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19/MHS01/300
CHEM 102
Medicine and Surgery

1) Give the IUPAC names of the following Organic compounds.

a). CH_3OCH_3

Methoxymethane

b) $CH_3CH_2OCH_2$

Ethoxyethane

c) $(CH_3CH_2CH_2CH_2)_2O$

Butoxybutane

d) $CH_3CH_2OCH_3$

Methoxyethane

e) $CH_3CH_2CH_2OCH_2CH_3$

Ethoxypropane

2) Discuss the properties of Ethers.

a) Physical State

At room temperature, ethers are colourless, neutral liquids with pleasant odours. Lower aliphatic ethers are highly flammable gases or volatile liquids.

b) Density

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 infact denser than water.

c) Reactivity

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

d) Solubility

Ethers are less soluble in water than their corresponding alkanols. Lower

molecular weight ethers are fairly soluble in water since the molecule are able to form hydrogen bonds with H_2O molecules, but as the hydrocarbon content of the molecules increases, there is a rapid decline in solubility.

c) Boiling point

Low molecular mass ethers have a lower B.P than the corresponding alchols but for those ethers containing alkyl radicals lager 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 molecule are not associated in the liquid phase as there are no suitably available hydrogen for association through hydrogen bonds.

3) Discuss explicitly 2 methods of preparing ethers and show equations of reaction.

a) Partial dehydration of alchols

Simple ethers are manufactured from alchols by catalytic dehydration. The alchol in excess and concentrated H_2SO_4 acid is heated at a carefully maintained temperature of 140°c. This process is known as Continuous Etherification. If excess alchol is not used, the temperature is as high as 170-180c, further dehydration yields alkene.

$$2ROH \xleftarrow[140c]{\text{Conc. } H_2SO_4} R\text{-}O\text{-}R + H_2O$$

Alkanol — Ether

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

Ethanol — Ethoxyethane

b) From Haloalkanes and dry Silver (I) Oxide

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

Haloalkane — Ether

$$2CH_3CH_2CH_2Br + Ag_2O \xrightarrow{\text{Warm}} CH_3CH_2CH_2OCH_2CH_2CH_3 + 2AgBr$$

Propyl bromide — Propoxypropane

4) State 3 uses of Ethylene Oxide

a) Ethylene Oxide is used as a gaseous Sterilising agent

b) It is used in Preparing nonionic emulsifying agents

c) It is used as an intermidiate in hydrolytic manufacture of ethylene glycol