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Assignment Title: Assignment on Ether
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Question 1: Give the IUPAC Name of the following Compounds

i) CH_3OCH_3 → Methoxymethane
ii) $CH_3CH_2OCH_2CH_3$ → Ethoxyethane
iii) $(CH_3CH_2CH_2CH_2)_2O$ → Butoxybutane
iv) $CH_3CH_2OCH_3$ → Methoxyethane
v) $CH_3CH_2CH_2OCH_2CH_3$ → Ethoxypropane

Question 2: Discuss the properties of ethers

i). Physical States: Ethers are colorless, neutral liquids with pleasant odours at room temperature. 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 are fairly soluble in water since the molecule are able to form hydrogen bonds with the water molecules but as the hydrocarbon content of the molecules increases, there is a rapid decline in solubility.

iii) Boiling point: lower 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 suitably available hydrogen for association through hydrogen bonds.

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

v) Reactivity: Ethers are inert at moderate temperature. Their inertness at moderate temperatures leads to their wide use as reaction media.

Question 3: Discuss explicitly two methods of preparing ethers and show equations of reaction

i) Partial dehydration of alcohols: Simple ethers are manufacture from alcohols by catalytic dehydration. Excess alcohol and concentrated tetraoxosulphate(vi) acid 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°C–180°C, further dehydration to yield alkene occurs.

$$2ROH \xleftarrow{\text{conc. } H_2SO_4/140^\circ C} R-O-R + H_2O$$

Examples $$2CH_3CH_2OH \xleftarrow{\text{conc. } H_2SO_4/140^\circ C} CH_3CH_2-O-CH_2CH_3 + H_2O$$

ii) Controlled catalytic hydration of olefins

$$2CH_3CH=CH_2 + H_2O \rightarrow (CH_3)_2CH-O-CH(CH_3)_2$$

2-Isopropoxypropane

Question 4: State three uses of ethylene oxide

i) Ethylene oxide is used as a gaseous sterilizing agent

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

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