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19/MHS11/030
CHEM 102 (ETHERS) ASSIGNMENT

1) Give the IUPAC names of the following organic compounds

CH_3OCH_3 – Dimethyl Ether
$CH_3CH_2OCH_2CH_3$ – Ethoxyethane
$(CH_3CH_2CH_2CH_2)_2O$ – Butoxymethane
$CH_3CH_2OCH_3$ – Methoxyethane
$CH_3CH_2CH_2OCH_2CH_3$ – Ethoxypropane

2) Discuss the properties of ethers

a) Density – Most of the simple ethers are less denser than water, although the density increases with increasing relative molecular mass.

b) Reactivity – Ethers are inert at moderate temperature

c) Physical State – Ethers are less soluble in water than are the corresponding alcohols

d) Boiling Point – low molecular mass ethers have a lower boiling point than the corresponding alcohols but those ethers containing alkyl radicals larger than 4 Carbon atoms, the reverse is true.

e) Solubility – Ethers are less soluble in water than are the corresponding alcohols

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

i) Preparation of Ethers by Dehydration of Alcohols – In the presence of protic acids (sulphuric acids), alcohols undergo dehydration to produce alkenes and ethers under different conditions. For example; In the presence of sulphuric acid, dehydration of ethanol at 443K ~~This~~ yields ethene where as it yields ethoxyethane at 413K. This is an ideal method of preparation through primary alcohols

$$CH_3CH_2OH \xrightarrow[443K]{H_2SO_4} CH_2=CH_2$$
$$CH_3CH_2OH \xrightarrow[413K]{H_2SO_4} CH_3CH_2OCH_2CH_3$$

ii) Preparation of Ethers by Williamson Synthesis – Williamson Synthesis is an important method for the preparation of symmetrical ~~synthesis~~ and asymmetrical ethers in laboratories. In this method, an alkyl halide is reacted with sodium alkoxides which leads to the formation of ether. The reaction generally follows the S_N2 mechanism for primary alcohol.

$$R-X + R-\ddot{O}^{\ddot{}}Na^+ \longrightarrow R-\ddot{O}^{\ddot{}}-R' + NaX$$

As we know alkoxides are strong bases and they can react with alkyl halides leading to elimination reactions.

4) State 3 uses of ethylene oxides.

- Ethylene oxide is used as a gaseous sterilizing agent.
- It is used as a fumigant and as pesticides
- Ethylene oxide is used as an intermediate in the hydrolytic manufacture of ethylene glycol.