

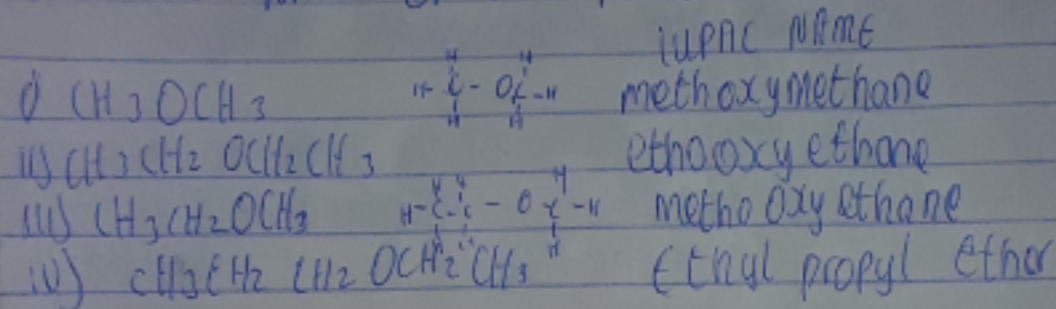
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SUBJECT: CHEMISTRY 102

1) IUPAC NAMES OF THE FOLLOWING ORGANIC COMPOUNDS:



(5)

## PROPERTIES OF ETHERS

- 2) Ether molecules cannot form hydrogen bonds with each other, resulting in relatively low boiling points compared to those of analogous alcohols.
- i) Ethers are slightly polar - Many of the chemical properties of these compounds arise because of polarization of the carbonyl group which results in the molecule being susceptible to attack by nucleophilic reagents.
- ii) The lower ethers are highly volatile and flammable.
- iv) Ethers are good organic solvents.
- v) Lower ethers also act as anaesthetics.

## 3) METHODS OF PREPARING ETHERS

- 1) Dehydration of Alcohols - This direct nucleophilic substitution reaction requires elevated temperatures (about  $125^{\circ}\text{C}$ ). The reaction is catalyzed by acids, usually sulfuric acid. Elimination reactions compete with dehydration of alcohol:  $\text{R}-\text{CH}_2-\text{CH}_2(\text{OH}) \rightarrow \text{R}-\text{CH}=\text{CH}_2 + \text{H}_2\text{O}$   
The dehydration of alcohols afford ethers  
 $2\text{R}-\text{OH} \rightarrow \text{R}-\text{O}-\text{R} + \text{H}_2\text{O}$  at high temperature

## 2) Williamson ether synthesis

nucleophilic displacement of alkyl halides by alkoxides  
 $\text{R}-\text{O}^-\text{Na} + \text{R}'-\text{X} \rightarrow \text{R}-\text{O}-\text{R}' + \text{NaX}$

It involves treatment of a parent alcohol with a strong base to form the alkoxide, followed by addition of an appropriate aliphatic compound bearing a suitable leaving group (R-X).

## USES OF ETHYLENE OXIDE

- i) ethylene oxide has been used for over 60 years for both insecticidal treatments (pesticides and fumigants) and for sterilization of food stuff.
- ii) ethylene oxide is used to make antifreeze, adhesives.
- iii) ethylene oxide is used in the production of detergents and polyester.