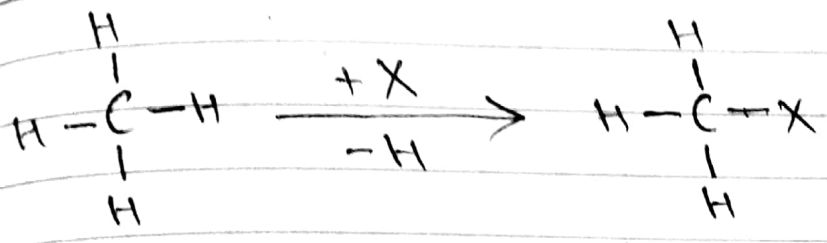
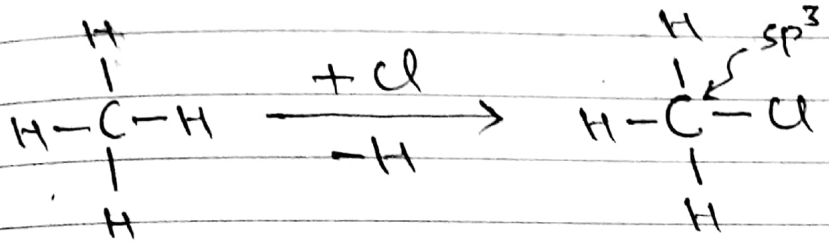
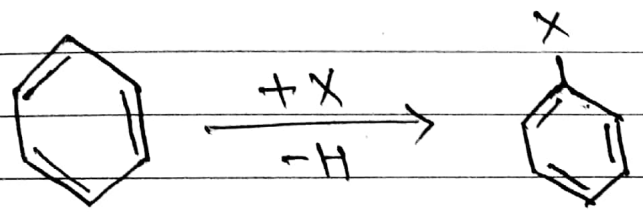
~~Organic Compounds~~ Haloalkanes and haloarenes



methane — Halo methane (Haloalkane)

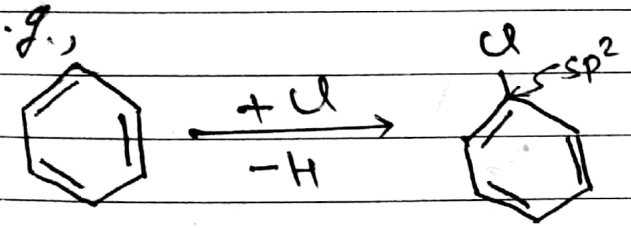


Chloro methane (~~Chloroalkane~~)
(methyl chloride)

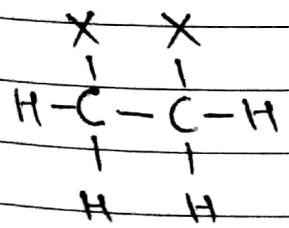


Benzene — Halo benzene (Haloarene)

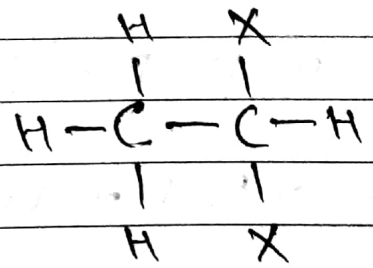
e.g.,



Chloro benzene



Vicinal dihalide
(alkylene dihalide or Ethylene dihalide)



gem dihalide
(alkylidene halide or Ethylidene halide)

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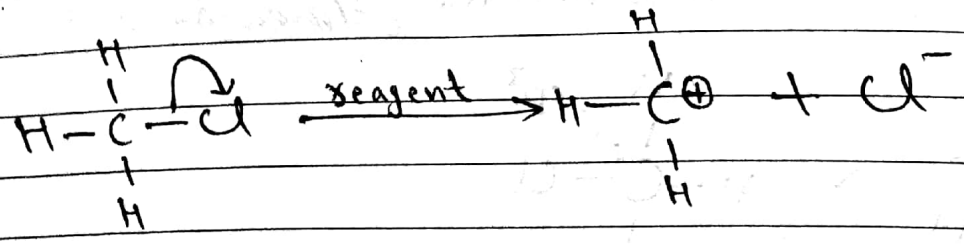
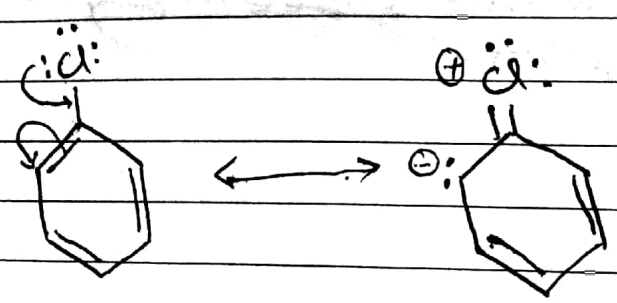
Nature of C-X bond –

(a) In halo alkane



(b) In halo arene –



Bond length –

C–F C–Cl C–Br C–I

Bond length increases →

Bond energy & bond strength decreases →

Methods of preparation –

1

(i) $ROH + PCl_5 \longrightarrow RCl + POCl_3 + HCl$.

(ii) $3ROH + PCl_3 \longrightarrow 3RCl + H_3PO_3$

(iii) $ROH + SOCl_2 \longrightarrow RCl + HCl + SO_2$

→ For the preparation of alkyl halide from alcohol.

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Thionyl chloride method is preferred because the other two products are escapable gases.

(iv) $\underset{1^\circ \text{ or } 2^\circ}{ROH} + HX \xrightarrow{ZnCl_2} R-X + H_2O$

(v) $ROH + NaBr + H_2SO_4 \longrightarrow R-Br + NaHSO_4 + H_2O$

(v) $ROH \xrightarrow{\text{Red Phosphorus} / X_2} R-X$

② By Free radical halogenation –

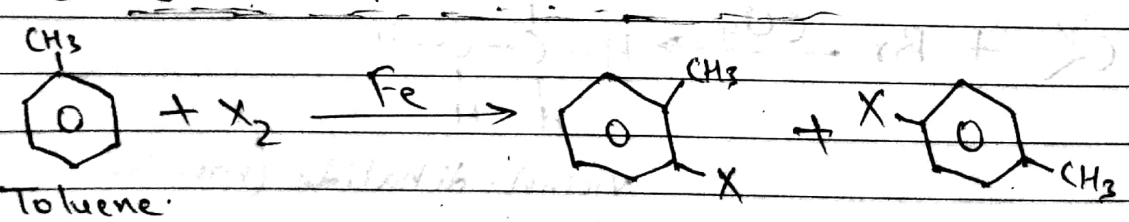
free radical chlorination or bromination of alkane gives alkyl halide.

$$CH_4 + Cl_2 \xrightarrow[\text{or Organic peroxide}]{\text{U.V or heat or TEL}} CH_3Cl + HCl$$

$$CH_3CH_2CH_2CH_3 + Cl_2 \xrightarrow{\text{do}} \underset{\text{(minor product)}}{CH_3-CH_2-CH_2-CH_2Cl} + \underset{\text{(major product)}}{CH_3-CH_2-\overset{Cl}{CH}-CH_3}$$

Since the given reaction undergoes via free radical mechanism hence 2° free radical intermediate would lead to the formation of $CH_3-CH_2-\overset{Cl}{CH}-CH_3$ as major product.

③ By electrophilic substitution –



Toluene

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