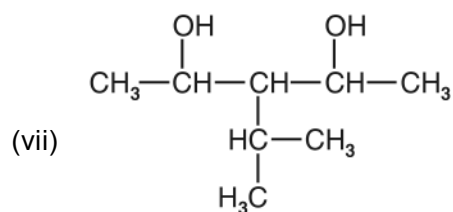
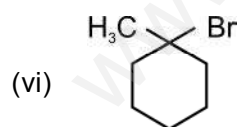
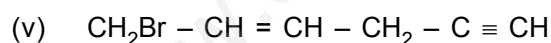
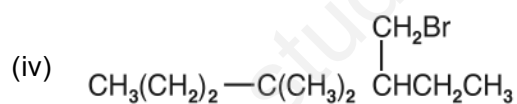
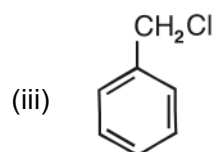
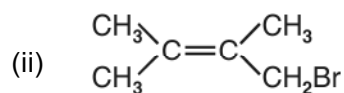
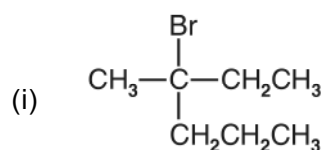
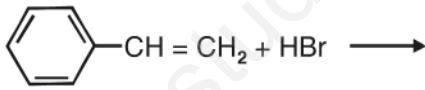
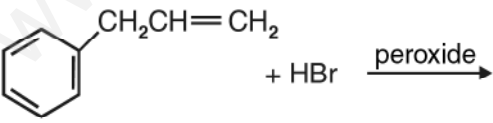
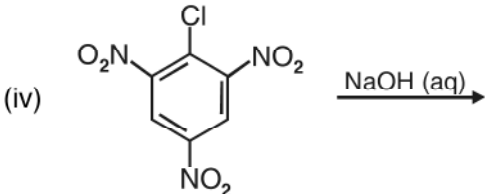


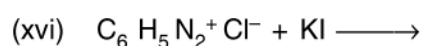
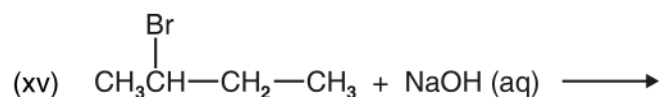
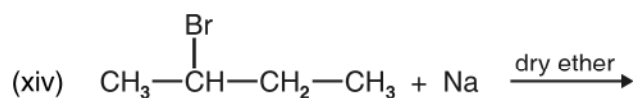
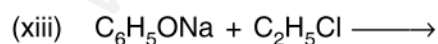
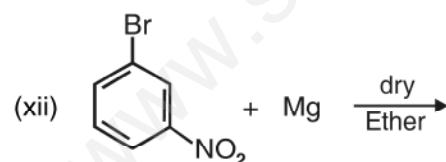
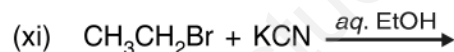
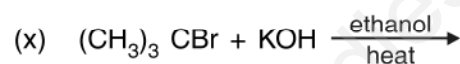
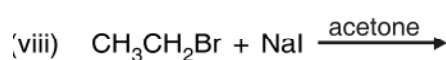
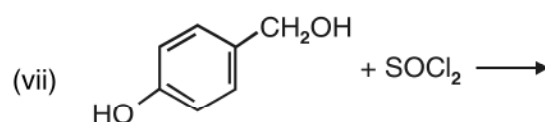
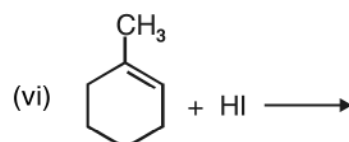
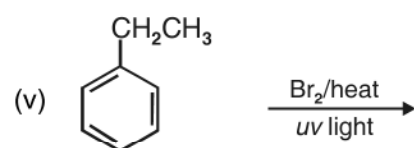
## Unit - 10

**HALOALKANES AND HALOARENES**

1. Write the IUPAC names of the following compounds.



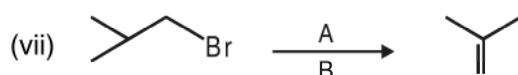
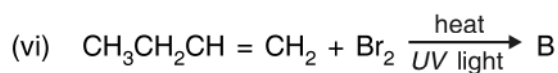
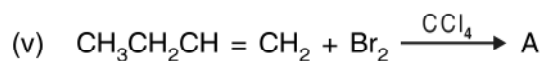
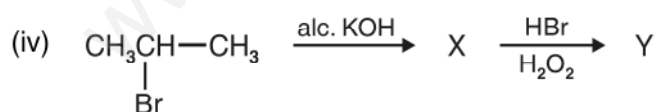
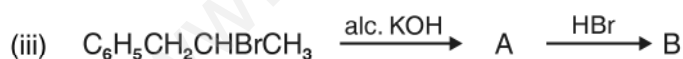
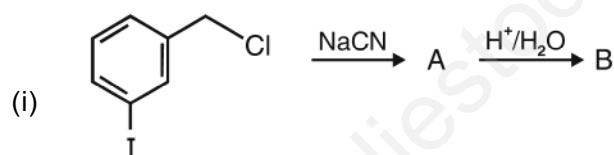
2. Write the structure of following halogen compounds
- 2-chloro-3-methylpentane
  - 2-(2-chlorophenyl)-1-iodooctane
  - 1-bromo-4-sec-butyl-2-methylebenzene.
  - p-bromotoluene.
  - chlorophenylmethane
3. Arrange the following in the increasing order of properly indicated :
- bromomethane, chloromethane, dichloromethane. (Increasing order of boiling points).
  - 1-chloropropane, isopropyl chloride, 1-chlorobutane (Increasing order of boiling point)
  - dichloromethane, chloroform, carbon tetrachloride. (Increasing order of dipole moment).
  - $\text{CH}_3\text{F}$ ,  $\text{CH}_3\text{Cl}$ ,  $\text{CH}_3\text{Br}$ ,  $\text{CH}_3\text{I}$  (Increasing reactivity towards nucleophilic substitution and increasing order of dipole moment)
  - o,m,p*-dichlorobenzenes (Increasing order of melting points).
4. Complete the following reactions :
- 
 $\text{C}_6\text{H}_5\text{CH}=\text{CH}_2 + \text{HBr} \longrightarrow$
  - $\text{CH}_3 - \text{CH}_2 - \text{Cl} + \text{AgNO}_2 \longrightarrow$
  - 
 $\text{C}_6\text{H}_5\text{CH}_2\text{CH}=\text{CH}_2 + \text{HBr} \xrightarrow{\text{peroxide}}$
  - 
 $\text{C}_6\text{H}_2(\text{NO}_2)_3\text{Cl} \xrightarrow{\text{NaOH (aq)}}$

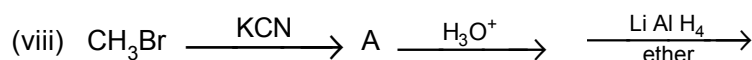


5. How will you bring about the following conversions?

- (i) benzene to 3-bromonitrobenzene
- (ii) ethanol to but-1-yne
- (iii) 1-bromopropane to 2-bromopropane
- (iv) benzene to 4-bromo-1-nitrobenzene
- (v) aniline to chlorobenzene
- (vi) 2-methyl-1-propene to 2-chloro-2-methylpropane
- (vii) ethyl chloride to propanoic acid
- (viii) but-1-ene to n-butyl iodide
- (ix) benzene to phenylchloromethane.
- (x) tert-butyl bromide to isobutyl bromide.

6. Identify the products formed in the following sequence :

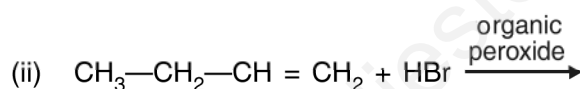
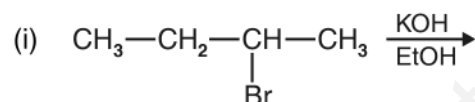




7. Explain the following reactions with suitable example :

- (i) Finkelstein reaction.
- (ii) Swarts reaction.
- (iii) Wurtz reaction.
- (iv) Wurtz-Fitting reaction
- (v) Friedel-Craft's alkylation reaction.
- (vi) Friedel-Craft's acylation reaction
- (vii) Sandmeyer reaction.

8. Write the major products and name the rule responsible for the formation of the product.



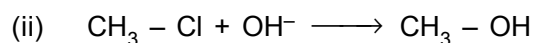
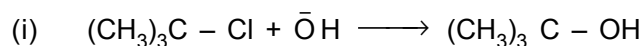
9. Write the difference between

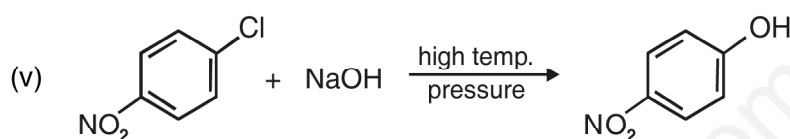
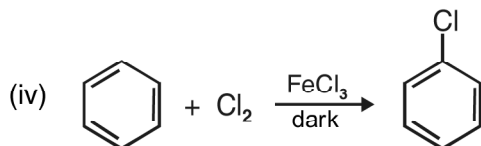
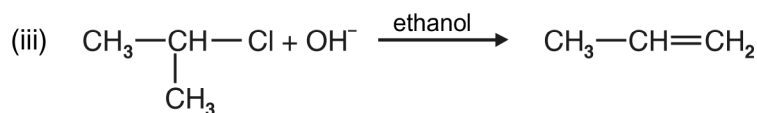
- (i) enantiomers and diastereomers
- (ii) retention and inversion of configuration.
- (iii) electrophilic and nucleophilic substitution reactions.

10. Give a chemical test to distinguish between the following pairs of compounds:

- (i) chlorobenzene and cyclohexylchloride.
- (ii) vinyl chloride and ethyl chloride.
- (iii) n-propyl bromide and isopropyl bromide.

11. Give mechanism of the following reactions :



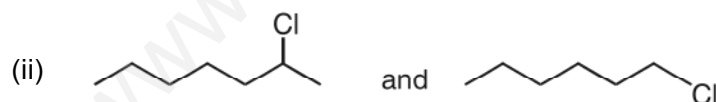
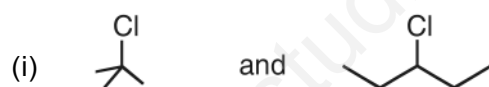


12. Which compound in each of the following pairs will react faster in  $\text{S}_\text{N}2$  reaction with  $\text{OH}^-$  and why?

(i)  $\text{CH}_3\text{Br}$  or  $\text{CH}_3\text{I}$

(ii)  $(\text{CH}_3)_3\text{CCl}$  or  $\text{CH}_3\text{Cl}$

13. In the following pairs which halogen compound undergoes faster  $\text{S}_\text{N}1$  reaction?



(iii)  $(\text{CH}_3)_3\text{CCl}$  and  $\text{C}_6\text{H}_5\text{CH}_2\text{Cl}$

(iv)  $\text{C}_6\text{H}_5\text{CH}_2\text{Cl}$  and  $\text{C}_6\text{H}_5\text{C}(\text{Cl})\text{C}_6\text{H}_5$

(v)  $\text{CH}_2=\text{CH}-\text{Cl}$  and  $\text{CH}_2=\text{CH}-\text{CH}_2\text{Cl}$

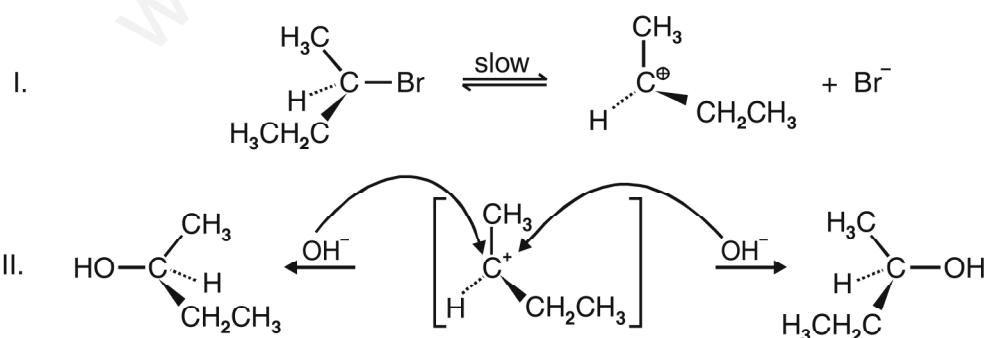
14. Give reasons for the following :

(i) The bond length of  $\text{C}-\text{Cl}$  bond is larger in haloalkanes than that in haloarenes.

(ii) Although alkyl halides are polar in nature but are not soluble in water.

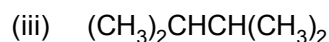
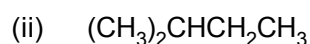
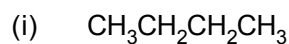
- (iii) tert-butyl bromide has lower boiling point than n-Butyl bromide.
- (iv) haloalkanes react with KCN to form alkyl cyanide as main product while with AgCN alkyl isocyanide is the main product.
- (v) sulphuric acid is not used in the reaction of alcohol with KI.
- (vi) thionyl chloride is the preferred reagent for converting ethanol to chloroethane.
- (vii) haloalkanes undergo nucleophilic substitution reaction easily but haloarenes do not undergo nucleophilic substitution under ordinary conditions.
- (viii) chlorobenzene on reaction with fuming sulphuric acid gives ortho and para chlorosulphonic acids.
- (ix) 2, 4-dinitro chlorobenzene is much more reactive than chlorobenzene towards hydrolysis reaction with NaOH.
- (x) Grignard reagent should be prepared under anhydrous conditions.
- (xi) the dipole moment of chlorobenzene is lower than that of cyclohexyl chloride.
- (xii) neopentyl bromide undergoes nucleophilic substitution reactions very slowly
- (xiii) vinyl chloride is unreactive in nucleophilic substitution reaction.
- (xiv) An optically inactive product is obtained after the hydrolysis of optically active 2- bromobutane.

**[Hint :** The hydrolysis reaction occurs by  $S_N1$  pathway. The carbocation is formed first which gives a mixture of ( $\pm$ ) butan-2-ol in the second step].



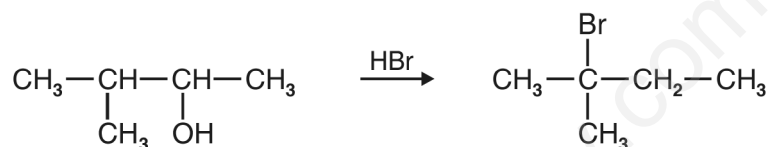
- (xv) methyl iodide is hydrolysed at faster rate than methyl chloride.

15. Write the different products and their number formed by the monochlorination of following compounds :



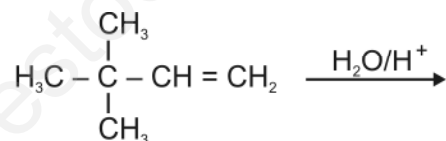
[Hint : (i) Two, (ii) four, (iii) three

16. (a) When 3-methylbutan-2-ol is treated with HBr, the following reaction takes places :

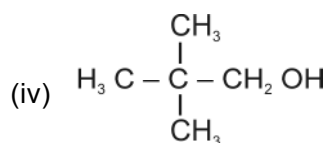
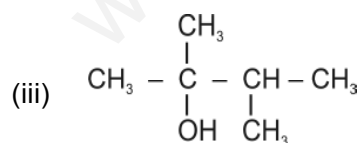
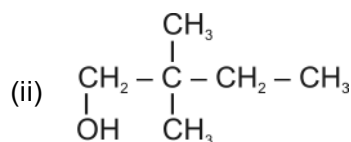
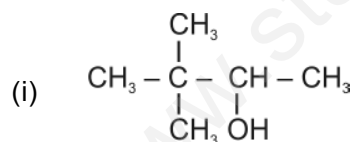


Give the mechanism for this reaction.

- (b) In the following reaction :



major and minor products are :



Ans. Major (iii) minor (i)

17. Give one use of each of following :

(i) Freon-12

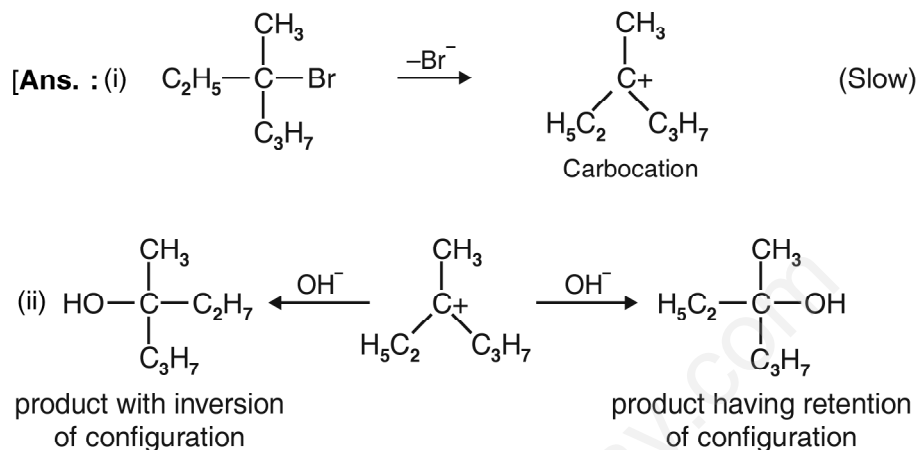
(ii) DDT

(iii) Carbon tetrachloride

(iv) Iodoform

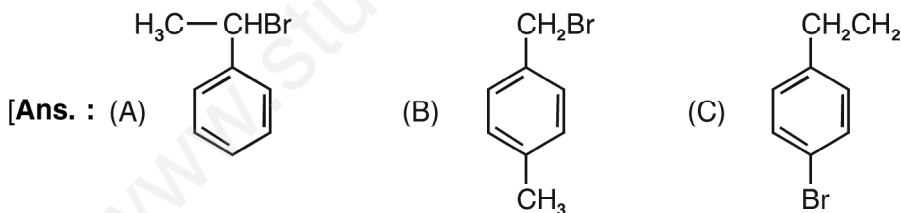


18. An optically active compound having molecular formula  $C_7H_{15}Br$  reacts with aqueous KOH to give  $C_7H_{15}OH$ , which is optically inactive. Give mechanism for the reaction.



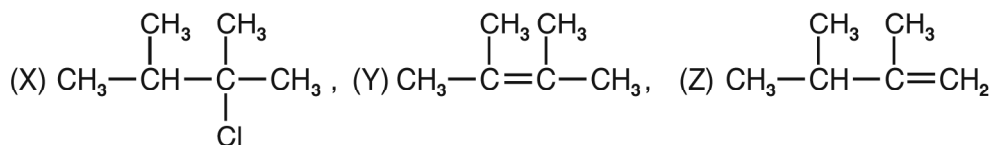
A racemic mixture is obtained which is optically inactive.]

19. An organic compound  $C_8H_9Br$  has three isomers A, B and C. A is optically active. Both A and B gave the white precipitate when warmed with alcoholic  $AgNO_3$  solution in alkaline medium. Benzoic acid, terephthalic and p-bromobenzoic acid were obtained on oxidation of A, B and C respectively. Identify A, B and C.



- \*20. An alkyl halide X having molecular formula  $C_6H_{13}Cl$  on treatment with potassium tert-butoxide gives two isomeric alkenes Y and Z but alkene Y is symmetrical. Both alkenes on hydrogenation give 2, 3-dimethylbutane. Identify X, Y and Z.

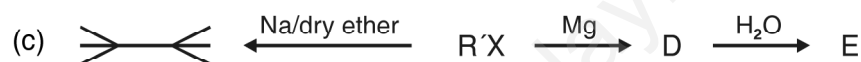
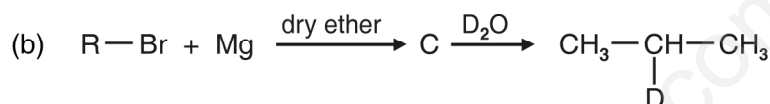
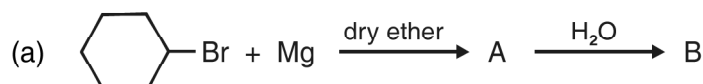
[Ans.



- \*21. An organic compound (A) having molecular formula  $C_3H_7Cl$  on reaction with alcoholic solution of KCN gives compound B. The compound B on hydrolysis with dilute HCl gives compound C. C on reduction with  $H_2/Ni$  gives 1-aminobutane. Identify A, B and C.

[Ans. : (A)  $CH_3CH_2CH_2Cl$ , (B)  $CH_3CH_2CH_2CN$ , (C)  $CH_3CH_2CH_2CONH_2$ ]

- \*22. Identify A, B, C, D, E, R and R' in the following sequence of reactions :



23. Which nomenclature is not according to IUPAC system.

(i)  $Br-CH_2CH=CH_2$ ; 1-bromoprop-2-ene

(ii)  $CH_3-CH_2-\underset{\substack{| \\ Br}}{\overset{\substack{CH_3 \\ |}}{C}}-CH_2-\underset{\substack{| \\ Br}}{CH}-CH_3$  4-bromo-2, 4-dimethylhexane

(iii)  $CH_3-\underset{\substack{| \\ CH_3}}{CH}-\underset{\substack{| \\ \text{C}_6\text{H}_5}}{CH}-CH_2CH_3$ , 2-methyl-3-phenylpentane

(iv)  $CH_3-\underset{\substack{|| \\ O}}{C}-CH_2CH_2-CH_2COONa$ , 5-oxohexanoic acid