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DEPARTMENT: PHARMACY

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COURSE CODE: CHEM 102

ASSIGNMENT

1. Give the IUPAC names of the following compounds

CH_3OCH_3 - Methoxymethane

$\text{CH}_3\text{CH}_2\text{OCH}_2\text{CH}_3$ - Ethoxyethane

$(\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2)_2\text{O}$ - Butoxybutane

$\text{CH}_3\text{CH}_2\text{OCH}_3$ - Methoxyethane

$\text{CH}_3\text{CH}_2\text{CH}_2\text{OCH}_2\text{CH}_3$ - Ethoxypropane

2. Discuss the properties of ethers

i. Physical State: At room temperature, ethers are colorless, 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 their 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 water molecules but as the hydrocarbon content of the molecules increases, there is a rapid decline in solubility. They are miscible with most organic solvents.

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

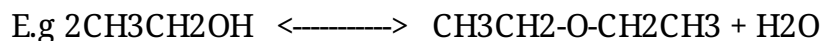
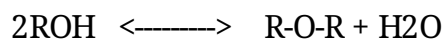
iv. Boiling point: Low molecular mass ethers have a lower boiling point than their corresponding alcohols but those ethers containing alkyl radicals larger than four carbon atoms, the reverse is true. The boiling point of ethers tend to approximate those of hydrocarbons of the same relative molecular mass from which it can be concluded that the molecules are not associated in the liquid phase as there are no suitably available hydrogen for association through hydrogen bonds.

v. 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 or bonds is present in such natural products such as sugars, starches and cellulose.

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

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 carefully maintained temperature at 140°C. This process is called continuous etherification. If excess alcohol is not used, the temperature is as high as 170-180°C, further dehydration to yield alkene occurs



ii. Controlled Catalytic Hydration Of Olefins or Alkenes



2-isopropoxypropane

4. State three uses of ethylene oxide

i. It is used as a gaseous sterilizing agent

ii. It is used as an intermediate in the hydrolytic manufacture of ethylene glycol

iii. Ethylene oxide is used in the preparation of nonionic emulsifying agents, plastics, plasticizers and several synthetic textiles.

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