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MBB

Chemistry 10th - On Ether

Give the IUPAC names of the following organic compounds

- $\text{CH}_3\text{OCH}_3$  - Methoxymethane
- $\text{CH}_3\text{CH}_2\text{OCH}_2\text{CH}_3$  - Ethoxyethane
- $\text{C}_4\text{H}_9\text{OC}_4\text{H}_9$  - Butoxybutane
- $\text{CH}_3\text{CH}_2\text{OCH}_2\text{CH}_2\text{CH}_3$  - Methoxyethane
- $\text{CH}_3\text{CH}_2\text{OCH}_2\text{CH}_2\text{CH}_2\text{CH}_3$  - Ethoxypropane

2. Discuss the properties of ether

1) Physical State  
At room temperature, ethers are colourless, neutral liquids with pleasant odours. The lower aliphatic ethers are highly flammable gases or volatile liquids.

2) Solubility  
Ethers are less soluble in water than 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 decrease in solubility. They are miscible with most organic solvents.

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

4) Boiling Point  
Low molecular mass ethers 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 separated in the liquid phase as there are no suitably available hydrogen for absorption through hydrogen bonds.

### S) Reactivity

Ethers are inert at moderate temperatures. Their increase at moderate temperatures leads to their wide use as reaction media.

Q. Discuss explicitly two methods of preparing ethers and show equations of reaction.

#### 1. Partial Dehydration of alcohol

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  $140^{\circ}\text{C}$ . This process is known as continuous refluxification. If excess alcohol is not used, the temperature is as high as  $170-180^{\circ}\text{C}$ , further dehydration to yield alkene occurs.



Controlled catalytic hydration of olefins (olefins + water) under controlled catalytic conditions produces alcohols.



4) State three uses of ethylene oxide.

- i) Ethylene oxide is used as an intermediate in the hydrolytic manufacture of ethylene glycol.
- ii) Ethylene oxide is used in the preparation of nonionic emulsifying agents, plastics, pesticides and several synthetic textiles.
- iii) Ethylene oxide is used as a gaseous sterilizing agent.