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CHEM 102 ASSIGNMENT

1. CH3OCH3 – Methoxymethane

CH3CH2OCH2CH3- Ethoxyethane

(CH3CH2CH2CH2)2O- Butoxymethane

CH3CH2OCH3- Methoxyethane

CH3CH2CH2OCH2CH3- Ethoxypropane

1. i.) Physical states: Ethers are colourless, neutral liquids with pleasant odours at room temperature. The lower aliphatic ethers are highly flammable gases or volatile liquids.

ii.) Solubility: Ether molecules are miscible in water. We can attribute this to the fact that like alcohols, the oxygen atom of ether can also form hydrogen bonds with a water molecule but as the hydrocarbon content of the molecules increases, there is rapid decline in solubility. They are miscible in most organic solvents.

iii.) 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.

iv.) Boiling point: The boiling point of ethers is comparable to the alkanes. However, it is much lower compared to that of alcohols of comparable molecular mass. 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 suitable available hydrogen for association through hydrogen bonds.

v.) Reactivity: Ethers are inert at moderate temperature. Their inertness at moderate temperature leads to their wide use as reaction media. Simple ethers are not commonly found in nature but the ether linkage is present in such natural products such as sugars, starches and glucose.

1. i.) Preparation of Ethers by partial dehydration of alcohols: 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 called continuous etherification. If excess alcohol is not used, the temperature is as high as 170-180°C, further dehydration to yield alkene occurs.

2CH3CH2OH CH3CH2OCH2CH3 + H2O

Conc.H2SO4/140°C

ii.) Williamson ether synthesis: it involves the treatment of parent alcohol with a strong base to from alkoxide , followed by adition of an appropriate aliphatic compound bearing a suitable leaving group(R-X). suitable leaving group (X) include iodide, bromide or sulfonates. It is an SN2 reaction in which a metal alkoxide displaces a halide ion from alkyl halide. It is the most widely used method for preparing ethers.

Na CH3CH2Br

CH3OH CH3O-Na+ CH3OCH2CH3 + Na+Br-

methanol methyl ethyl ether

1. i.) it is used to make sterilization equipments for medical equipment.

ii.) ethylene oxide is used as an intermediate in the hydrolytic manufacture of ethane glycol.

iii.) it is used to make antifreeze, adhesives, detergents, fumigants and pesticides

iv.) ethylene oxide is used in prepration of non ionic emulsifying agents, plastics, plasticizers and several synthetic textiles.