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MHS

DENTISTRY

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CHEM 102

1 Give the IUPAC names of the following organic compounds:

- CH_3OCH_3 - $\text{CH}_3\text{CH}_2\text{OCH}_2\text{CH}_3$
- $(\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2)_2\text{O}$ - $\text{CH}_3\text{CH}_2\text{OCH}_3$
- $\text{CH}_3\text{CH}_2\text{CH}_2\text{OCH}_2\text{CH}_3$

Ans:

- $\text{CH}_3\text{OCH}_3 \longrightarrow$ Methoxymethane
- $\text{CH}_3\text{CH}_2\text{OCH}_2\text{CH}_3 \longrightarrow$ Ethoxyethane [diethyl ether]
- $(\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2)_2\text{O} \longrightarrow$ Butyl ether
- $\text{CH}_3\text{CH}_2\text{OCH}_3 \longrightarrow$ Methoxyethane [methyl ethyl ether]
- $\text{CH}_3\text{CH}_2\text{CH}_2\text{OCH}_2\text{CH}_3 \longrightarrow$ Ethoxypropane

2 Discuss the properties of ethers

Ans:

Physical properties:

- A room temperature most ethers are a colourless, sweet-smelling liquid.
- Compared to alcohols, ethers have low boiling points because alcohol has hydrogen bonding, whereas ethers do not.
- An ether molecule has net dipole moment due to the polarity of C-O bonds.
- Ethers do have nonbonding electron pairs on their oxygen atoms, however they can form hydrogen bonds with other molecules that have O-H or N-H bonds.

v The ability to form hydrogen bonds with other compounds makes ethers particularly good solvent for a wide variety of organic compounds.

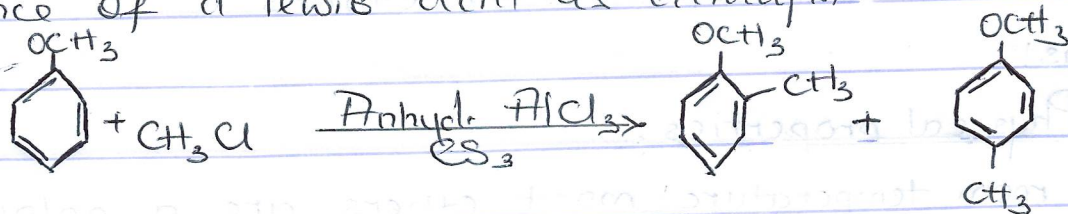
Chemical properties

i It doesn't react with bases, active metals, oxidizing agents and reducing agents.

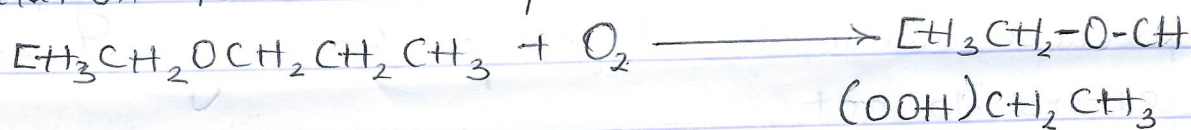
ii Cleavage of C-O bond: ethers are generally very unreactive in nature. When an excess of hydrogen halide is added to the ether, cleavage of C-O bond takes place leading to the formation of alkyl halides.



iii Friedel craft's reaction of ethers: Aromatic ethers undergo Friedel craft's reaction; for example addition of alkyl or acyl group upon the reaction with alkyl or acyl halide in the presence of a Lewis acid as catalyst.



iv In the presence of oxygen, ethers undergo self-oxidation to unstable peroxides.



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

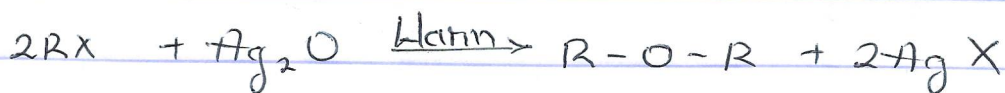
Ans:

1. Dehydration of alcohols - The

alcohol in excess and concentrated tetraoxo-sulphate (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 $170^{\circ}\text{C} - 180^{\circ}\text{C}$; further dehydration to yield alkene occurs



ii From haloalkanes and dry silver (I) oxide: This is ^{including} the Williamson ether synthesis in which an alkoxide ion is a nucleophile that displaces a halide ion from an alkyl halide to give an ether; and then heating haloalkanes with dry silver.



4 State three uses of ethylene oxide

Ans!

- i In the medical field; it is used as a gaseous sterilizing agent.
- ii it is used in the preparation of non-ionic emulsifying agents, plastics, plasticizers and several synthetic textiles.
- iii it is used as an intermediate in the hydrolytic manufacture of ethylene glycol.