

CHM 102 ASSIGNMENT [ETHERS]

- a)  $\text{CH}_3\text{OCH}_3$  - Methoxymethane.
- b)  $\text{CH}_3\text{CH}_2\text{OCH}_2\text{CH}_3$  - Ethoxyethane
- c)  $(\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2)_2\text{O}$  - Butoxybutane
- d)  $\text{CH}_3\text{CH}_2\text{OCH}_3$  - Methoxyethane
- e)  $\text{CH}_3\text{CH}_2\text{CH}_2\text{OCH}_2\text{CH}_3$  - Ethoxypropane

2) General Properties (Physical and Chemical)

a) Physical states:

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

b) ~~Boiling point~~ Density:

~~Low molecular mass ethers are less dense than water, although the~~  
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.

c) Boiling point:

Low molecular mass ethers have a lower boiling point than the corresponding alcohols but those ethers ~~cont~~ containing alkyl radicals larger than four carbon atoms, the reverse is true.

d) Reactivity:

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

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

e) Solubility:

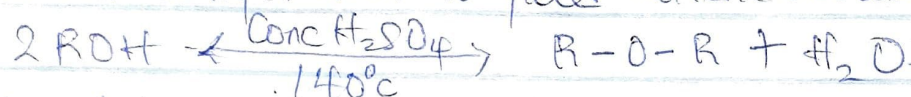
Ethers are less soluble in water than the corresponding alcohols. Lower molecular weight ethers such as methoxymethane and methoxyethane are fairly soluble in water since the molecules are able to form hydrogen bonds with the

water molecules but as the hydrogen content of the molecules increases there is a rapid decline in solubility. They are miscible with most organic solvents.

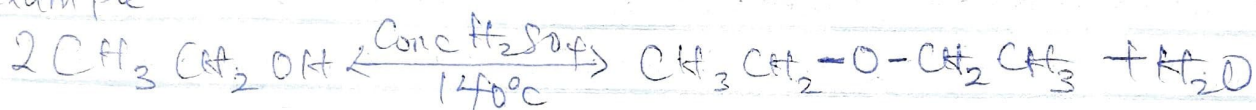
### 3) Methods of Preparation of ethers

#### a) Partial dehydration of alcohols:

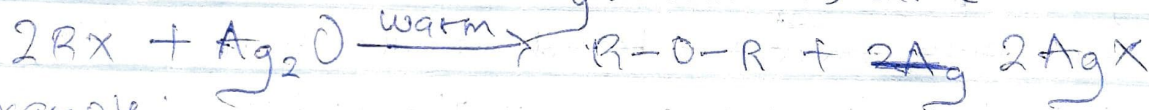
Simple ethers are manufactured from alcohols by catalytic ~~dehydration~~ dehydration. The alcohol in excess and concentrated tetraoxosulphate(VI) acid is heated at a carefully maintained temperature of  $140^{\circ}\text{C}$ . This process is known as <sup>CC</sup> "Continuous Etherification". If the excess alcohol is not used, the temperature is as high as  $170 - 180^{\circ}\text{C}$ . Further dehydration to yield alkene occurs.



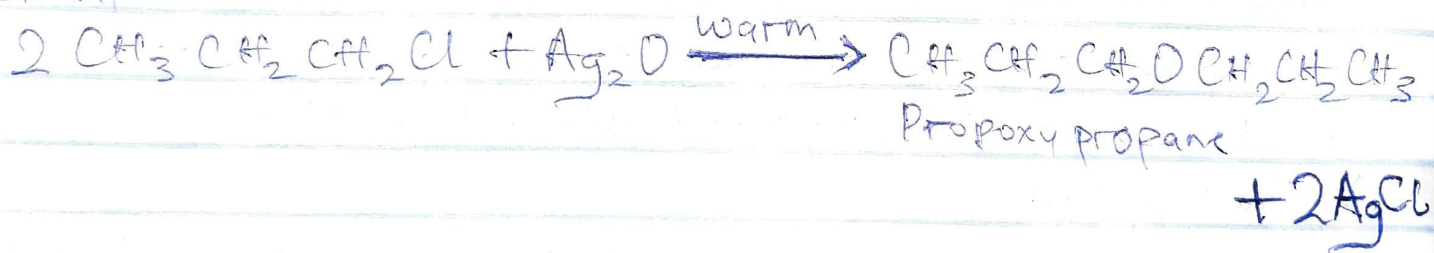
Example



#### b) From Haloalkanes and dry Silver (I) oxide



Example



### 4) Uses of Ethylene Oxide

- Ethylene oxide is used as a gaseous sterilizing agent.

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

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