

Chemistry

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Chm 102

① Below are the IUPAC names of the following compounds

- CH_3OCH_3 — Methoxymethane
- $\text{CH}_3\text{CH}_2\text{OCH}_2\text{CH}_3$ — Ethoxyethane
- $(\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2)_2\text{O}$ — Dioxane
- $\text{CH}_3\text{CH}_2\text{OCH}_2\text{CH}_3$ — Methoxyethane
- $\text{CH}_3\text{CH}_2\text{CH}_2\text{OCH}_2\text{CH}_3$ — Ethoxypropane

② Below

are the properties of ethane

(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) 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.

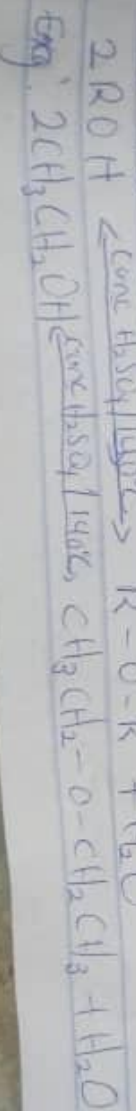
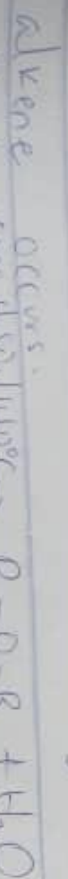
(iii) Solubility. Ethers are less soluble in water than the corresponding alcohols. Lower molecular weight ethers such as methoxyethane and methoxymethane are fairly soluble in water since the molecules are able to form hydrogen bonds with the water molecules but as the hydrogen content of the molecules increases, there is a rapid decline in solubility. They are miscible with most organic solvents.

(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, the reverse is true. The boiling point of ethers 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 suitable available hydrogen for association through hydrogen bonds.

v) Reactivity: Ethers are inert at moderate temperature. Their inertness at moderate temperature lead to their wide use of reaction media. Simple ~~inert~~ ethers are not found commonly in nature but the ether linkage is present in such natural products such as starches, sugar and cellulose.

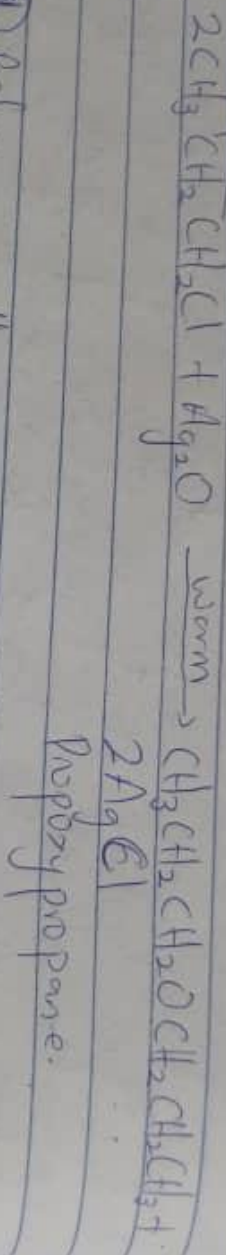
3) Below are the methods of preparing ethers and Equations of reactions:

(i) 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 temperature of 140°C . This process is known as continuous etherification. If excess alcohol is not used, the temperature is as high as $170^\circ - 180^\circ\text{C}$, further dehydration to yield



(ii) From haloalkanes and dry silver Cl₂ oxide
 $2RX + Ag_2O \xrightarrow{\text{warm}} R-O-R + 2AgX$

Example:



Below are the uses of ethylene oxide

- (i) It is used as a gaseous sterilising agent
- (ii) It is used as an intermediate in the hydrolytic manufacture of ethylene glycol
- (iii) It is used in the preparation of non-ionic emulsifying agents, plastic, and several synthetic textiles