NAME : OKOH TESSY EBUBE

DEPARTMENT : MBBS

MATRIC NUMBER : 19/MHS01/320

COURSE : CHEM 102

ASSIGNMENT ON ETHERS

1. Give the IUPAC names of the following organic compounds

a CH_3OCH_3 b) $CH_3CH_2OCH_2CH_3$ c.) $(CH_3CH_2CH_2CH_2)_2O$

d) $CH_3CH_2OCH_3$ e) $CH_3CH_2CH_2OCH_2CH_3$

Answer.

	Organic compounds	IUPAC names
a.	CH_3OCH_3	Methoxymethane
b.	$CH_3CH_2OCH_2CH_3$	Ethoxyethane
c.	$(CH_3CH_2CH_2CH_2)_2O$	Butoxymethane
d	$CH_3CH_2OCH_3$	Methoxyethane
e	$CH_3CH_2CH_2OCH_2CH_3$	Ethoxypropane

2. Discuss the properties of Ethers.

PROPERTIES OF ETHERS

1. PHYSICAL STATES

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

2. SOLUBILITY

Ethers are less soluble in water than 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 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.

3 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.

4 BOILING POINT

Low molecular mass ethers have a low boiling point than the corresponding alcohols but those ethers containing alkyl ~~acids~~ 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.

5 REACTIVITY

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

Simple ethers are not found commonly in nature but the ether linkage linkage is present in such natural products as sugars, starches and cellulose.

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

ANSWERS.

METHODS OF PREPARING ETHERS WITH EQUATIONS

1. PARTIAL DEHYDRATION OF ALCOHOLS

Simple ethers are manufactured from alcohols by catalytic dehydration. The alcohols in excess and concentrated tetraoxosulphate (vi) acid is heated at a carefully maintained temperature of 140°C. This process is known as "continuous etherification". If excess alcohol is not used, the temperature is as high as 170 - 180°C, further dehydration to yield alkene occurs.

$$2ROH \xrightleftharpoons[140^\circ C]{\text{Conc. } H_2SO_4} R-O-R + H_2O$$

Examples.

$$CH_3-CH_2-O-H + H-O-CH_2-CH_3 \xrightleftharpoons[140^\circ C]{\text{Conc. } H_2SO_4} CH_3-CH_2-O-CH_2-CH_3 + H_2O$$

(2 moles of ethanol) (Ethoxyethane) Water

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

(2 moles of ethanol.) Ethoxyethane Water

2. FROM HALOALKANES AND DRY SILVER (I) OXIDE.

General formula for ethers => R-O-R, R-O-Ar, Ar-O-Ar, where R => Alkyl group and Ar => Aryl group.

* In the 1st example [it gives a basic explanation]

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

As said earlier here R represents an alkyl group while X represents a halogen. The 2 atoms of the alkyl group displace the silver from its oxide to form an ether as seen above. The 2 atoms of the alkyl group attach themselves to both sides of the single oxygen atom thereby forming an ether.

* In the 2nd example [They make use of actual elements to explain]

$$2CH_2CH_2CH_2Cl + Ag_2O \xrightarrow{\text{warm}} CH_2CH_2CH_2OCH_2CH_2CH_2 + 2AgCl$$

R X R — O — R

Here $CH_2CH_2CH_2$ (C_3H_6) is your alkyl group (R) and chlorine is your halogen. The same reaction takes place just like in example 1, 2 atoms of $CH_2CH_2CH_2$ (C_3H_6) displace silver and attach themself to each side of the single oxygen atom to form :-> $CH_2CH_2CH_2OCH_2CH_2CH_2$ "propoxypropane"

R — O — R

which is an ether.

4. State three uses of ethylene oxide.

USES OF ETHYLENE OXIDE.

1. Ethylene oxide is used as an intermediate in the hydrolytic manufacture of ethylene glycol.

2. Ethylene oxide is used in the preparation of non-ionic emulsifying agents, plastics, plasticizers and several synthetic textiles.

3. Ethylene oxide is used as a gaseous sterilizing agent.