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Chemistry 102 (2)

(i) CH_3OCH_3 - methoxy methane
(ii) $CH_3CH_2OCH_2CH_3$ - ethoxy ethane
(iii) $(CH_3CH_2CH_2CH_2)_2O$ - ~~[illegible]~~

(iv) $CH_3CH_2OCH_3$ - ~~e~~ methoxy ethane

v $CH_3CH_2CH_2OCH_2CH_3$ - ethoxy propane

2 Physical properties of Ethers
(i) an ether molecule has a net dipole movement we can attribute this to ~~a~~ the polarity of C-O bonds
(ii) 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 depsite the fact of the polarity of the C-O bond
(iii) The miscibility of ethers with water resembles those of alcohols.
(iv) Ether molecules are miscible in water. we can attribute this to the fact like alcohols, the oxygen atom of ether can also form hydrogen bonds with a water molecule

Chemical properties of Ethers
(i) 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:

HI > HBr > HCL

R-O-R + HX → RX + R-OH

ii) Electrophilic Substitution: The alkoxy group in ether activates the aromatic rings at ortho and para positions for electrophilic substitution. Common electrophilic substitution reactions are halogenation, friedel craft's reaction etc 4)

iii) Halogenation reaction of ethers: aromatic ethers undergo halogenation, for example, bromination, when we add a halogen in the presence or absence of a catalyst

3) ① Preparation of ethers by dehydration of alcohols in the presence of protic acids (sulphuric acid), alcohols undergo dehydration to produce alkenes and ethers under different conditions. for example: in the presence of sulphuric acid, dehydration of ethanol at 443 K yields ethene whereas it yields ethoxy ethane at 413 K. This is an ideal method of preparation through primary alcohol

$$CH_3CH_2OH \longrightarrow \begin{cases} \xrightarrow[443\,K]{H_2SO_4} CH_2{=}CH_2 \\ \xrightarrow[413\,K]{H_2SO_4} C_2H_5OC_2H_5 \end{cases}$$

② Preparation of ethers by williamson synthesis

williamson synthesis is an important method for the preparation of symmetrical and asymmetrical ethers in laboratories. In this method, an alkyl halide is reacted with sodium alkoxide which leads to the formation of ether. The reaction generally follows the SN^2 mechanism for primary alcohol

$$R-X + R-\ddot{O}^- \; Na^+ \longrightarrow R-\ddot{O}-R + NaX$$

4) (i) Etylene oxide is produced in large volumes and is primarily used as an intermediate in the production of several industrial chemicals, the most notable is etylene glycol

(ii) it is also used as a fumigant in certain agricultural products

(iii) it is also used as a sterilant for medical equipment and supplies