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Course Title: General Chemistry II

### Assignment On Ethers

1. Give the IUPAC names of the following organic compounds:

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.  $\text{CH}_3\text{CH}_2\text{OCH}_3$  - Methoxy ethane

e.  $\text{CH}_3\text{CH}_2\text{CH}_2\text{OCH}_2\text{CH}_3$  - Ethoxy propane

2. Properties Of Ethers

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. Solubility: Ethers are less soluble in water than the corresponding alcohols because they will not form hydrogen bonds with water. Lower molecular weight ethers such as methoxymethane and methoxy ethane are fairly soluble in water 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 denser than water.

(d) Boiling point: Low molecular mass ethers have a lower boiling point than the corresponding alcohols but <sup>for</sup> those ethers containing alkyl radicals larger

than four carbon atoms, the reverse is true. The boiling point of ethers tend to be approximate those of hydrocarbons of same relative molecular mass.

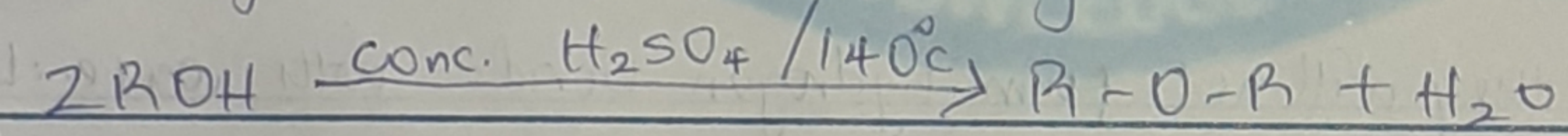
(e) Reactivity: Ethers are inert at moderate temperature. Their inertness at moderate temperatures leads to their wide use as reaction media. Simple ethers are not found commonly in nature but the ether linkage is present in such natural products as sugars, starches and cellulose.

### 3. Methods Of Preparing Ethers

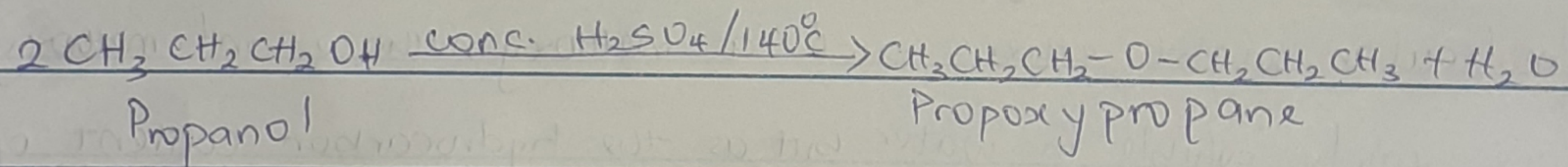
(a) Partial dehydration of alcohols:

Simple ethers are manufactured from alcohols by catalytic dehydration. The alcohol in excess and concentrated tetraoxosulphate

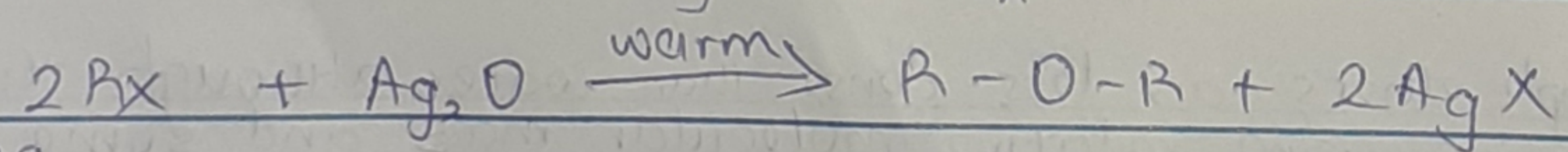
(VI) acid is heated at a carefully maintained temperature of  $140^{\circ}\text{C}$ . This process is known as continuous etherification. If excess alcohol is not used and the temperature is as high as  $170-180^{\circ}\text{C}$ , further dehydration occurs to yield alkene.



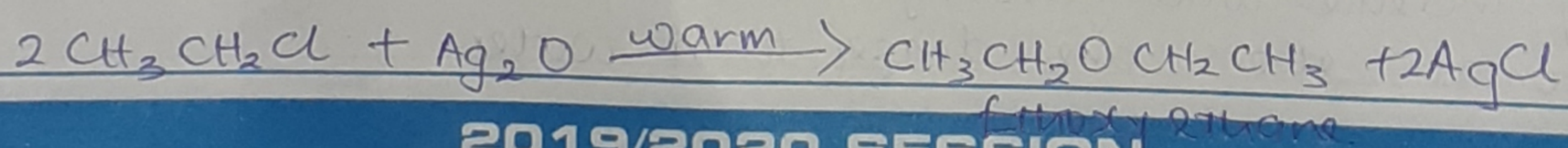
e.g



(b) From haloalkanes and dry silver(I) oxide: This involves heating haloalkanes with dry silver <sup>(I)</sup> oxide



e.g





## H. Uses Of Ethylene Oxide

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