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Dept: Nursing Science

Course: CHM 102

* Assignment

1 Give the IUPAC names of the following organic compounds

a CH_3OCH_3 - Methoxymethane

b $\text{CH}_3\text{CH}_2\text{OCH}_2\text{CH}_3$ - Ethoxyethane

c $\text{C}_6\text{H}_5\text{CH}_2\text{CH}_2\text{CH}_2\text{O}$ - Butoxybenzene

d $\text{CH}_3\text{CH}_2\text{OCH}_3$ - Methoxyethane

e $\text{CH}_3\text{CH}_2\text{CH}_2\text{OCH}_2\text{CH}_3$ - Ethoxypropane

2 Discuss the properties of ethers

There are physical and chemical properties of ethers.

a Physical properties

- An ether molecule has a net dipole moment due to the polarity of C-O bonds.

- The boiling point of ethers is comparable to the alcohols but much lower than that of alcohols of comparable

molecular mass despite the polarity of the C-O bond.

The miscibility of ethers with water resembles those of alcohols.

- Ether molecules are miscible in water. This is attributed to the fact that like alcohols, the oxygen atom of ether can

also form hydrogen bonds with a water molecule.

b Chemical properties

a Cleavage of C-O bond

Ethers are generally very unreactive in nature. With an excess of hydrogen halide is added to the ether, cleavage of C-O bond takes place leading to the formation of alkyl halides. The order of reactivity is given as $\text{HI} > \text{HBr} > \text{HCl}$

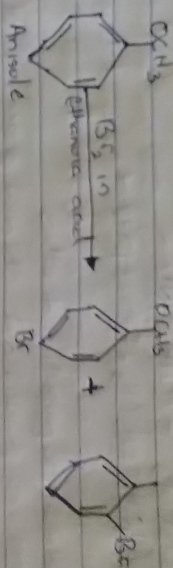
$\text{R-O-R} + \text{HX} \rightarrow \text{RX} + \text{R-OH}$

Electrophilic Substitution

The alkoxy group in ether activates the ortho and para positions for electrophilic substitution reactions and halogenation, Friedel-Crafts reactions etc.

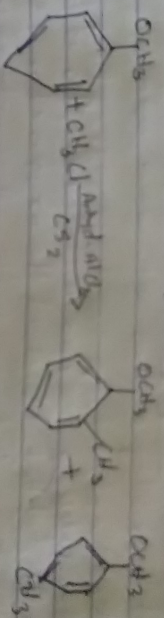
Halogenation of ethers

Aromatic ethers undergo halogenation (for example bromination) upon the addition halogen in the presence of trace of the catalyst.



Friedel-Crafts Reaction of Ethers

Aromatic ethers undergo Friedel-Crafts reaction for example acylation (alkyl or acyl group upon the reaction with alkyl or acyl halide in the presence of Lewis acid as catalyst).



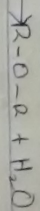
Discuss explicitly two methods of preparing ethers and show equations of reaction.

1 Partial dehydration of alcohols

Simple ethers are manufactured from alcohols by catalytic dehydration. The alcohol in excess and concentrated tetraoxosulphuric acid is heated at a catalyst, residues

temperature of 1400°C . This process is known as continuous etherification. If excess alcohol is not used, the temperature is as high as $170^{\circ}\text{--}190^{\circ}\text{C}$, further dehydration to yield alkene occurs.

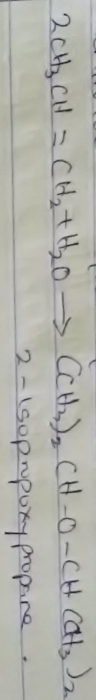
$\text{R-O-R} \leftarrow$



e.g.



2. Controlled catalytic hydration of olefins



4. State three uses of ethylene oxide.

1. Ethylene oxide is used as an intermediate in the hydrolytic manufacture of ethylene glycol.

2. It is used in the preparation of nonionic emulsifying agents, plasters, plaster casts and several synthetic fertilizers.

3. It is used as a gaseous sterilizing agent.