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100 LEVEL, MBBS

19/MHS01/200

CHM 102

* Give the IUPAC names of the following organic compounds:
* CH3OCH3 - Methoxymethane
* CH3CH2OCH2CH3 - Ethoxyethane
* (CH3CH2CH2CH2)2O - Butoxymethane
* CH3CH2 OCH3 - Methoxyethane
* CH3CH2CH2OCH2CH3 – Ethoxypropane
* Discuss the properties of ethers
* Physical states:

At room temperature, ethers are colorless, neutral liquids with pleasant odours. The lower aliphatic other’s are highly flammable gases or volatile liquids.

* Solubility:

Ethers are less soluble in water than the other corresponding 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 rapid decline in solubility. They are miscible with most organic solvents.

* 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 in fact denser than water.

* Boiling point:

Low molecular mss 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 as there are no suitably available hydrogen for association through hydrogen bonds,

* Reactivity

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

* Discuss explicitly two methods of preparing ethers and show equations of reaction
* Partial dehydration of alcohols:

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 140oC. this process is known as continuous etherification. If excess alcohol is not used, the temperature is as high as 170-180oC, further dehydration to yield alkene occurs

2ROH conc. H2SO4 /140oCR-O-R + H2O

Eg: 2CH3CH2OH conc. H2SO4 /140oCCH3CH2-O-CH2CH3 + H2O

* Preparations of Ethers by Williamson Synthesis:

Williamson synthesis is an important method for the preparation of symmetrical and asymmetrical ethers in laboratories. In this method, an alkyl halide is reacted with sodium alkoxide which leads to the formation of ether. The reaction generally follows the SN2 mechanism for primary alcohol. As we know alkoxides are strong bases and they can react with alkyl halides leading to elimination reactions. Williamson synthesis exhibits higher productivity in the case of primary alkyl halides. In the case of secondary alkyl halides, elimination competes with substitution whereas, we observe the formation of elimination products only in the case of tertiary alkyl halides.

* State three uses of ethylene oxide
* Ethylene oxide is used as a gaseous sterilizing agent
* Ethylene oxide is used in the preparation of nonionic emulsifying agents, plastics and several other synthetic textiles
* Ethylene oxide is used as an anti freeze agent