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19/mhs11/118 chem 102

1. Give the IUPAC names of the following organic compounds. 1)

CH_3OCH_3 – Methoxymethane
$CH_3CH_2OCH_2CH_3$ – Ethoxyethane
$CH_3CH_2CH_2CH_2OCH_3$ – Butoxymethane
$CH_3CH_2OCH_3$ – Methoxyethane
$CH_3CH_2CH_2OCH_2CH_3$ – Ethoxypropane

2. Discuss the properties of ethers
General properties
Physical state – Ethers are colourless, neutral liquids with pleasant odour at room temperature
Solubility – Ethers are less soluble in water than are the corresponding alcohols
Density – Most of the simple ethers are less dense than water, although the density increases with increasing relative molecular mass.
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.
Reactivity – Ethers are inert at moderate temperatures

3. Discuss explicitly two methods of preparing ethers and show equations of reactions.
i. Partial dehydration of alcohols
Simple ethers are manufactured from alcohols by catalytic dehydration. The alcohol in excess and conc. tetraoxosulphate(VI) acid is heated at a carefully maintained temperature of 140°C, this process is known as continuous etherification

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

(ii) Controlled catalytic hydration of olefins

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

2-isopropoxypropane

4 State three uses of ethylene oxide

(i) Ethylene oxide is used as an intermediate in the hydrolytic manufacture of ethylene glycol

(ii) Ethylene oxide is used in the preparation of non-ionic emulsifying agents, plastics, plasticizers and several synthetic textiles

(iii) Ethylene oxide is used as a gaseous sterilizing agent