FADARE AYOMIDE IYANUOLUWA
DENTISTRY
19/MHS09/008

CHEMISTRY ASSIGNMENT

1. CH_3OCH_3 – Methoxymethane

   $CH_3CH_2OCH_2CH_3$ - Ethoxyethane

   $(CH_3CH_2CH_2CH_2)_2O$ - Butoxymethane

   $CH_3CH_2OCH_3$ – Methoxyethane

   $CH_3CH_2CH_2OCH_2CH_3$ – Ethoxypropane

2. Discuss properties of ethers

   General properties

   Physical states

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

   Solubility

   Ethers are less soluble in water than are the corresponding alcohols. Lower molecular weight ethers such as methoxymethane and methoxyethane are soluble in water since the molecule can 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 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.

   Reactivity

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

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

   Partial dehydration of alcohols.

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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

$2ROH \xrightarrow{\text{conc. } H_2SO_4 \text{ /140°C}} R\text{-}O\text{-}R + H_2O$

Examples

$2CH_3CH_2OH \xrightarrow{\text{conc. } H_2SO_4 \text{ /140°C}} CH3CH2\text{-}O\text{-}CH_2CH_3 + H_2O$

From Haloalkanes and dry silver (I) oxide

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

$2CH_3CH_2CH_2Cl + Ag_2O \xrightarrow{\text{warm}} CH_3CH_2CH_2O\ CH_2CH_2CH_3 + 2AgCl$ Propoxypropane

4. State three uses of ethyl oxide
    a) Ethylene oxide is used as an intermediate in the hydrolytic manufacture of ethylene glycol.
    b) Ethylene oxide is used in the preparation of nonionic emulsifying agents, plastics, plasticizers and several synthetic textiles.
    c) Ethylene oxide is used as a gaseous sterilizing agent.