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CHM 102 ASSIGNMENT

1. **IUPAC NAMES OF ORGANIC COMPOUNDS.**

CH_3OCH_3– Methoxymethane

$CH_3CH_2OCH_2CH_3$– Ethoxyethane

$(CH_3CH_2CH_2CH_2)_2O$– Butoxymethane

$CH_3CH_2CH_2OCH_2CH_3$– Ethoxypropane

2. **PROPERTIES OF ETHERS**

   i) **Physical states**: at room temperature, ethers are colorless, neutral liquids with pleasant odors. The lower aliphatic ethers are highly flammable gases or volatile liquids.

   ii) **Solubility**: ethers are less soluble in water than are the corresponding alcohols. Lower molecular weight ethers such as methoxymethane 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 fast decline in solubility. They are miscible with most organic solvents.

   iii) **Reactivity**: ethers are inert at moderate temperature. Their inertness at moderate temperatures leads to their wide use as reaction media.

   iv) **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.

   v) **Boiling 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 the case. The boiling point of ethers tends to be almost the same with those of hydrocarbons of some 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.

3. **PREPARATION OF ETHERS.**

   i) 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 140^0c. this process is known as continuous etherification. If excess alcohol is not used, the temperature is as high as 170-180^0c. further dehydration to yield alkene occurs.

   Equation:

   $2ROH \xrightarrow{\text{conc. } H_2SO_4/140^0c} R\text{-}O\text{-}R + H_2O$

   Example

   $2CH_3OH \xrightarrow{\text{conc. } H_2SO_4/140^0c} CH_3\text{-}O\text{-}CH_3 + H_2O$

   ii) From haloalkanes and dry silver (I) oxide

   Equation:

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

   Example:

   $2CH_3CH_2Cl + Ag_2O \xrightarrow{\text{warm}} CH_3CH_2OCH_2CH_3 + 2AgCl$

   ethoxyethane

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 in the preparation of nonionic emulsifying agents, plastics, plasticizers and several synthetic textiles

   iii. Ethylene oxide is used as a gaseous sterilizing agent