

ANSWERS

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

2.) Properties of ethers

a) Physical state

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

b) Solubility

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

c) Density

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

d) Boiling point

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

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 ether linkage is present in such natural products as sugars, starches and cellulose.

3a) Controlled catalytic hydration of olefins [alkene]
Through controlled catalytic hydration of olefins we get ethers

$$2\text{CH}_3\text{CH}=\text{CH}_2 + \text{H}_2\text{O} \longrightarrow (\text{CH}_3)_2\text{CH}-\text{O}-\text{CH}(\text{CH}_3)_2$$

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2-Isopropoxypropane

b) From haloalkanes and dry silver (I) oxide: Through haloalkanes and dry silver (I) oxide we get ethers

$$2\text{CH}_3\text{CH}_2\text{CH}_2\text{Cl} + \text{Ag}_2\text{O} \xrightarrow{\text{warm}} \text{CH}_3\text{CH}_2\text{CH}_2\text{OCH}_2\text{CH}_2\text{CH}_3 + 2\text{AgCl}$$

↓
Propoxypropane

4) Uses of ethylene oxide.

a) It is used as an intermediate in the hydrolytic manufacture of ethane glycol.

b) It is used in the preparation of non-ionic emulsifying agents, plastics, plasticizers and several synthetic textiles.

c) It is used as a gaseous sterilizing agent.