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MECHATRONICS ENGINEERING
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1 CH_3OCH_3 Methoxymethane.

$CH_3CH_2OCH_2CH_3$ Ethoxyethane.

$(CH_3CH_2CH_2CH_2)_2O$ Butoxymethane.

$CH_3CH_2OCH_3$ Methoxyethane.

$CH_3CH_2CH_2OCH_2CH_3$ Ethoxypropane.

2 Properties of Ethers.

i Physical states: At room temperatures, ethers are colourless neutral liquids with pleasent odours. The lower aliphatic are highly flamable gases or volatile liquids.

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

iii Density: Most of the simple ethers are less dense than water, although increases with increasing relative molecular mass and some aromatic ethers are denser than water

iv Reactivity: Ethers are inert at moderate temperature. Their inertness at moderate temperatures leads to their wide use as a reaction media. Simple ether are not commonly found in nature but the ether linkage is present in such natural products as sugar, Starch

v Boiling point: Low molecule mass ethers have a lower boiling point than corresponding alcohols but the ethers containing alkyl radicals larger than four carbon atoms the reverse occurs.

3 Methods of preparing ethers

i Partial dehydration of alcohol

Simple ethers are manufactured from alcohol 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 is 170-150°C, further dehydration to yields alkene occurs

$$2ROH \xleftarrow[140^\circ C]{Conc\ H_2SO_4} R-O-R + H_2O$$

Specific example

$$CH_3CH_2OH \xleftarrow[140^\circ C]{Conc\ H_2SO_4} CH_3CH_2-O-CH_2CH_3 + H_2O$$

Ethoxyethane.

ii From Haloalkanes and dry silver (i) oxide

$$2RX + Ag_2O \xrightarrow{Warm} R-O-R + 2AgX$$

R → Alkyl group
X → Halogen.

Specific example

$$2CH_3CH_2CH_2Fl + Ag_2O \longrightarrow CH_3CH_2CH_2OCH_2CH_2CH_3 + 2AgFl$$

4 Uses of Ethylene oxide.

i Ethylene oxide is used as an intermediate in the hydrolytic manufacture of ethylene glycol.

ii Ethylene oxide is used as a gaesious sterilizing agent for hospital equipments.

iii Ethylene oxide is used in the production of nonionic emulsifying agents, plastics, plasticizers and several synthetic textiles