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19/MHS01/111
Medicine and Surgery

1) Give the IUPAC Names of the following organic compounds

CH_3OCH_3 — Methoxy methane

$CH_3CH_2OCH_2CH_3$ — Ethoxyethane

$(CH_3CH_2CH_2CH_2)_2O$ — Butoxymethane

$CH_3CH_2OCH_3$ — Methoxyethane

2) Discuss the properties of ethers

a) Ethers are colourless, and neutral liquid with pleasant odour at room temperature. Lower aliphatic ethers are highly flammable gases or volatile liquids

b) Ethers are less soluble in water than in organic solvents. As the hydrocarbon content of the molecule increases, there is rapid decline in solubility, making lower molecular weight ethers such as methoxymethane fairly soluble in water, since it is able to form hydrogen bonds with water molecules

c) Simple ethers are less dense than water, but the density increases with increasing relative molecular mass. And some aromatic ethers are denser than water

d) The boiling point of ethers increases with increasing number of alkyl radicals. Ethers with alkyl radicals lesser than four carbons have low boiling point.

e) Ethers are inert at moderate temperature, which leads to their wide use as reaction media. They are not found commonly in nature.

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

a) Partial dehydration of alcohols: Simple ethers are manufactured from alcohols by catalytic dehydration. The alcohol in excess are heated at a carefully maintained temperature of 140°C. This process is known as continuous etherification. Tetraoxosulphate (VI) acid is Excess alcohol is needed, if not the temperature will be as high as

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170°c - 18°c, and further dehydration will yield alkene

$$2CH_3CH_2OH \xrightarrow[140°C]{Conc.\ H_2SO_4} CH_3CH_2-O-CH_2CH_3 + H_2O$$

Ethanol — Ethoxyethane

b) From Haloalkanes and dry silver (I) oxide: Haloalkanes is warmed with the silver (I) oxide to yield an ether and silver halide

$$2CH_3CH_2CH_2Cl + Ag_2O \xrightarrow{Warm} CH_3CH_2CH_2OCH_2CH_2CH_3 + 2AgCl$$

1-chloro propane — Propoxypropane — Silver chloride

4 State three uses of ethylene oxide

i) It is used in the preparation of nonionic emulsifying agents, plastics, plastizers and several synthetic textiles

ii) It is used as an intermediate in the hydrolytic manufacture of ethylene glycol

iii) It is used as a gaseous sterilising agent