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Assignment Title: Assignment on Ether

Course Title: General Chemistry II

Course Code: CHM 102

### Question

① Give the IUPAC names of the following organic compounds.

i)  $\text{CH}_3\text{OCH}_3 \rightarrow$  Methoxymethane

ii)  $\text{CH}_3\text{CH}_2\text{OCH}_2\text{CH}_3 \rightarrow$  Ethoxyethane

iii)  $(\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_2)_2\text{O} \rightarrow$  Butoxymethane

iv)  $\text{CH}_3\text{CHOCH}_3 \rightarrow$  Methoxyethane

v)  $\text{CH}_3\text{CH}_2\text{CH}_2\text{OCH}_2\text{CH}_3 \rightarrow$  Ethoxypropane

② Discuss the properties of ethers.

① Physical states

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

② 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 molecules 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 esters have a lower boiling point than the corresponding alcohols but those esters containing alkyl radicals larger than four carbon atoms, the reverse is true. The boiling point of esters 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

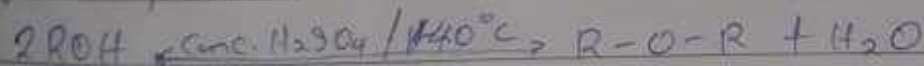
Esters are inert at moderate temperature. Their inertness at moderate temperature ~~leads~~ leads to their wide use as reaction media.

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

#### ① PARTIAL DEHYDRATION OF ALCOHOLS

Simple esters are manufactured from alcohols by catalytic dehydration. The alcohol in excess and concentrated tetraoxosulphate (VI) acid is heated at a carefully maintained temperature of  $140^{\circ}\text{C}$ . This process is known as continuous esterification. If excess alcohol is not used, the temperature is as high as  $170-180^{\circ}\text{C}$ , further dehydration to yield alkene occurs.

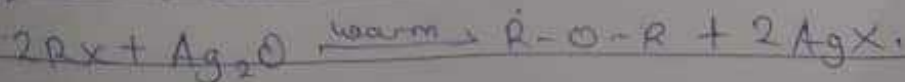
Equation of reaction:



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

Ether can be prepared by heating haloalkanes with dry silver (I) oxide.

Equation of reaction



④ State three 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 nonionic emulsifying agents, plastics, plasticizers and several synthetic textiles

3) Ethylene oxide is used as a gaseous sterilizing ~~gas~~ agent.