Lecture - 1

Date

Expt. No.

Page No. 1

Alkyl & Aryl halides

Haloalkane & Haloarenes::

Class - XII, Haloalkane / Haloarenes introduction. DR-S-K-JHA

When hydrogen atom from hydrocarbon (Aliphatic or Aromatic is displaced by halogen atom (X = Cl, Br, I) then it forms alkyl halide (haloalkane) or aryl halides (Haloarenes) In alkyl halide 'X' (halogen) atom is bonded with alkyl (R) group by sp^3 hybridised Carbon whereas in aryl halide halogen (X) atom is bonded with benzene ring (Carbon which is sp^2 hybridised). Halides are used in preparation of Alkyl magnesium halide (Grignard reagent), in preperation of medicine like chloramphenicol (a broad spectrum antibiotics) Brompheniramin (an antiallergic or antihistamin) etc, and as a good solvent in industry. Halides are also very important Compound for Conversion in organic Chemistry.

Classification of organic Compounds :→

[A] On the basis of no. of halogen atom in Compound :→ If halogen atom is only present in Compound as a functional group then we can classify the compound into three parts

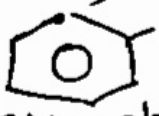
i) Monohaloalkane / arenes
ii) Dihaloalkane / arenes
iii) Trihaloalkane / arenes.

Teacher's Signature :

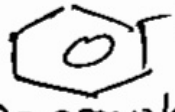
(1) Monohaloalkane/arenes: → If there is only one halogen atom is present in Compound then it is called monohaloalkane/arene.

i.e CH_3-Cl C_2H_5-Br C_3H_7-I

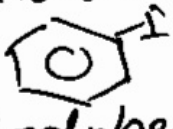
Methyl Chloride, (Ethyl-Bromide) (Propyl Iodide)
(Monohaloalkane) (Monohaloalkane) (Monohaloalkane)



Chlorobenzene
(Monohaloarene)



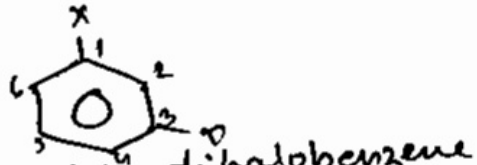
Bromobenzene
(Monohaloarene)



Iodobenzene.
(Monohaloarene)

ii) Dihaloalkane/Arene: - If there are two halogen atom is present in a Compound then it is called Dihaloalkane/arene.

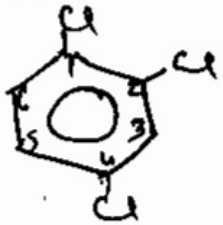
$^1CH_2-X$
$^2CH_2-X$
1,2 dihalo ethane
(Dihaloalkane)



1,3-dihalobenzene
Dihaloarene.

iii) Trihaloalkane/arene: If there are three halogen atoms are present in Compound then it is called trihaloalkane/arene.

CH_2-Cl
$CH-Cl$
CH_2-Cl
1,2,3-trichloropropane
(trihaloalkane)



1,2,4 trichlorobenzene
(trihaloarene).

[B] Classification on the basis of hybridisation of Carbon which is linked with halogen atom:-

a) sp^3 hybridised Carbon
b) sp^2 hybridised Carbon.

Date .....

Expt. No. .....

Q) 1) sp^3 hybridised carbon by which halogen atom is linked :→ It is three types :

i) Alkyl halide

ii) Allylic halide

iii) Benzylic halide

i) Alkyl halides or Haloalkanes :→ In this case halogen atom is bonded with alkyl(R) group $C_nH_{2n+1}X$. It can be further divided into three categories Primary or 1°, Secondary or 2° & Tertiary or 3°. Degree of halide can be decided by no. of carbon atom bonded to that carbon which contain halogen atom, If the carbon containing halogen is bonded with one carbon then it is primary or 1°, if bonded with two carbon atom then it is secondary or 2° & if bonded with three carbon atom then it is tertiary or 3°. All the bonds are single Covalent bond or all are Sigma bond.

$R-\overset{*}{C}H_2-Cl$ $\qquad$ $\begin{matrix} R \\ R \end{matrix}\!>\!\overset{*}{C}H-Cl$ $\qquad$ $\begin{matrix} R \\ R \\ R \end{matrix}\!>\!\overset{*}{C}-X$

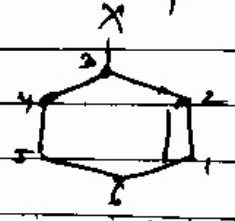
Primary or 1° $\qquad$ Secondary or 2° $\qquad$ Tertiary or 3°

2) Allylic halides :→ Carbon by which halogen atom is bonded that carbon's neighbour carbon contain double bond, then the compound is called allylic halides.

$H_2\overset{1}{C}=\overset{2}{C}H-\overset{3}{C}H_2-Cl$

3-chloro-prop-1-ene.

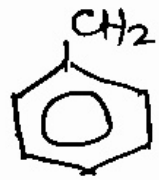
Primary or 1°



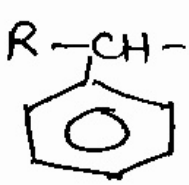
3-halo-Cyclohex-1-ene.

Teacher's Signature : _____ 20 Apr Sec.

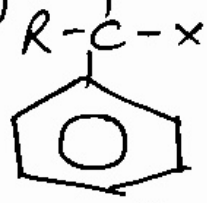
(a) iii) Benzylic halides :- → Carbon by which halogen atom is bonded that carbon is bonded with aromatic or benzene ring. R



1° or Primary



2° or Secondary



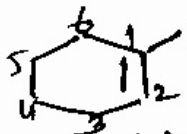
3° or Tertiary.

(b) ~~C~~ - sp2 hybridised carbon by which halogen atom is bonded :→ It is of two types :

i) Vinylic halides
ii) Arylic halides

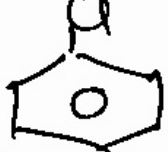
i) Vinylic halides :- → Carbon that contain halogen atom is bonded with other Carbon with double bond.

Chloro ethene



1-chlorocyclohexene.

ii) ~~Benzylic~~ Aryle halide :→ In this compound between halogen ~~atom~~ ~~and~~ ~~other~~ ~~carbon~~ ~~is present~~. is bonded with benzene ring.



Chlorobenzene

Bromo-benzene