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DEPARTMENT: NURSING

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QUESTION 1

Give the IUPAC names of the following organic compounds

- ❖ CH_3OCH_3 - Methoxymethane
- ❖ $\text{CH}_3\text{CH}_2\text{OCH}_2\text{CH}_3$ - Ethoxymethane
- ❖ $(\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2)_2\text{O}$ - Butoxymethane
- ❖ $\text{CH}_3\text{CH}_2\text{OCH}_3$ - Methoxyethane
- ❖ $\text{CH}_3\text{CH}_2\text{CH}_2\text{OCH}_2\text{CH}_3$ - Ethoxypropane

QUESTION 2

Discuss the properties of ethers.

Answer

General Properties

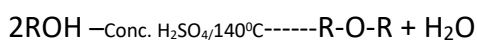
- ❖ Physical states: Ethers are colorless, neutral liquids with pleasant odours at room temperature. The lower aliphatic ethers are highly flammable gases or volatile liquids.
- ❖ Solubility: Ethers are less soluble in water than in the corresponding alcohols. Lower molecular weight ethers such as methoxymethane and methoxyethane are fairly soluble in water since the molecules are able to form hydrogen bonds with the water molecule but as the hydrocarbon content of the molecules increases, there is a rapid decline in solubility. They are miscible with moist organic solvents.
- ❖ Density: Most of the simple ethers are less dense than water, although the density increases with increasing relative molecular mass and some aromatic ethers are in fact denser than water.
- ❖ Boiling point: Ethers with low molecular mass have a lower boiling point than corresponding alcohols but those ethers containing alkyl radicals larger than four carbon atoms, the reverse is true. The boiling point of ethers tends 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 suitably available hydrogen atoms for association through hydrogen bonds.
- ❖ Reactivity: Ethers are inert at moderate temperature. Their inertness at moderate temperature leads to their wide use as reaction media.

QUESTION 3

Discuss explicitly two methods of preparing ethers and show equation of reaction.

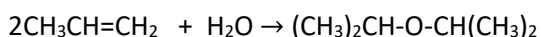
Answer

- ❖ 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 known as continuous etherification. If excess alcohol is not used, the temperature is as high as $170\text{-}180^\circ\text{C}$, further dehydration to yield alkene occurs



- E.G $2\text{CH}_3\text{CHOH} \xrightarrow{\text{Conc. H}_2\text{SO}_4/140^\circ\text{C}} \text{CH}_3\text{CH}_2\text{-O-CH}_2\text{CH}_3 + \text{H}_2\text{O}$

- ❖ Controlled catalytic hydration of olefins



2-isopropoxypropane

QUESTION 4

State three uses of ethylene oxide.

Answer

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