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Course Code: CHEM 102

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Assignment

1. IUPAC names of the following;

$\text{CH}_3\text{OCH}_3 \rightarrow$ methoxymethane

$\text{CH}_3\text{CH}_2\text{OCH}_2\text{CH}_3 \rightarrow$ ethoxyethane

$(\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2)_2\text{O} \rightarrow$ butoxymethane

$\text{CH}_3\text{CH}_2\text{OCH}_3 \rightarrow$ methoxyethane

$\text{CH}_3\text{CH}_2\text{CH}_2\text{OCH}_2\text{CH}_3 \rightarrow$ ethoxypropane

2. The properties of ethers are;

i. Physical states - Ethers are colourless, neutral liquids with pleasant odours at room temperature. The lower aliphatic ethers are highly flammable gases or volatile liquids.

ii. Solubility - Ethers are less soluble in water. Lower molecular weight ethers such as methoxymethane and methoxyethane are fairly soluble in water. They are miscible with most organic solvents.

iii. 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.

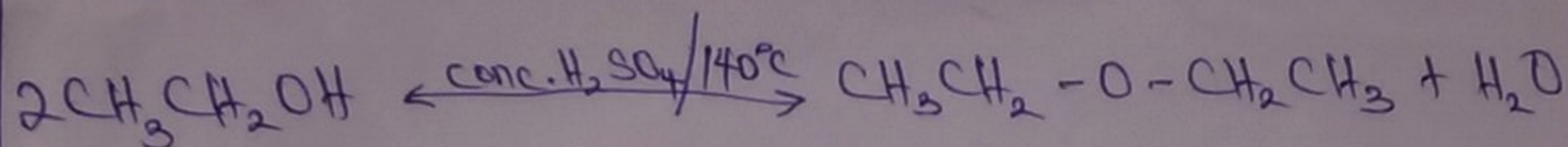
iv. Boiling point - Low molecular mass ethers have a lower boiling point than the corresponding alcohols, but those ethers containing alkyl radicals larger than four carbon atoms have a higher boiling point.

v. Reactivity: Ethers are inert at moderate temperature and thus leads to their wide use as reaction media.

3. Methods of preparing ethers;

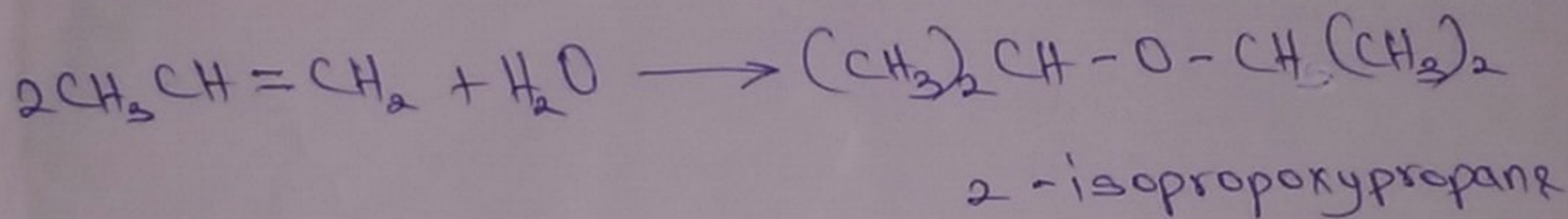
i. Partial dehydration of alcohols - Simple ethers are manufactured from alcohols by catalytic dehydration. The alcohol in excess and concentrated tetraoxosulphate(VI) acid (H_2SO_4) is heated at a carefully maintained temperature of 140°C , this process is called continuous etherification.

If excess alcohol is not used, the temperature is as high as $170 - 180^{\circ}\text{C}$.



2 molecules of ethanol when dehydrated gives 2 molecules of water

ii. Controlled catalytic hydration of olefins/alkene -



4. 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 as a gaseous sterilizing agent.
- iii. It is used in the preparation of nonionic emulsifying agents.