NAME : ATUME MIMIDOO VICTORIA
MATRIC NO: 19/MHS01/107
DEPT : MEDICINE AND SURGERY

COURSE: CHM 102.
ASSIGNMENT.

1a 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 The properties of ethers are:
a Physical states: Ethers are colourless, neutral liquids with pleasant odours at room temperature. The lower aliphatic ethers are highly flammable gases or volatile liquids.

b Solubility: Ethers are less soluble in water than the corresponding alcohols. Lower molecular weight ethers such as methoxymethane and methoxyethane are fairly soluble in water since the molecules 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.

c 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.

d Boiling point: low molecular mass ethers have a lower boiling than the corresponding alcohols but for those ethers containing alkyl radicals larger than four carbon atoms, the reverse is true. The boiling point of ethers tends to be approximate to 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.

e Reactivity: Ethers are inert at moderate temperature. Their inertness at moderate temperatures leads to their wide use as reaction media. This is also why they are widely used as solvents for a variety of organic reactions. They are inert undoubtedly due to the absence of the reactive O–H bond.

3 Two methods of preparing ethers are:

(i) Partial dehydration of alcohols:

Simple ethers are manufactured from alcohols by catalytic dehydration. The alcohol in excess and concentrated H_2SO_4 are 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 and then dehydration to yield an alkene occurs.

Equation:

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

Specific example: The production of ethoxyethane from ethanol.

$$2CH_3CH_2OH \xrightarrow{\text{conc. } H_2SO_4 / 140°C} CH_3CH_2OCH_2CH_3 + H_2O$$

ethanol — ethoxyethane.

~~2. Controlled Catalytic Hydration of Olefins~~

(ii) From haloalkanes and dry silver(I) oxide.

When an alkylhalide or haloalkane is heated with dry Ag_2O, it produces ether and a silverhalide.

Equation:

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

Specific example: The production of propoxypropane from propylchloride and Ag_2O.

$$2CH_3CH_2CH_2Cl + Ag_2O \xrightarrow{\text{warm}} CH_3CH_2CH_2OCH_2CH_2CH_3 + 2AgCl$$

propoxypropane

4 Three uses of ethylene oxide are:

(i) Ethylene oxide is used as an intermediate in the hydrolytic manufacture of ethylene glycol.

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

(iii) Ethylene oxide is used as a gaseous sterilizing agent.