***NWANKWO SOMTO EDWARD***

***19/ENG09/011***

***AERONAUTICAL ENGINEERING***

 ***CHM 102 ASSIGNMENT***

Assignment

1. Give the IUPAC names of the following organic compounds

CH3OCH3           CH3CH2OCH2CH3

(CH3CH2CH2CH2)2O           CH3CH2 OCH3

CH3CH2CH2OCH2CH3

2. Discuss the properties of ethers

3. Discuss explicitly two methods of preparing ethers and show equations of reaction

4. State three uses of ethylene oxide

  **ANSWERS;**

1. Methoxymethane ethoxyethane

Octanal ethoxymethane

Propoxyethane

1. Physical properties of ethers;
2. An ether molecule has a net diploe moment due to the polarity of the C-O bonds.
3. The boiling points 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.
4. Ether molecules are soluble in water. This is attribute to the fact that like alcohols, the oxygen atom of ether can also form hydrogen bonds with a water molecule.

Chemical properties of Ethers;

1. 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 Hl> HBr> HCl.

1. 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 of Ethers

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

 OCH3 OCH3 OCH3

 Br

 Br2 in +

 Ethanoic acid

 Anisole Br

* Friedel craft’s reaction of Ethers;

 Aromatic ethers undergo friedel craft’s reaction when there’s an addition of alkyl or acyl group upon the reaction with alkyl or acyl halides in the presence of a lewis acid as a catalyst.

 OCH3 OCH3 OCH3

 Br

 + CH3Cl Anhyd AlCl2 +

 CS3

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 ethoxyethane at 413 K. This is an ideal method of preparation through primary alcohols.

 

1. Preparations 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 SN2 mechanism for primary alcohol. As we know alkoxides are strong bases and they 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.

 

1. Uses of ethers;

 •We use dimethyl ether as a refrigerant and as a solvent at low temperature.

•Diethyl ether is a common ingredient as an anesthesia in surgery.

•Diethyl ether is common as a solvent for oils, gums, resins etc.