

## TEACHER ORIENTED

### UNIT X Haloalkanes & Haloarenes

- 1) Classification & nomenclature
- 2) Nature of C-X Bond
- 3) Methods of preparation
- 4) Physical & chemical properties
- 5) Polyhalogen compounds.

## STUDENT ORIENTED

### Haloalkanes & Haloarenes

#### CONCEPT DETAIL

### UNIT X Haloalkanes & Haloarenes ( 4 : MARKS)

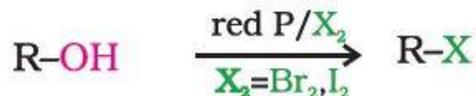
#### Haloalkanes & Haloarenes -

##### 1. Nature of C-X Bond

Since halogen atoms are more electronegative than carbon, the carbon halogen bond of alkyl halide is polarised; the carbon atom bears a partial positive charge whereas the halogen atom bears a partial negative charge. Since the size of halogen atom increases as we go down the group in the periodic table, fluorine atom is the smallest and iodine atom, the largest.

##### 2. Preparation of alkyl halides

Alkyl halides are prepared by the free radical halogenations of alkanes, addition of halogen acids to alkenes, replacement of -OH group of alcohols with halogens using phosphorus halides, thionyl chloride or halogen acids.



### 3.TYPES OF FORCES

The boiling points of organo halogen compounds are comparatively higher than the corresponding hydrocarbons because of strong dipole-dipole and van der Waals forces of attraction. These are slightly soluble in water but completely soluble in organic solvents.

### 4.NUCLEOPHILIC SUBSTITUTION REACTIONS

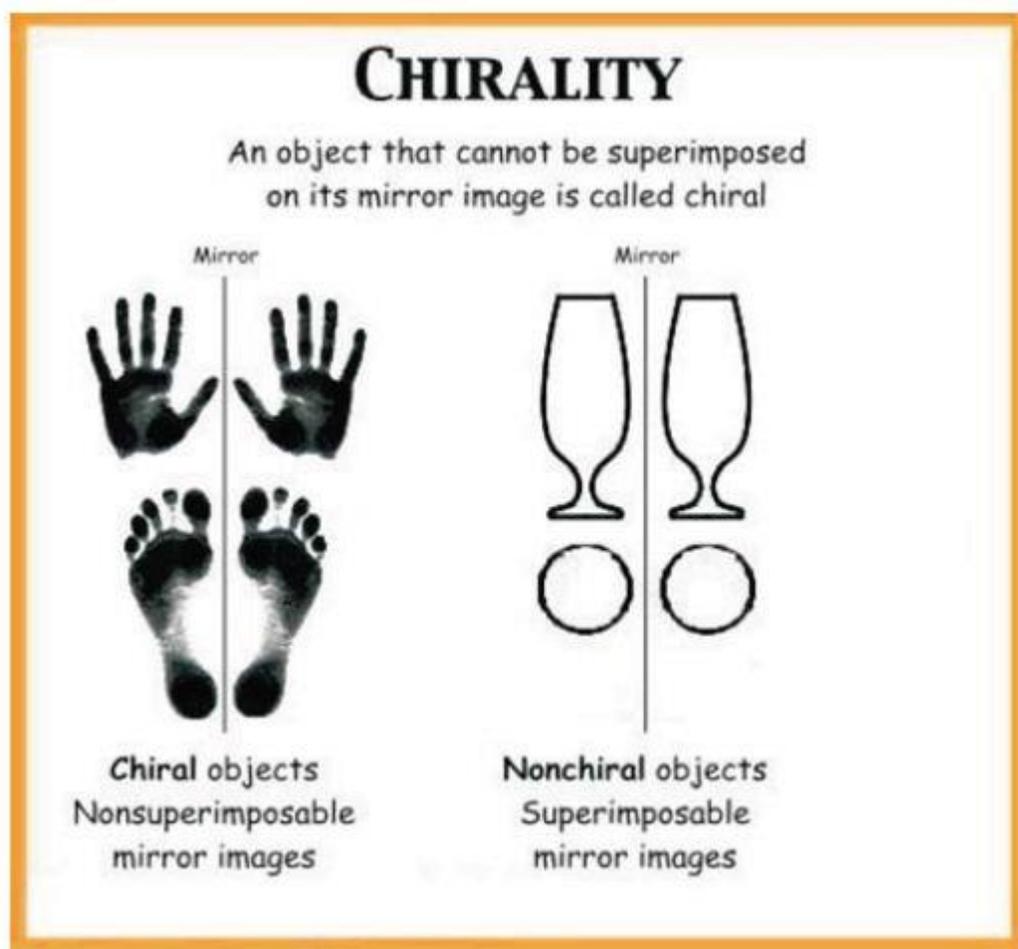
The polarity of carbon-halogen bond of alkyl halides is responsible for their nucleophilic substitution, elimination and their reaction with metal atoms to form organometallic compounds.

Nucleophilic substitution reactions are categorized into SN1 and SN2 on the basis of their kinetic properties.

Chirality has a profound role in understanding the reaction mechanisms of SN1 and SN2 reactions.

SN2 reactions of chiral alkyl halides are characterized by the inversion of configuration while SN1 reactions are characterized by racemisation

5.The objects which are non-superimposable on their mirror image are said to be **Chiral**, while the objects which are superimposable on their mirror images are called **Achiral**

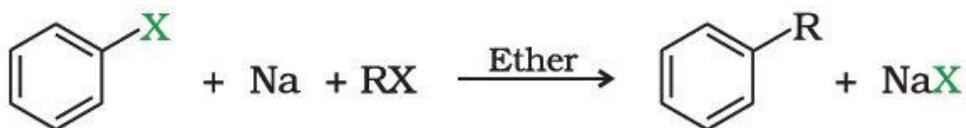


Aryl halides are prepared by electrophilic substitution to arenes. Fluorides and iodides are best prepared by halogen exchange method.

*Electrophilic substitution reaction in haloarenes takes place at ortho and para position since electron density is more at these positions*

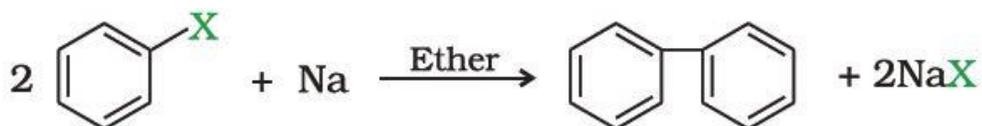
### **Wurtz-Fittig reaction**

A mixture of an alkyl halide and aryl halide gives an alkylarene when treated with sodium in dry ether and is called Wurtz-Fittig reaction.

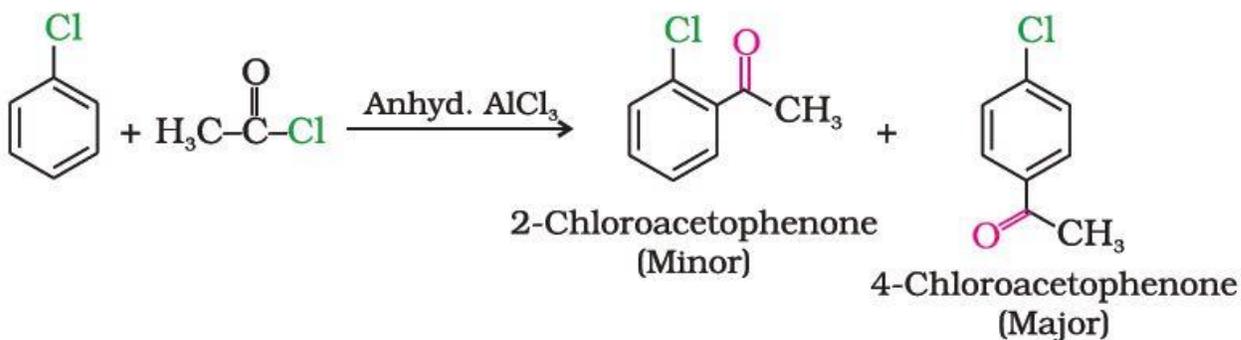
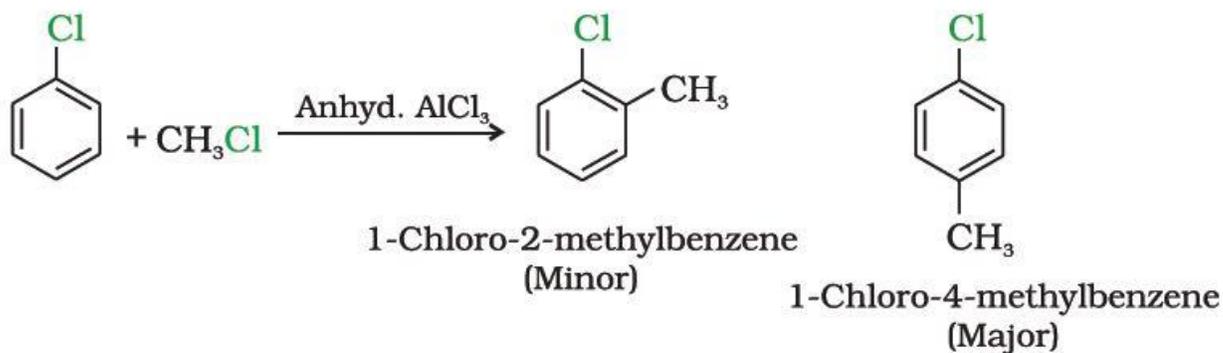


### **Fittig reaction**

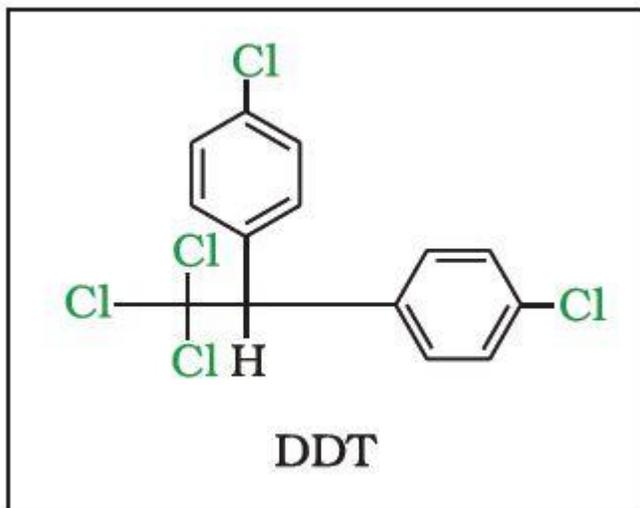
Aryl halides also give analogous compounds when treated with sodium in dry ether, in which two aryl groups are joined together. It is called Fittig reaction.



### (iv) Friedel-Crafts reaction



A number of polyhalogen compounds e.g., dichloromethane, chloroform, iodoform, Carbon tetrachloride, Freon and DDT have many industrial applications.



## INSTANT DIAGNOSTIC QUESTIONS

1. Which will have a higher boiling point 1-chloropentane or 2-chloro-2-methylbutane?
2. What are ambident nucleophiles?
3. Why should Grignard reagent be prepared in anhydrous conditions?
4. Write the structures of the following:
  - (i) 2-chloro-3-methylbutane
  - (ii) 3-chloro-4-methylhexane
  - (iii) 1-iodo-2,2-dimethylbutane
  - (iv) 1-bromo-3,3-dimethyl-1-phenylbutane

## LEVELWISE ASSIGNMENTS

### LEVEL I : SLOW BLOOMERS

- 1) Why alkyl halides are insoluble in water?
- 2) Explain the following reactions:
  - (a) Wurtz reaction
  - (b) Wurtz – Fittig reaction
  - (c) Fittig reaction

### LEVEL II : AVERAGE

- 1) Give two halogen exchange method reactions
- 2) Why chlorobenzene does not undergo nucleophilic substitution reaction?
- 3) Why an electrophile attacks on ortho and para position in haloarenes?

### LEVEL III : BRIGHT LEARNERS

1. Why electrophilic substitution reaction in aryl iodide takes place in presence of an oxidising agent?
2. Allylic and benzylic halides undergo SN1 reaction . Why?
3. **Write the chlorination reaction of butane?.**
4. **Convert toluene into O-halo toluene**

## **Project**

To find out the characteristics of SN1 & SN2 mechanism with suitable examples.

Activity

To prepare PPT on above mentioned project.