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Matric no.: 19/MHS01/409

Course: Chemistry Assignment Ethers

1. Nomenclatures

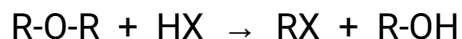
- CH_3OCH_3 : Methoxymethane
- $\text{CH}_3\text{CH}_2\text{OCH}_2\text{CH}_3$: Ethoxyethane
- $(\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2)_2\text{O}$: Pentanamide
- $\text{CH}_3\text{CH}_2\text{OCH}_3$: Methoxyehane
- $\text{CH}_3\text{CH}_2\text{CH}_2\text{OCH}_2\text{CH}_3$: Ethoxyproane

2. Physical Properties of Ethers

- An ether molecule has a net dipole moment. We can attribute this to the polarity of C-O bonds.
- The boiling point of ethers is comparable to the alkanes. However, it is much lower compared to that of alcohols of comparable molecular mass. This is despite the fact of the polarity of the C-O bond.
- The miscibility of ethers with water resembles those of alcohols.
- 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.

Chemical properties of ethers

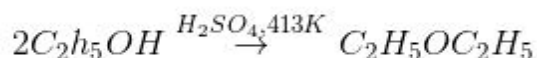
- **Cleavage of C-O bond:** Ethers are generally very unreactive in nature. When we add an excess of hydrogen halide to the ether, cleavage of C-O bond takes place. It leads to the formation of alkyl halides. The order of reactivity is as follows:



- **Electrophilic substitution:** The alkoxy group in ether activates the aromatic ring at ortho and para positions for electrophilic substitution. Common electrophilic substitution reactions are halogenation, Friedel Craft's reaction etc.
- **Halogenation reaction of ethers:** Aromatic ethers undergo halogenation, for example, bromination, when we add a halogen in the presence or absence of a catalyst.
- **Friedel Craft's reaction of ethers:** Aromatic ethers undergo Friedel Craft's reaction for example addition of alkyl or acyl group when we introduce it to an alkyl or acyl halide in the presence of a Lewis acid as catalyst.

3. Methods of preparing ethers

- **Dehydration of alcohols:** In the presence of sulphuric acid, dehydration of ethanol yields ethoxyethane at 413 K. This is an ideal method of preparation through primary alcohols. Preparation of ethers by dehydration of an alcohol is a nucleophilic substitution reaction.



- **Williamson's synthesis:** When an alkyl halide reacts with sodium alkoxide, ether is formed. This reaction is known as Williamson's synthesis. The reaction generally follows the S_N2 mechanism for primary alcohols.



Fig: Williamson's synthesis

4. Uses of ethylene oxide

- Most ethylene oxide is used as an intermediate in the production of other chemicals used to manufacture products, such as fabrics for clothes, upholstery, carpet and pillows.
- It is used to produce ethylene glycols for engine antifreeze that keeps our automobiles performing. Other ethylene oxide derivatives are used in household cleaners and personal care items such as cosmetics and shampoos.
- Ethylene oxide sterilization processes can sanitize medical and pharmaceutical products that cannot support conventional, high-temperature steam sterilization procedures. Delicate, heat-sensitive medical devices that incorporate plastics and electronics could be warped or otherwise damaged by steam sterilization.