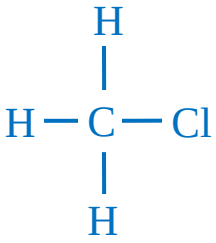
Chapter 10 Haloalkanes and Haloarenes

Haloalkanes

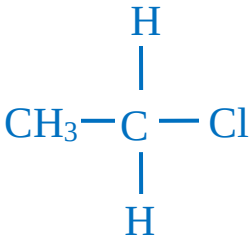
The compounds obtained by replacing one or more hydrogen atoms of alkanes by halogen atoms are called halogen derivatives of alkanes or haloalkanes.

$$\underset{\text{Alkanes}}{R\text{-}H} \xrightarrow[+X]{-H} \underset{\text{Haloalkanes}}{R\text{-}X}$$

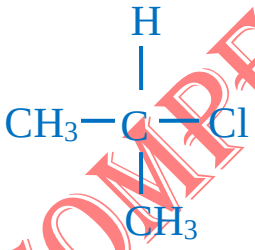
The general formula of monohalogen derivatives of alkanes is $C_nH_{2n+1}X$ or RX. For example,



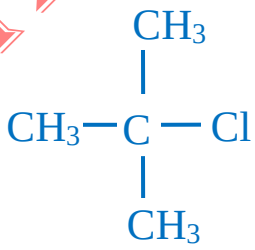
Chloromethane



Chloroethane



Isopropyl chloride



Tertiary butyl chloride

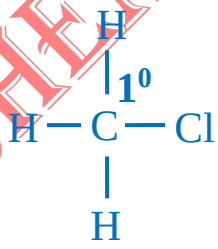
Classification of Haloalkanes

(I) Primary, Secondary and Tertiary Haloalkanes

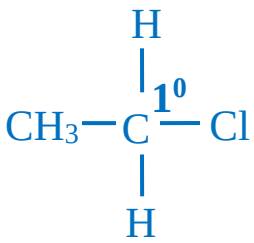
Depending upon the nature of carbon atom bearing halogen atom, haloalkanes may be of following three types-

(a) Primary (1^0) haloalkanes

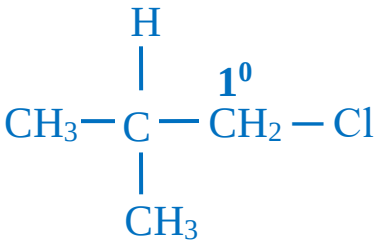
Such haloalkanes in which halogen atom remains attached to a primary carbon (1^0 carbon) are called primary or 1^0 haloalkanes. For example,



Chloromethane



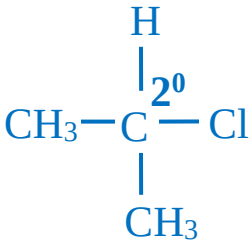
Chloroethane



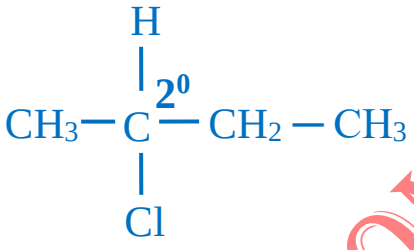
Isobutyl chloride

(b) Secondary (2^0) haloalkanes

Such haloalkanes in which halogen atom remains attached to a secondary carbon (2^0 carbon) are called secondary or 2^0 haloalkanes. For example,



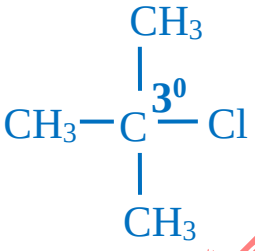
2-Chloropropane
(Isopropyl chloride)



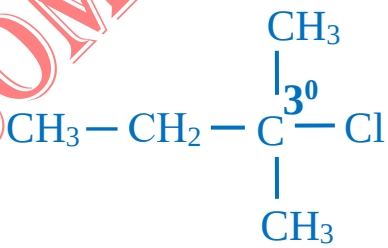
2-Chlorobutane
(Isobutyl chloride)

(c) Tertiary (3^0) haloalkanes

Such haloalkanes in which halogen atom remains attached to a tertiary carbon (3^0 carbon) are called tertiary or 3^0 haloalkanes. For example,



Tertiary butyle chloride



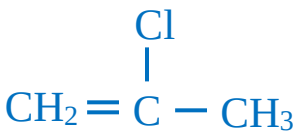
Tertiary pentyl chloride

(II) Vinyl and Allyl Haloalkanes

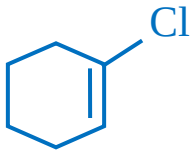
(a) Vinyl halides

sp^2 hybridized, doubly bonded carbon atoms are called vinylic carbon. Such haloalkanes in which halogen atom remains attached to vinylic carbon are called vinyl halides. For example,

Chloroethene



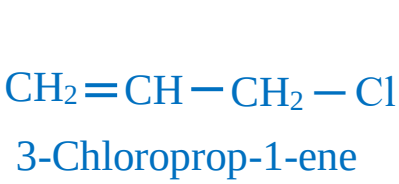
2-Chloroprop-1-ene



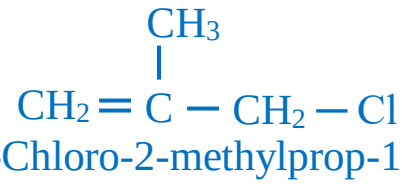
1- Chlorocyclohex-1-ene

(b) Allyl halides

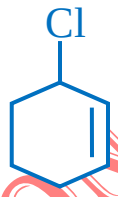
sp^3 hybridized carbon atoms, directly attached to a doubly bonded carbon are called allylic carbon. Such halides in which halogen atom remains attached to an allylic carbon atom are called allyl halides. For example,



3-Chloroprop-1-ene



3-Chloro-2-methylprop-1-ene

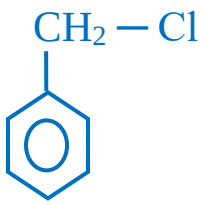


3- Chlorocyclohex-1-ene

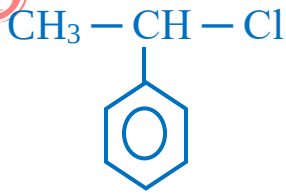
(III) Benzyl and aryl halides

(a) Benzyl halides

sp^3 hybridized carbon, directly attached to the benzene ring is called benzylic carbon. Such, halides in which halogen atom remains attached to the benzylic carbon atom are called benzylic halides. For example,



Phenyl chloro methane

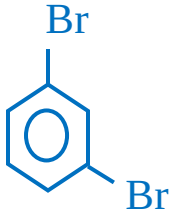


1-phenyl-1-chloroethane

(b) Arylic halides

sp^2 hybridized carbon of benzene ring are called arylic carbon. Such, halides in which halogen atom remains attached to the arylic carbon i.e. remains attached directly to the benzene ring, are called arylic halides. For example,

Chlorobenzene



1,3-dibromobenzene