Haloalkanes

General formulae: $C_nH_{(2n+1)}X$

Hydrolysis

Haloalkane + alkali → **alcohol** + salt
(aqueous KOH)
Haloalkane + water → **alcohol** + salt
The rate of reaction of different halides is observed using a silver nitrate solution. Precipitate of silver halide: white for Cl, cream for Br and pale yellow for I.

Strength of C-X bond

C-F is the strongest, as it is least reactive.

Bond	Bond enthalpy (kJ/mol)
C-F	467 (strongest)
C-Cl	346
C-Br	290
C-I	228 (weakest)

Environmental concerns from use of organohalogen compounds

Overall reaction: $O_3 + O\cdot \xrightarrow{UV\ radiation} 2O_2$

$CF_2Cl_2 \xrightarrow{UV\ radiation} CF_2Cl\cdot + Cl\cdot$

$Cl\cdot + O_3 \xrightarrow{UV\ radiation} ClO\cdot + O_2$

$ClO\cdot + O\cdot \xrightarrow{UV\ radiation} Cl\cdot + O_2$

Formation of ozone

Ozone (O_3) is continuously created and broken down in the presence of ultraviolet radiation.

$O_3 \leftrightharpoons O_2 + O$

Ozone if formed when an oxygen molecule splits into its free radicals in the presence of sunlight

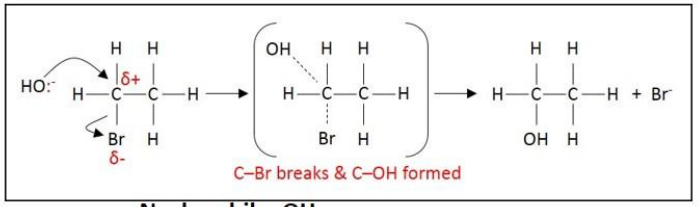
$O_2 \xrightarrow{UV\ radiation} O + O$

$O + O_2 \xrightarrow{UV\ radiation} O_3$

Mechanism of nucleophilic substitution in haloalkanes

Nucleophile: concentrated NH_3
Reagent: haloalkane dissolved in ethanol
Conditions: heat and sealed under pressure
$CH_3CH_2Br + 2NH_3 \rightarrow CH_3CH_2NH_2 + NH_4Br$
Primary amines are formed

Nucleophiles are electron pair donors.



Nucleophile: OH-
Reagent: aqueous KOH
Conditions: heated under reflux

Elimination reaction of halogenoalkanes

Reagent: KOH in the presence of ethanol
halogenoalkane → alkene
$H_3C\text{-}CH_2\text{-}CH_2Br + KOH \rightarrow H_3C\text{-}CH{=}CH_2 + KBr + H_2O$
Isomers are formed in case of tertiary and unsymmetrical haloalkanes.

Nucleophile: CN-
Reagent: KCN with ethanol
Conditions: heated under reflux