HALOALKANE AND HALOARENE

CLASSIFICATION

Compounds containing sp^2 C-X bond

- VINYLIC HALIDE
- ARYL HALIDE

Compounds containing sp^3 C-X bond

- BENZYLIC HALIDE
- ALLYLIC HALIDE

HALOALKANE, R-X

ON THE BASIS OF NUMBER OF HALOGEN ATOMS

- MONOHALALKANE EG. CH2X
- DIHALOALKANE EG. CHX2
- TRIHALOALKANE EG. CX3

NATURE OF C-X BOND

where X = Cl, Br, F, I as size of Halogen a C-X Bond Length

$$\alpha \frac{1}{\text{Bond Enthalpy}}$$

PHYSICAL PROPERTIES

PROPERTIES OF HALOALKANES

- Soluble in organic solvent
- REACTIVITY ORDER: R-I > R-BR > R-CL > R-F
- FOR SOME HALIDE GROUP: 3°(HALIDE) > 2° (HALIDE) > 1° (HALIDE)
- ORDER OF M.P. AND B.P. IS: R-I > RBR > RCL > RF
- POLARITY ORDER: RF > RCL > RBR > R-F

PROPERTIES OF HALOARENES

- B.P. a size of anyl group
- ORDER OF B.P.: AR-I>AR-BR> A-CL>AR-F
- M.P. OF: P-ISOMER> O-ISOMER TM-ISOMER

METHODS OF PREPARATIONS

PREPARATIONS OF HALOALKANE

FORM ALCOHOLS

$$R-OH + HCl \xrightarrow{ZnCl_2} R-Cl + H_2O$$

$$R-OH + PCl_5 \longrightarrow R-Cl + POCl_3 + HCl$$

$$R-OH + SOCl_2 \longrightarrow R-Cl + SO_2 + HCl$$

HALOGEN EXCHANGE

$$R-X + NaI \rightarrow R-I + NaX$$

SWARTS REACTION

$$H_3C-Br + AgF \rightarrow AgBr + H_3C-F$$

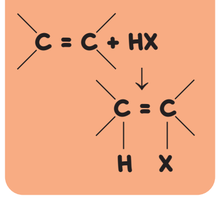
FROM HYDROCARBON

From Alkane By free Radical Halogenation

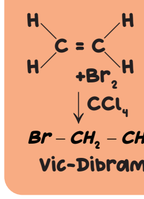
$$CH_4 \xrightarrow[HV]{Cl_2} CH_3Cl + CH_2Cl_2 + CHCl_3 + Cl_4$$

FROM ALKENE

Addition of Hydrogen Halide



Addition of Halogens

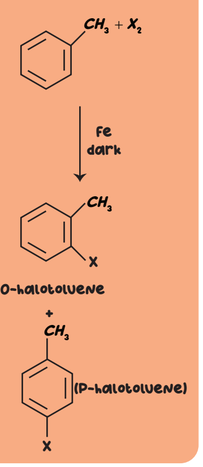


$Br-CH_2-CH_2-Br$

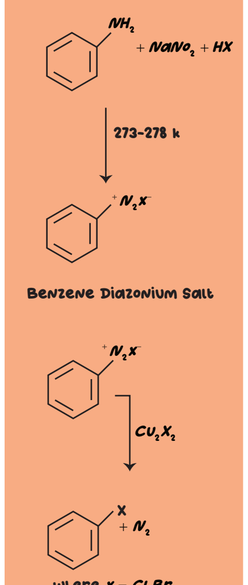
Vic-Dibramide

PREPARATION OF HALOARENES

From Hydrocarbon By Electrophilic Substitution



From amines by Sandmeyer's reaction



where X = Cl, Br

CHEMICAL PROPERTIES

HALOARENES

NUCLEOPHILIC SUBSTITUTION REACTION

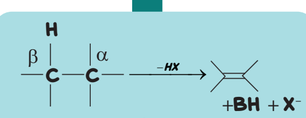
- Less reactive than alkyl Halide
- Instability of Phenyl cation
- Stablization of molecule by delacalization of electron

ELECTROPHILIC SUBSTITUTION REACTION

Haloarene are o-4p-directing e.g. Halogenation Sulphonation

HALOALKANES

ELIMINATION METHOD



- β-Hydrogen is Involved β-Elimination

SAYTZEFF RULE

Preferred product is the alkene which has greater No. of Alkyl group attached to it.

NUCLEOPHILIC SUBSTITUTION REACTION

$$NU + C^{+\delta} - X^{-\delta} \longrightarrow C - NU + X^-$$

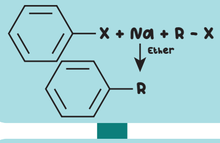
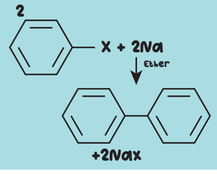
SN_1 REACTION

- $(CH_3)_3CBr + OH \rightarrow (CH_3)_3C-OH + Br^-$
- Rate = k [Rx]
- Follows First order Kinetics.
- Reactivity order of Alkyl Halide: 3° (halide) > 2° (halide) > 1° (halide)
- Low Concentration and weak Nucleophile favour SN reaction
- Partial Racemisation
- Rate of reaction depends on Stability of Carbocation

SN_2 REACTION

- $CH_3CH_2Br + OH^- \rightarrow CH_3CH_2OH + Br^-$
- Rate = k [Rx][NU-]
- Inversion of Configuration takes place
- Reactivity of Halides: 1°>2°>3°
- Rate a Strength of NU-a
- Non-Polar NU-, Strong NU- and hight Concentration of NU- favour SN2.

WURTZ FITTIG REACTION



FITTIG REACTION