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Course Code: Chem 102 (Assignment 3) - Ethers

① Give the IUPAC names of the following organic compounds:

(i) CH_3OCH_3 - Ethanal Methoxymethane

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

(iii) $\text{CCH}_3\text{CH}_2(\text{CH}_2\text{CH}_2)_2\text{O}$ - Butoxymethane

(iv) $\text{CH}_3\text{CH}_2\text{OCH}_3$ - Methoxyethane

(v) $\text{CH}_3\text{CH}_2\text{CH}_2\text{OCH}_2\text{CH}_3$ - Ethoxypropane.

② Discuss the properties of ethers

(i) Physical states: At room temperature, ethers are colourless, neutral liquids with pleasant odours. The lower aliphatic ethers are highly flammable gases or volatile liquids.

(ii) 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 the water molecules but as the hydrocarbon content of the molecule increases, there is rapid decline in solubility. They are miscible with most organic solvents.

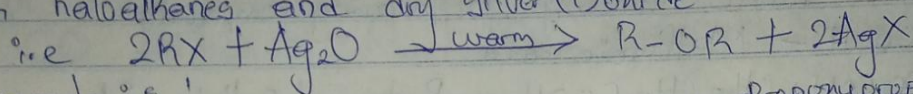
(iii) Density: Most of the simple ethers are less dense than water although density increases with increasing relative molecular mass and some of the aromatic ethers are in fact denser than water.

(iv) 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.

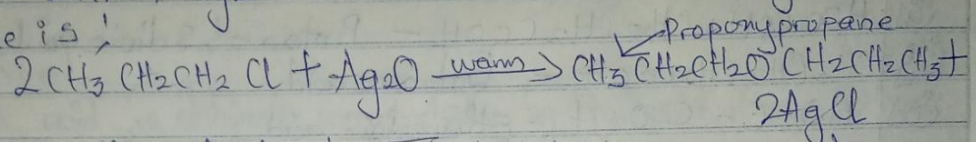
Q) Discuss explicitly two methods of preparing ethers and show equations of reaction.

Answers

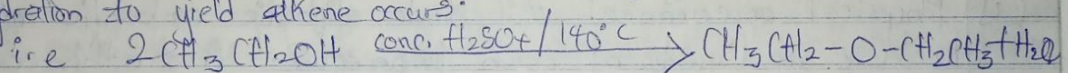
(i) From haloalkanes and dry silver(I) oxide



An example is:



(ii) Partial dehydration of alcohols: The alcohol in excess and concentrated H_2SO_4 is 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 $170-180^\circ\text{C}$, further dehydration to yield alkene occurs.



Q) State three uses of ethylene oxide

(i) It is used as a gaseous sterilizing agent

(ii) It is used in the preparation of ~~non~~ nonionic emulsifying agents, plastics, plasticizers and several synthetic textiles.

(iii) It is used as an intermediate in the hydrolytic manufacture of ethylene glycol.