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CHEM 102

COLLEGE OF MEDICINE AND HEALTH SCIENCES

MEDICINE AND SURGERY

ASSIGNMENT

1. Give the IUPAC name of the following Organic compounds.
2. CH3OCH3- Methoxymethane.
3. CH3CH2OCH2CH3- Ethoxyethane.
4. (CH3CH2CH2CH2)2O- Butoxymethane.
5. CH3CH2OCH3- Methoxyethane.
6. CH3CH2CH2OCH2CH3- Ethoxypropane.
7. Discuss the properties of ethers.
8. An ether molecule has a net dipole moment. We can attribute this to the polarity of C-O bonds.
9. 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 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. They are miscible with most organic solvents.
10. Reactivity: Ethers are inert at moderate temperature.
11. Density: Most of the simple ethers are less dense than water, although the density increases with increasing relative molecular mass and some of the aromatic ethers are in fact denser than water.
12. 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. The boiling points of ethers tends to approximate those of hydrocarbons of same relative molecular mass from which it can be conclude that the molecules are not associated in the liquid phase as there are no suitably available hydrogen for association through hydrogen bonds.
13. Physical states: At room temperature, ethers are colourless, neutral liquids with pleasant odours. The lower aliphatic ethers are highly flammable gases or volatile Liquids.
14. Discuss explicitly two methods of preparing ethers and show equations of reaction.
15. Preparation of Ethers by the partial dehydration of Alcohols

In the presence of protic acids (sulphuric acid), alcohols undergo dehydration to produce alkenes and ethers under different conditions. 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 **CONTINUOS ETHERIFICATION**. If excess alcohol is not used, the temperature is as high as 170-180°C, further dehydration leads to the formation of alkenes.

**CONC.H2SO4/140°C**

**2ROH R-O-R + H2O**

Examples;

**2CH2CH2OH CH3CH2-O-CH2CH3 + H2O**

The preparation of ethers by dehydration of alcohol is a nucleophilic substitution reaction. The alcohol involved in reaction plays two roles; one alcohol molecule acts as a substrate while the other acts as a nucleophile.

1. Preparations of Ethers by Williamson Synthesis

Williamson synthesis is an important method for the preparation of symmetrical and asymmetrical ethers in laboratories. In this method an alkyl halide is reacted with sodium alkoxide which leads to the formation of ether. As we know alkoxide are strong bases and they can react with alkyl halides leading to elimination reactions. Williamson synthesis exhibits higher productivity in the case of primary alkyl halides. In the case of secondary alkyl halides, elimination competes with substitution whereas we observe the formation of elimination products only in the case of tertiary alkyl halides.

Example;

**[Na]+[CH3CH2O]- + CH3CH2Cl ----------- CH3CH2OCH3CH2 +[Na]+[Cl]-**

1. State three uses of ethylene oxide.

Uses of ethylene Oxide

1. Ethylene oxide is used as an intermediate in the hydrolytic manufacture of ethylene glycol.
2. Ethylene oxide is used in the preparation of non-ionic emulsifying agents, plastics, plasticizers and several synthetic textiles.
3. Ethylene oxide is used as a gaseous sterilizing agent.