

Question

1. Give the IUPAC names of the following organic compounds
 CH_3OCH_3 , $\text{CH}_3\text{CH}_2\text{OCH}_2\text{CH}_3$, $\text{C}_4\text{H}_9\text{OCH}_2\text{CH}_2\text{CH}_3$, $\text{CH}_3\text{CH}_2\text{OCH}_2\text{CH}_3$
 $\text{CH}_3\text{CH}_2\text{OCH}_2\text{OCH}_2\text{CH}_3$

Solution

1. $\text{CH}_3\text{OCH}_3 \rightarrow$ Methoxymethane
2. $\text{CH}_3\text{CH}_2\text{OCH}_2\text{CH}_3 \rightarrow$ Ethoxyethane
3. $\text{C}_4\text{H}_9\text{OCH}_2\text{CH}_2\text{CH}_3 \rightarrow$ Butoxyethane
4. $\text{CH}_3\text{CH}_2\text{OCH}_2\text{CH}_3 \rightarrow$ Methoxyethane
5. $\text{CH}_3\text{CH}_2\text{OCH}_2\text{OCH}_2\text{CH}_3 \rightarrow$ Ethoxypropane

2. Discuss the properties of ethers

Solution

- 1) Physical States \rightarrow At room temperature, ethers are colourless, neutral liquids with pleasant odours. The lower aliphatic ethers are highly flammable gases or volatile liquids.
- 2) Solubility \rightarrow 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 hydrogen content of the molecules increases, there is a rapid decline in solubility. They are miscible with most organic solvents.
- 3) Density \rightarrow 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.

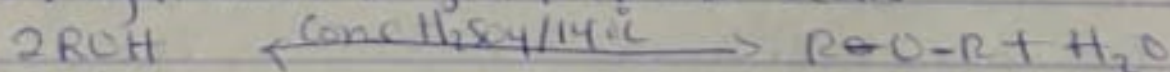
4.) Boiling point \rightarrow Low molecular mass ethers have a lower boiling point than the corresponding alcohols but those ethers containing alkyl radicals larger than four carbon atoms, the reverse is true. The boiling point of ethers tend to approximate those of hydrocarbons of same relative molecular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

5.) Reactivity: Ethers are inert at moderate temperatures. Their inertness at moderate temperature leads to their wide use as reaction media.

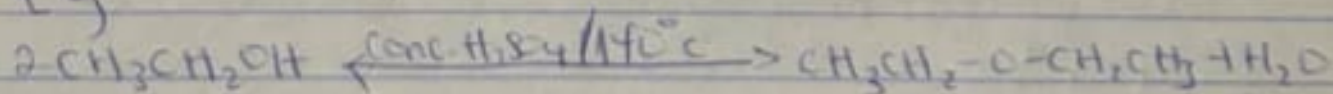
3. Discuss explicitly two methods of preparing ethers and show equations of reaction.

1. partial dehydration of alcohols

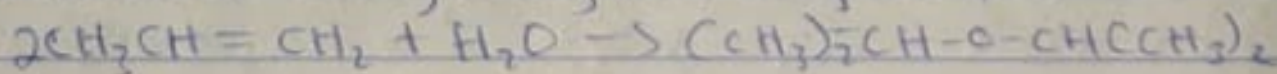
Simple ethers are manufactured from alcohols by catalytic dehydration. The alcohol is excess and concentrated tetraoxosulphate(VI) acid is heated at a carefully maintained temperature of 140°C . This process is known as continuous etherification. If excess alcohol is not used the temperature is as high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



E.g.



2. Controlled catalytic hydration of alkenes



2-Isopropoxypropane

4. State three uses of Ethylene oxide solution

1. Ethylene oxide is used as an intermediate in the hydrolytic manufacture of ethylene glycol.
2. Ethylene oxide is used in the preparation of nonionic emulsifying agents, plastic, plasticizers and several synthetic textiles.
3. Ethylene oxide is used as a gaseous sterilizing agent.