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**1 .** The IUPAC names of the following organic compounds:

**a** **. CH3OCH3** - methoxymethane

**b . CH3CH2OCH2CH3** - ethoxyethane

**c . (CH3CH2CH2CH2)2O** - butoxymethane

**d . CH3CH2OCH3** - methoxyethane

**e . CH3CH2CH2OCH2CH3** - ethoxypropane

**2 .** The properties of ethers:

**PHYSICAL PROPERTIES:**

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

2 . The boiling points of ethers is comparable to the alkanes but much lower than that of alcohols of comparable molar mass despite the polarity of the C-O bond. The miscibility of ethers with water resembles those of alcohols.

3 . Ether molecules are miscible in water. This is attributed to the fact that like alcohol, the oxygen atom of ether can also form hydrogen bonds with a water molecule.

**CHEMICAL PROPERTIES:**

1 . **Cleavage** **of C-O bond:** Ethers are generally very unreactive in nature. When an excess of hydrogen halide is added to ether, cleavage of C-O bond takes place leading to the formation of alkyl halides. The order of reactivity is given as HI>HBr>HCl.

2 . **Electrophilic** **substitution:** The alkoxy group in ether activates the aromatic ring at ortho mad para positions for electrophilic substitution. Common electrophilic substitution reactions are halogenation, Friedel Craft's reaction etc.

3 . **Halogenation of ethers:** Aromatic ethers undergo halogenation,for example,bromination, upon the addition of halogen in the presence or absence of a catalyst.

4 . **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.

**3 .** Two methods of preparing ethers:

1 . **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 known as continuous etherification. If excess alcohol is not used, the temperature is as high as 170-180°C, further dehydration to yield alkene occurs.

2ROH —> R-O-R + H2O

(conc. H2SO4/140°C)

2 . From Haloalkanes and dry silver (I) oxide:

2RX + Ag2O —> R-O-R + 2AgX

(warm)

**4 .** Three uses of ethylene oxide:

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