NAME: IKE-EGBUONU MARVELLOUS CHINELO
MATRIC NO: 19/SC109/003
DEPT: INDUSTRIAL CHEMISTRY
LECTURER: MR. JONATHAN JOHNSON 100L 12/04/2020

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

CH_3OCH_3 - methoxy methane $CH_3CH_2OCH_2CH_3$ - Ethoxy Ethane

$(CH_3CH_2CH_2CH_2)_2O$ - Butoxy butane $CH_3CH_2OCH_3$ - Methoxy ethane

$CH_3CH_2CH_2OCH_2CH_3$ - Ethoxypropane

(2) Discuss the properties of ethers.

a. Physical states: Ethers are colourless, neutral liquids with pleasant smells at room temperature. The lower ~~the~~ aliphatic ethers are highly flammable gases or volatile liquids

b. Density: the density of ethers increase with increasing relative molecular mass, some of the aromatic ethers are in fact denser than water, even most of the simple ethers are less dense than water.

c. Solubility: Ethers are less soluble in water than the corresponding alcohols. Lower molecular weight ethers are fairly soluble in water since the molecule are able to form hydrogen bonds with the water molecules, but as the ~~hydrogen~~ hydrocarbon contents of the molecules increase, there is a rapid decline in solubility. They are miscible with most organic solvent.

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

e. Boiling point: Low molecular mass ethers have a lower boiling points than the corresponding alcohols but those ethers containing alkyl radicals larger than 4 carbon atoms, the reverse is true. The boiling point of ethers tend to approximate those of hydrocarbon of same relative molecular mass from which it can be concluded that the molecules are

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not associated in the liquid phase as there are no suitable available hydrogen for association through hydrogen bonds.

(3) Discuss explicitly 2 methods of preparing ethers and show equations of reaction.

a. Controlled catalytic hydration of defins is a method of preparing ethers by the addition of water to alkenes.

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

2-isopropoxypropane.

b. Ethers can be prepared from haloalkanes and dry silver (I) oxide.

$2RX + Ag_2O \xrightarrow{warm} R-O-R + 2AgX$

haloalkane silver (I) oxide

$2CH_3CH_2CH_2Cl + Ag_2O \xrightarrow{warm} CH_3CH_2CH_2OCH_2CH_2CH_3 + 2AgCl$

1-Chloropropane Silver (I) oxide Propoxypropane

(4) State 3 uses of ethylene oxide.

a. It is a raw material for the industrial manufacture of ethylene glycol and its oligomers, glycol ethers, and ethanolamines.

b. It is used as a fumigant in certain agricultural products and as a sterilant for medical equipment and supplies.

c. It is used in the production of a variety of industrial and everyday consumer products such as household cleaners, fabrics and textiles, etc.