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MATRIC N0: 19/ENG05/016

DEPARTMENT: MECHATRONICS ENGINEERING.

COURSE: CHM 102

COVID-19 HOLIDAY ASSIGNMENT

Question 1

Give the IUPAC names of the following organic compounds;

- (a) CH_3OCH_3
- (b) $\text{CH}_3\text{CH}_2\text{OCH}_2\text{CH}_3$
- (c) $(\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2)_2\text{O}$
- (d) $\text{CH}_3\text{CH}_2\text{OCH}_3$
- (e) $\text{CH}_3\text{CH}_2\text{CH}_2\text{OCH}_2\text{CH}_3$

SOLUTION

- (a) CH_3OCH_3 – Methoxymethane
- (b) $\text{CH}_3\text{CH}_2\text{OCH}_2\text{CH}_3$ – Ethoxyethane
- (c) $(\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2)_2\text{O}$ – Butoxybutane
- (d) $\text{CH}_3\text{CH}_2\text{OCH}_3$ – Methoxyethane
- (e) $\text{CH}_3\text{CH}_2\text{CH}_2\text{OCH}_2\text{CH}_3$ – Ethoxypropane

Question 2

Discuss the properties of ethers.

SOLUTION

(a) **Physical states:**

At room temperatures, ethers are colourless neutral liquids with pleasant odour. The lower aliphatic ethers are flammable gases or volatile liquid.

(b) **Solubility:**

Ethers are less soluble in water than are 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 bond with the water molecules. But as the carbon content increases per molecule, there is a rapid decrease in solubility. Ethers are miscible with most organic solvents.

(c) **Density:**

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

(d) Boiling point:

Lower molecular mass ethers have a lower boiling point than the corresponding alcohols but those ethers with alkyl radicals larger than four carbons, 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.

(e) Reactivity:

Ethers are inert at moderate temperature. This leads to their wide use as reaction media.

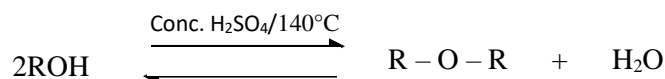
Question 3

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

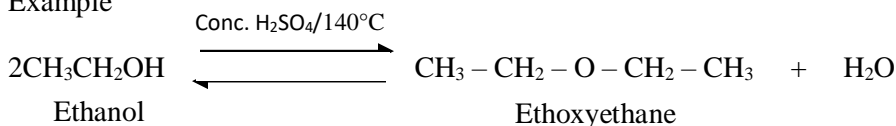
SOLUTION

(a) Partial dehydration of alcohol

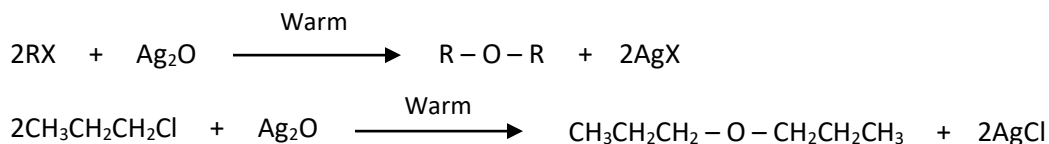
Simple ethers are manufactured from alcohols by catalytic dehydration. The alcohol in excess and concentrated tetraoxosulphate(VI) acid is heated at a carefully maintained temperature of 140°C. this process is known as continuous etherification. If excess alcohol is not used, the temperature is as high as 170°C – 180°C, further dehydration to yield alkene occurs.



Example



(b) From haloalkanes and dry silver(I)oxide



Question 4

State three uses of ethylene oxide

SOLUTION

- (a) Ethylene oxide is used as an intermediate in the hydrolytic manufacture of ethylene glycol
- (b) Ethylene oxide is used in the preparation of nonionic emulsifying agents, plastics, plasticizers and several synthetic textiles
- (c) Ethylene oxide is used as a gaseous sterilizing agent.