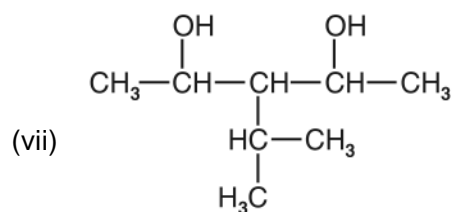
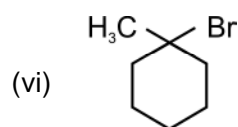
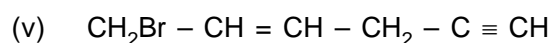
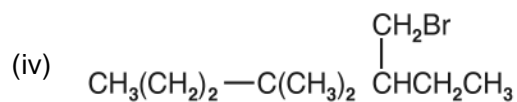
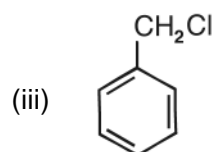
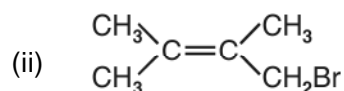
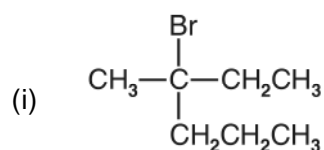
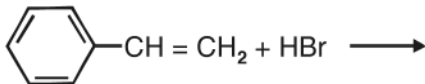
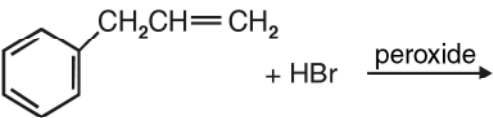
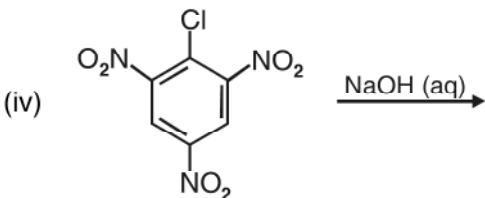


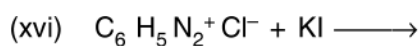
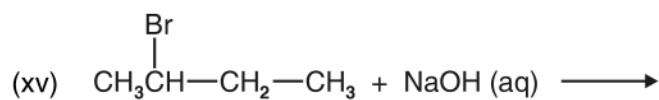
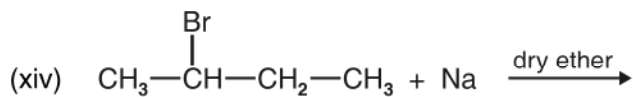
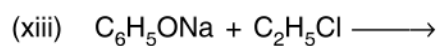
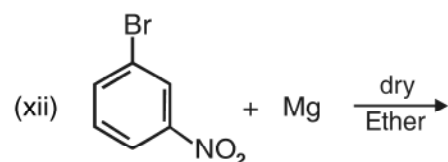
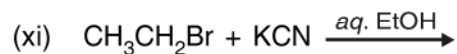
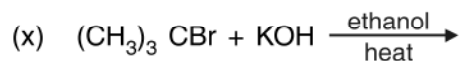
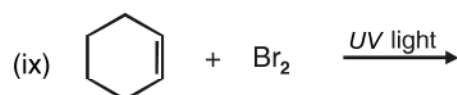
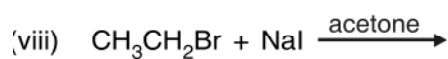
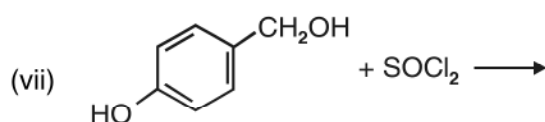
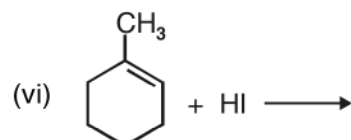
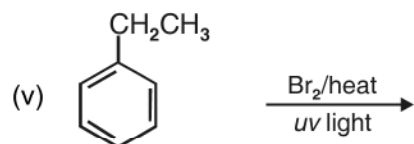
Unit - 10

HALOALKANES AND HALOARENES

1. Write the IUPAC names of the following compounds.



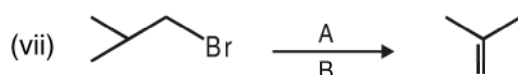
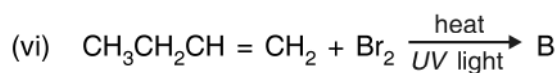
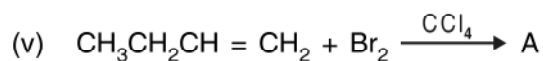
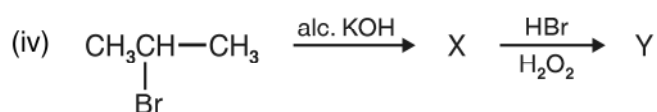
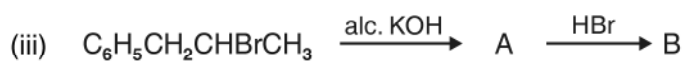
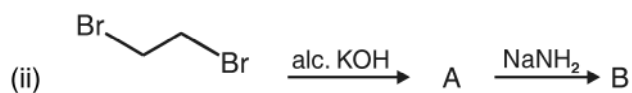
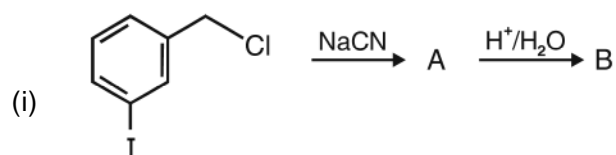
2. Write the structure of following halogen compounds
- 2-chloro-3-methylpentane
 - 2-(2-chlorophenyl)-1-iodooctane
 - 1-bromo-4-sec-butyl-2-methylebenzene.
 - p-bromotoluene.
 - chlorophenylmethane
3. Arrange the following in the increasing order of properly indicated :
- bromomethane, chloromethane, 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.
 - CH_3F , CH_3Cl , CH_3Br , CH_3I (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 :
- 
 $\text{C}_6\text{H}_5\text{CH}=\text{CH}_2 + \text{HBr} \longrightarrow$
 - $\text{CH}_3 - \text{CH}_2 - \text{Cl} + \text{AgNO}_2 \longrightarrow$
 - 
 $\text{C}_6\text{H}_5\text{CH}_2\text{CH}=\text{CH}_2 + \text{HBr} \xrightarrow{\text{peroxide}}$
 - 
 $\text{C}_6\text{H}_3(\text{NO}_2)_3\text{Cl} \xrightarrow{\text{NaOH (aq)}}$

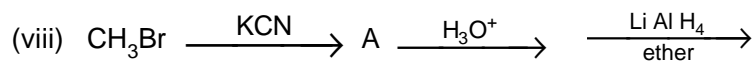


5. How will you bring about the following conversions?

- (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 :

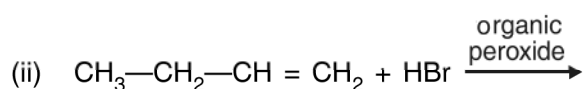
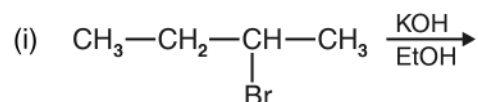




7. Explain the following reactions with suitable example :

- (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.



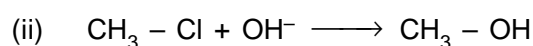
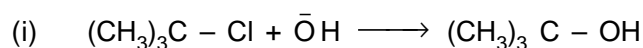
9. Write the difference between

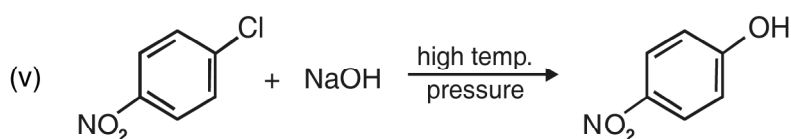
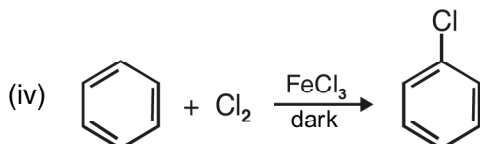
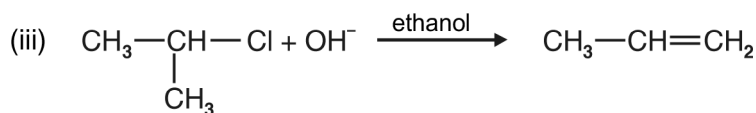
- (i) enantiomers and diastereomers
- (ii) retention and inversion of configuration.
- (iii) electrophilic and nucleophilic substitution reactions.

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 :



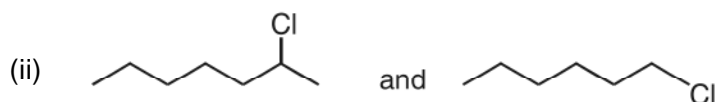
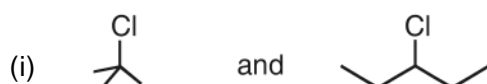


12. Which compound in each of the following pairs will react faster in S_N2 reaction with OH⁻ and why?

(i) CH₃Br or CH₃I

(ii) (CH₃)₃CCl or CH₃Cl

13. In the following pairs which halogen compound undergoes faster SN1 reaction?



(iii) (CH₃)₃C – Cl and C₆H₅CH₂Cl

(iv) C₆H₅CH₂Cl and C₆H₅C(Cl)C₆H₅

(v) CH₂ = CH – Cl and CH₂ = CH – CH₂Cl

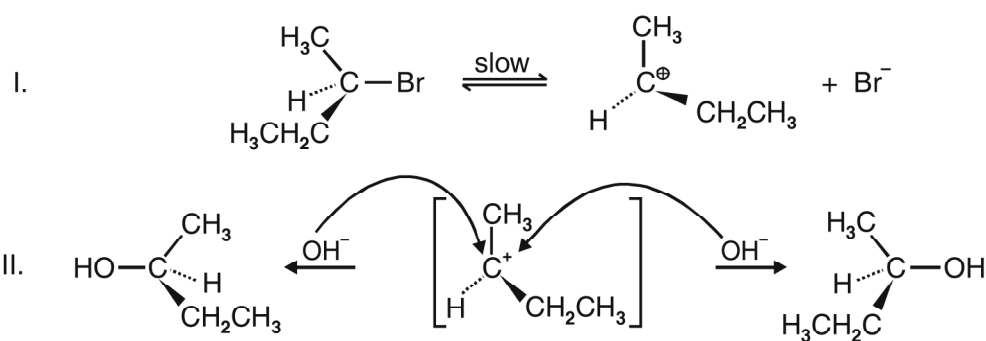
14. Give reasons for the following :

(i) The bond length of C–Cl bond is larger in haloalkanes than that in haloarenes.

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

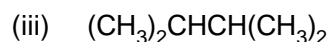
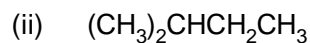
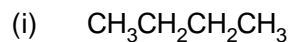
- (iii) tert-butyl bromide has lower boiling point than n-Butyl bromide.
- (iv) haloalkanes react with KCN to form alkyl cyanide as main product while with AgCN alkyl isocyanide is the main product.
- (v) sulphuric acid is not used in the reaction of alcohol with KI.
- (vi) thionyl chloride is the preferred 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 :



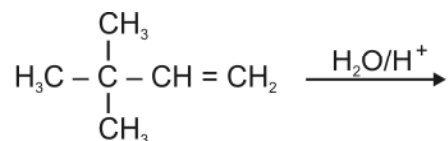
[Hint : (i) Two, (ii) four, (iii) three

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

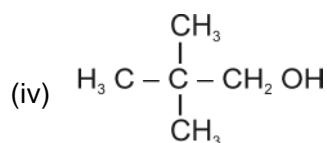
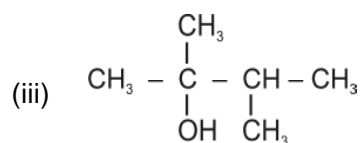
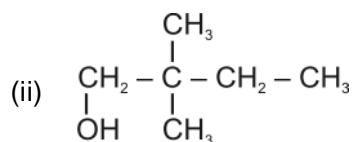
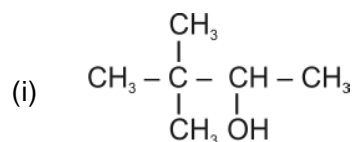


Give the mechanism for this reaction.

(b) In the following reaction :



major and minor products are :



Ans. Major (iii) minor (i)

17. Give one use of each of following :

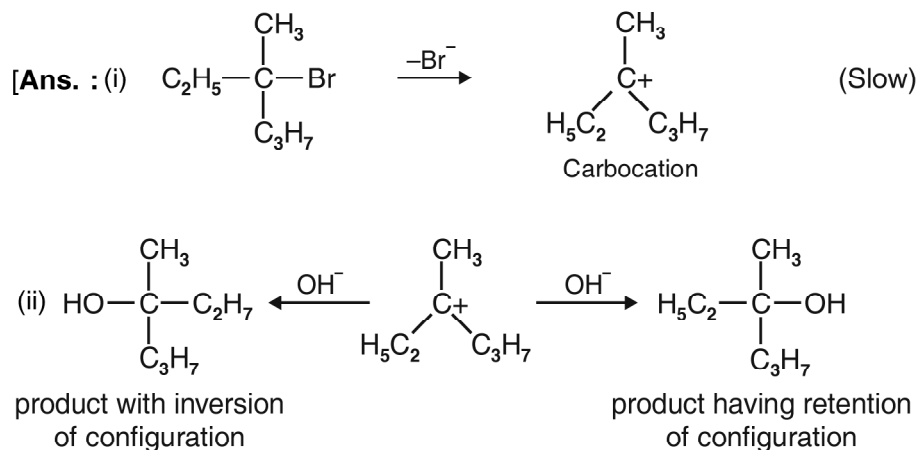
(i) Freon-12

(ii) DDT

(iii) Carbon tetrachloride

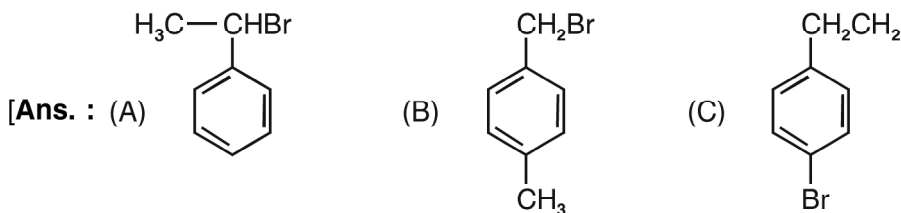
(iv) Iodoform

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.



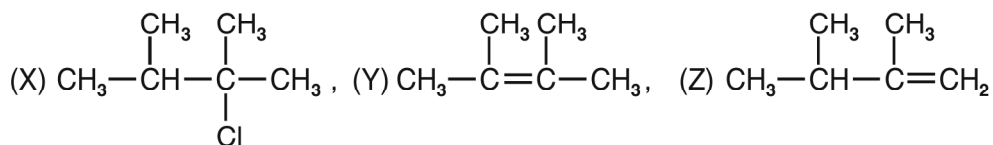
A racemic mixture is obtained which is optically inactive.]

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.

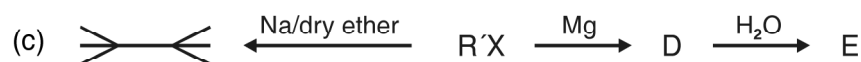
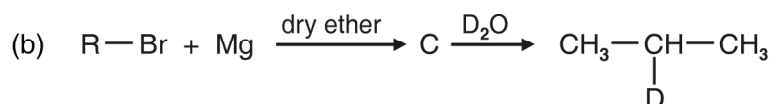
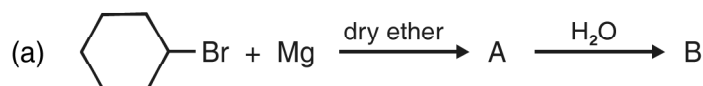
[Ans.



- *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