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CHM 102

1a CH_3OCH_3 - Methoxymethane

b $CH_3CH_2OCH_2CH_3$ - methyl propyl ether

& $(CH_3CH_2CH_2CH_2)_2O$ - ethyl propyl ether

d. $CH_3CH_2OCH_3$ - ethyl methyl ether

e $CH_3CH_2CH_2OCH_2CH_3$ - ~~Ethyl~~ propyl ether

2 Physical properties of ethers

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

ii The boiling point of ethers is comparable to the alkanes 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

iii Ether molecules are miscible in water.

Chemical properties of Ethers

i 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. The order of reactivity is given as $HI > HBr > HCl$

$$R-O-R + HX \longrightarrow RX + R-OH$$

ii Electrophilic substitution

The alkoxy group in ether activates the aromatic ring at ortho and para positions for electrophilic substitutions. Eg Fiedel Craft's reaction

iii Halogenation of Ethers:

Aromatic ethers undergo halogenation for example, bromination, upon the addition halogen in the presence or absence of a catalyst

iv Aromatic ethers undergo friedel craft's reaction.

3.; Preparations of Ethers by Williamson Synthesis

Willian synthesis method deal with when an alkyl halide is reacted with sodium alkoxide which leads to the formation of ether. The reaction generally follows the S_N2 mechanism for primary alcohol

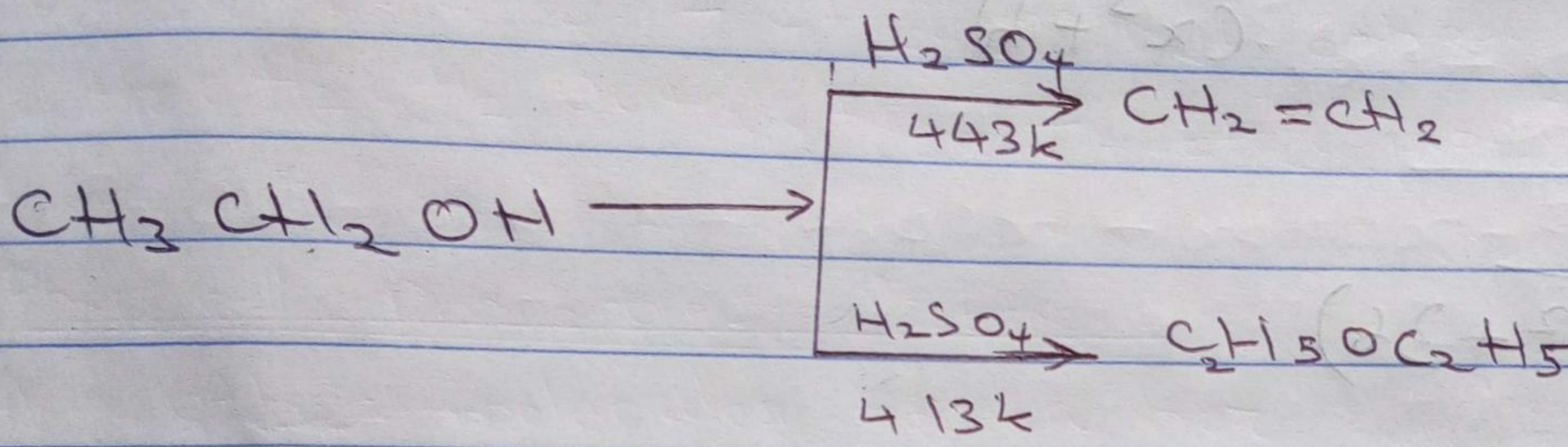
$$R-X + R'-\ddot{\underline{\underline{O}}}\,Na^{+} \longrightarrow R-\ddot{O}-R' + NaX$$

As we know alkoxides are strong bases and then can react with alkyl halides leading to elimination reactions. Williamson Synthesis exhibits higher productivity in the case of primary alkyl halides. In the case of secondary alkyl halides, elimination competes with substitution whereas, we observe the formation of elimination products only in the case of tertiary alkyl halides.

ii Preparation of Ethers by dehydration of Alcohols.

In the ~~preparation~~ presence of protic acids, alcohols undergo dehydration to produce alkenes and ethers under different conditions. for example: In the presence of sulphuric acid, dehydration of ethanol at

443k yields ethene whereas it yields ethoxy ethane at 413k. This is an ideal method of preparation through primary alcohols.



- Ethylene oxide is used to make antifreeze, adhesives, detergents, polyester, fumigants and pesticides

- It is also used to make sterilization agents for medical equipment.