

(i) Physical states: At room temperature, ethers are colourless, neutral liquids with pleasant odours. The lower aliphatic ethers are highly flammable gases or volatile liquids.

(ii) Solubility: Ethers are less soluble in water than are the corresponding alcohols. Lower molecular weight ethers such as methoxyethane and methylmethane are fairly soluble in water. Since the molecules are able to form hydrogen bonds with the ~~water~~ water molecules but not the hydrocarbon content of the molecules, increases, there is rapid decline in solubility. They are miscible with most organic solvents.

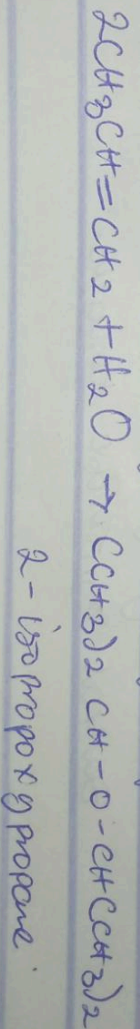
(iii) Boiling points: Low molecular mass ethers have a lower boiling point than the corresponding alcohols but ethers containing alkyl radicals larger than four carbon atoms have higher boiling points. It can be concluded that the molecules are not associated in the liquid phase as there are no suitable

evaluate hydrogen for association through hydrogen bonds.

- ① Reactivity: Ethers are inert at moderate temp. Their inertness at moderate temperatures leads to their wide use as reaction media. Simple ethers are not commonly found in nature but they are found in natural products such as sugar, cellulose & starch.

3. Methods of preparing ethers

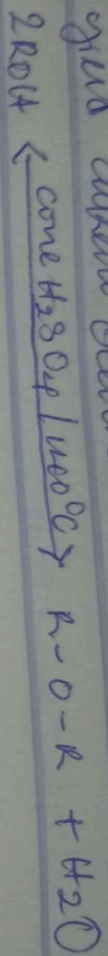
- ① Conventional catalytic hydrogenation of Olefins



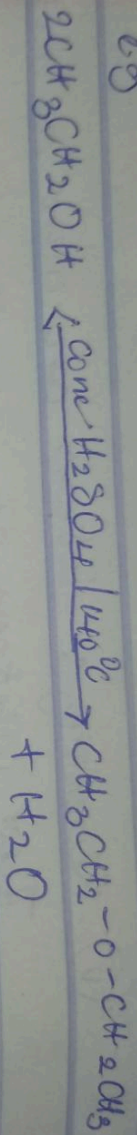
- (ii) Partial dehydration of alcohols.

Simple ethers are manufactured from alcohols by catalytic dehydration. The alcohol in excess and concentrated H_2SO_4 is heated and maintained at a temp. of 140°C . This process is known as convinde esterification. If excess alcohol is not used, the temp. is high as $170-180^\circ$ then further dehydration

to give alkyl ethers:



e.g.



4 Uses of Ethylene Oxide

- It is used as a gaseous sterilizing agent.
- It is used as an intermediate in the hydrolytic manufacture of ethylene glycol.
- It is used in preparation of nonionic emulsifying agent, plastics, plasticizers and several synthetic textiles.

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Course code: CEM 102

Esters Assignment

1. CH_3OCH_3 - methoxy methane
2. $\text{CH}_3\text{CH}_2\text{OCH}_2\text{CH}_3$ - Ethoxy ethane
3. $\text{CH}_3\text{CH}_2\text{CH}_2\text{OCH}_2\text{CH}_2\text{CH}_3$ - Propoxy methane
4. $\text{CH}_3\text{CH}_2\text{OCH}_2\text{CH}_2\text{CH}_3$ - Ethoxy methane
5. $\text{CH}_3\text{CH}_2\text{CH}_2\text{OCH}_2\text{CH}_2\text{CH}_3$ - Ethoxy propane

2. Properties of Esters

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