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19/ENG04/052 Elect/Elect Engineering
CHM102

1i CH_3OCH_3 - Methoxymethane / Dimethyl ether
$CH_3CH_2OCH_2CH_3$ - methyl propyl ether
$(CH_3CH_2CH_2CH_2)_2O$ - ethyl propyl ether
$CH_3CH_2OCH_3$ - ethyl methyl ether
$CH_3CH_2CH_2OCH_2CH_3$ - Ethyl propyl ether

2 Physical properties of ethers.

i An ether molecule has a non dipole moment due to the polarity of C–O bonds.

ii The boiling point of ethers is similar to alkanes but much lower than that of alcohols of comparable monacular mass. Despite the polarity of C-O bond. The miscibility of ethers to water is as those of alkanols

iii They are miscible in water

Chemical properties of Ethers.

i) Cleavage of C-O bond: Ethers are usually non-reactive in nature but when excess hydrogen halides is added, cleavage takes place and leads to the formation of alkyl halides. The order of reactivity
$HI > HBr > HCl$

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

ii Electrophilic Substitution.
The alkoxy group in ether activates the aromatic ring at the ortho and para positions for electrophilic substitution

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

William 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.

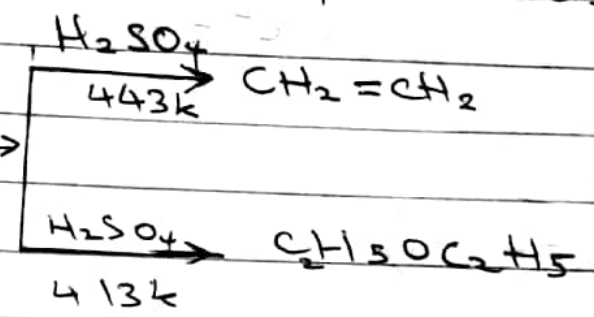
$$R-X + R'-\ddot{\underset{\cdot\cdot}{O}}^{-}Na^{+} \longrightarrow R-\ddot{O}-R' + NaX$$

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 second 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 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.