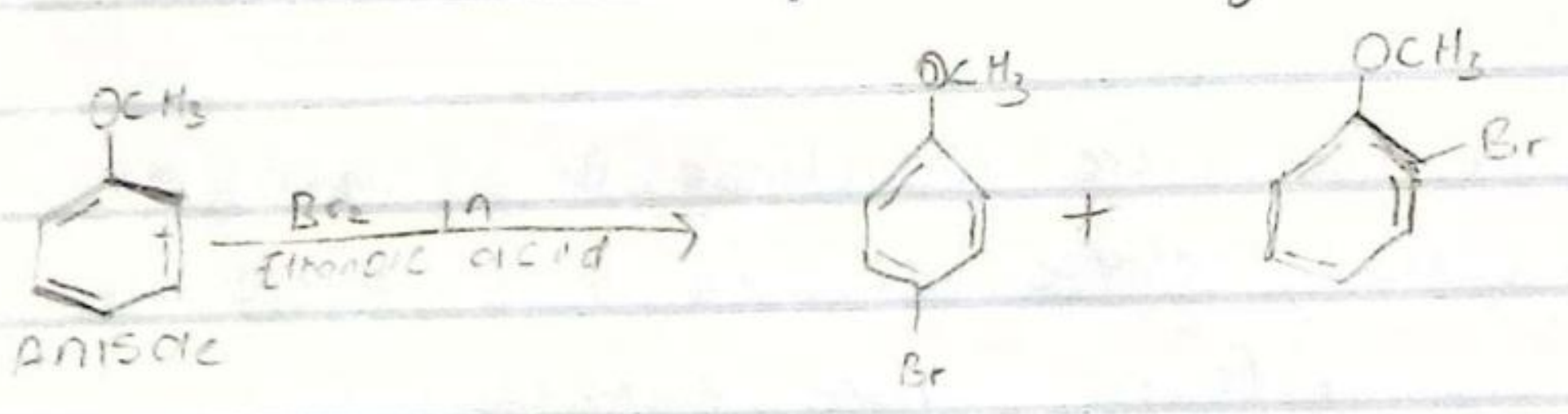


(e) Boiling point: Ethers with low molecular mass have a lower boiling point than the corresponding alcohols but those ethers containing alkyl radicals larger than four carbon atoms, the reverse is true. The boiling point of ethers tend to approximate those of hydrocarbons of same relative molecular mass from which it can be concluded that the molecules are not associated in the liquid phase as there are no suitably available hydrogen for association through hydrogen bonds.

(f) Cleavage of C-O bond :- Ether are generally very unreactive in nature. When an excess of hydrogen halide is added to the ether, cleavage of C-O bond takes place leading to the formation of alkyl halides. The order of reactivity is given as $\text{HI} > \text{HBr} > \text{HCl}$.

(g) Electrophilic Substitution :- The alkoxy group in ether activates the aromatic ring at ortho and para position for electrophilic substitution reactions are halogenation, Friedel Craft's reaction, etc.

(h) Halogenation of Ethers :- Aromatic ethers undergo halogenation for example, bromination, upon the addition halogen in the presence or absence of a catalyst.



(i) Autoxidation :- In the presence of oxygen, ethers undergo self-oxidation to unstable peroxides and this reaction may create the danger of explosion in stored ether. For this reason, ethers should be stored in dark bottles and should contain an antioxidant.

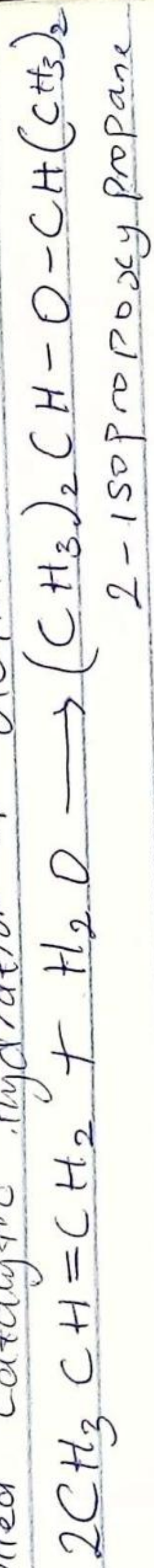


Uses of Ethylene Oxide

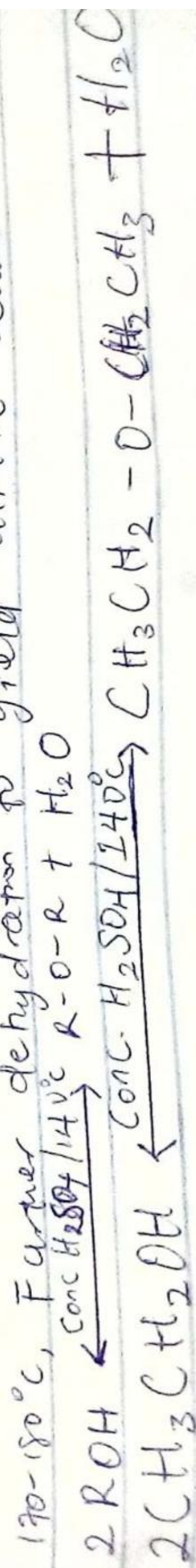
- 1 Ethylene oxide is used as an intermediate in the hydrolytic manufacture of ethylene glycol
- 2 It is the standard method for sterilization due to the tendency of the copolymer chains to undergo scission when irradiated
- 3 Ethylene oxide is used in the preparation of nonionic emulsifying agents, plastics, plasticizers and several textile.
- 4 Ethylene oxide is used as a fumigant for spices, seasonings, and foodstuffs and as an agricultural fungicide
- 5 It is used in drug synthesis and as a pesticide intermediate.

3) PREPARATION OF ETHERS

1 Controlled Catalytic hydration of Olefins



2 Partial dehydration of alcohols:- Simple ethers are manufactured from alcohols by catalytic dehydration. The alcohol in excess and concentrated tetraoxosulphate (VI) acid is heated at a carefully maintained temperature of 140°C . This process is known as continuous etherification. If excess alcohol is not used, the temperature is as high as $170-180^\circ\text{C}$, further dehydration to yield alkene occurs



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CHM 102 Assignment 2

1. CH_3OCH_3 - Methoxymethane
- b. $\text{CH}_3\text{CH}_2\text{OCH}_2\text{CH}_3$ - Ethoxyethane
- c. $(\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2)_2\text{O}$ - Butoxy methane
- d. $\text{CH}_3\text{CH}_2\text{OCH}_3$ - methoxyethane
- e. $\text{CH}_3\text{CH}_2\text{CH}_2\text{OCH}_2\text{CH}_3$ - Ethoxypropane

2. Properties of ethers

a) Physical States

Ethers are colourless, neutral liquids with pleasant odour at room temperature. The lower aliphatic ethers are highly flammable gases or volatile liquids.

b) Solubility

Ethers are less soluble in water than are the corresponding alcohols. Lower molecular weight ethers such as methoxymethane and methoxyethane are fairly soluble in water since the molecules are able to form hydrogen bonds with the water molecules but as the hydrocarbon content of the molecules increases, there is a rapid decline in solubility. They are miscible with most organic solvents.

c) Density

Most of the simple ethers are less dense than water, although the density increases with increasing relative molecular mass and some of the aromatic ethers are in fact denser than water.

d) Reactivity:

Ethers are inert at moderate temperature. Their inertness at moderate temperatures lead to their wide use as reaction media. Simple ethers are not commonly found in nature but the ether linkage is present in such natural products as sugars, starch

c-1 $\text{C}_2\text{H}_5\text{OCH}_2\text{CH}_2\text{CH}_3$ - Ethoxypropane

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