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COURSE CODE: CHM 102

1. Give the IUPAC names of the following organic compounds:
2. CH3OCH3 – Methoxymethane
3. CH3CH2OCH2CH3 - Ethoxyethane
4. (CH3CH2CH2CH2)2O – Butoxybutane
5. CH3CH2 OCH3 – Methoxyethane
6. CH3CH2CH2OCH2CH3 – Ethoxypropane
7. Discuss the properties of ethers:
8. Physical State:

At room temperature, ethers are colorless, neutral liquids with pleasant odors. The lower aliphatic ethers are highly flammable gases and volatile liquids.

1. Solubility:

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 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.

1. 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

1. Boling Point:

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

1. Reactivity:

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

1. Discuss explicitly two methods of preparing ethers and show equations of reaction.
2. Dehydration of Alcohols:

Simple ethers are manufactured from alcohols by catalytic dehydration. The alcohol in excess and concentrated tetraoxosulphate (VI) (H2SO4) 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.

Conc. H2SO4

2R-OH R—O—R + H2O

140OC

Examples

Conc. H2SO4

2CH3CH2OH CH3CH2-O-CH2CH3 + H2O

**Ethoxyethane**

140OC

1. Williamson’s Synthesis:

Mixed or simple ethers of definite structure may be synthesized by Williamson’s synthesis. The process involves the displacement of a halogen from a haloalkane by an alkoxide (alkylate) or phenoxide (phenate) ion.

RX + R’-ONa ROR’ + NaX

A typical example:

C3H7ONa + C2H5Br C3H7OC2H5 + NaBr

**Ethoxypropane**

Methoxyaromatics are more efficiently prepared from the dimethyl sulphate and appropriate phenol.

OCH3

OH

Aq. NaOH

 + (CH3)2SO4  + CH3NaSO4

heat

**Methoxybenzene**

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