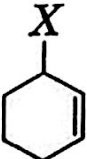
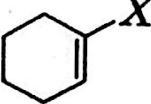


# 1 Mark Questions

1. Write the structure of 2, 4-dinitrochlorobenzene.

2. Out of  and  which is an example of allylic halide?

3. Write the structure of 1-bromo-4-chlorobut-2-ene.

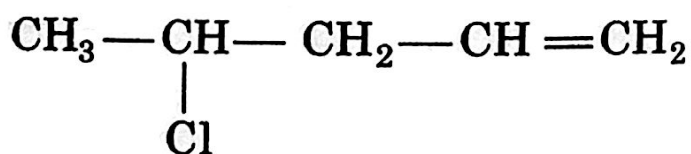
4. Write the structure of 3-bromo-2-methylprop-1-ene.

5. Draw the structure of 2-bromopentane.

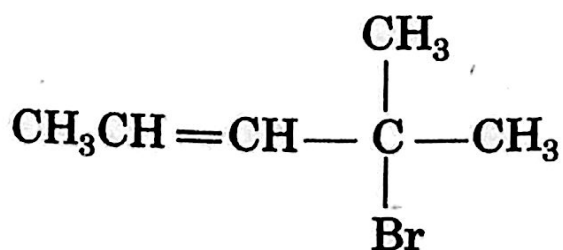
6. Write the IUPAC name of



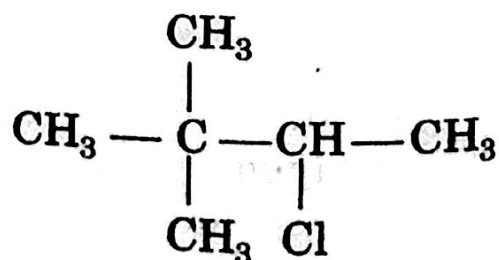
7. Write the IUPAC name of



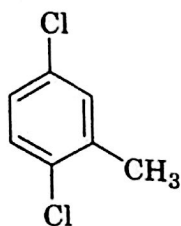
8. Write the IUPAC name of



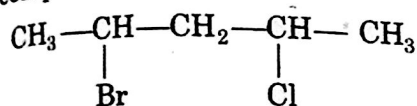
9. Write the IUPAC name of the following compound:



10. Write the IUPAC name of the following compound:

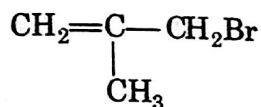


11. Write the IUPAC name of the following compound:



12. A hydrocarbon  $\text{C}_5\text{H}_{12}$  gives only one monochlorination product. Identify the hydrocarbon.

13. Give the IUPAC name of the following compound:



14. What happens when bromine attacks  $\text{CH}_2 = \text{CH} - \text{CH}_2 - \text{C} \equiv \text{CH}$ ?

15. Write the IUPAC name of the following compound  $(\text{CH}_3)_3\text{CCH}_2\text{Br}$ .

16. Write the IUPAC name of the following compound:  $\text{CH}_2 = \text{CHCH}_2\text{Br}$ .

17. Draw the structure of 1,4-dibromobut-2-ene.

18. Draw the structure of 2-(2-bromophenyl)butane.

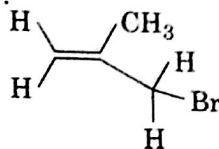
19. Draw the structure of 2-(2-chlorophenyl)-1-iodooctane.

20. Draw the structure of the following compound:  
1-bromo-4-*sec*-butyl-2-methylbenzene

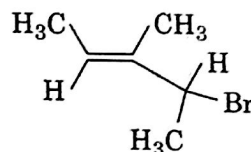
21. Draw the structure of the following organic compound:  
2-chloro-3-methylpentane.

22. Draw the structure of the following compound: 3-(4-chlorophenyl)-2-methylpropane

23. Write the IUPAC name of the following compound:

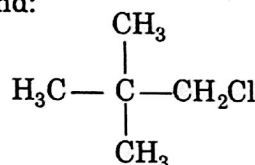


24. Give the IUPAC name of the following compound:



25. Draw the structure of the compound, 4-*tert*-butyl-3-iodoheptane.

26. Write the IUPAC name of the following compound:

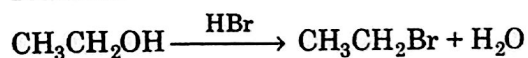


27. Draw the structure of the compound, 1-chloro-4-ethylcyclohexane.

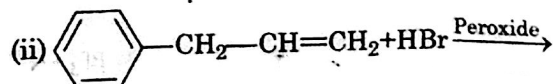
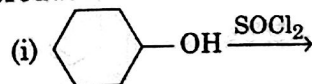
28. Draw the structure of the following compound. 4-bromo-3-methylpent-2-ene.

## 2 Marks Questions

29. Write the mechanism of the following reaction:



30. Draw the structure of major monohalo product in each of the following reactions:



31. Draw the structures of the following organic halogen compounds:

- (i) *p*-bromochlorobenzene

(ii) 1-chloro-4-ethylcyclohexane

**32.** Draw the structures of the following organic halogen compounds:

(i) 4-*tert*-butyl-3-iodoheptane

(ii) 4-bromo-3-methylpent-2-ene

**33.** Write the IUPAC names of the following compounds :

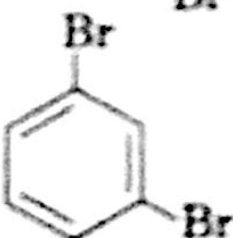
(i)  $\text{CH}_2 = \text{CHCH}_2\text{Br}$

(ii)  $(\text{CCl}_3)_3\text{CCl}$

### 3 Marks Questions

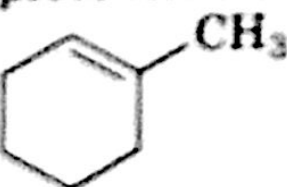
**34.** Give the IUPAC names of the following compounds:

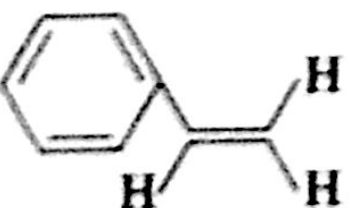
(i)  $\text{CH}_3 - \underset{\text{Br}}{\text{CH}} - \text{CH}_2 - \text{CH}_3$

(ii) 

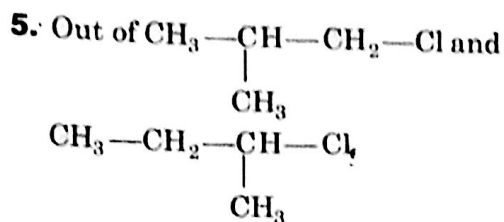
(iii)  $\text{CH}_2 = \text{CH} - \text{CH}_2 - \text{Cl}$

**35.** Complete the following reactions :

(i)  +  $\text{HI} \longrightarrow$

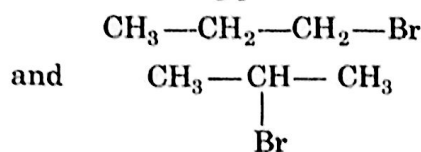
(ii)  +  $\text{HBr} \longrightarrow$

(iii)  $\text{CH}_3\text{CH}_2\text{CH} = \text{CH}_2 + \text{HBr} \longrightarrow$

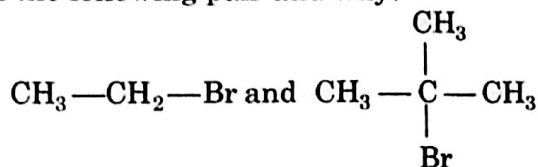


which is more reactive towards  $\text{S}_{\text{N}}1$  reaction and why?

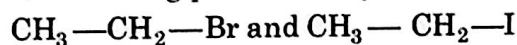
6. Which would undergo  $\text{S}_{\text{N}}1$  reaction faster in the following pair?



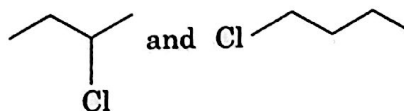
7. Which would undergo  $\text{S}_{\text{N}}2$  reaction faster in the following pair and why?



8. Which would undergo  $\text{S}_{\text{N}}2$  reaction faster in the following pair and why?



9. Identify the chiral molecule in the following pair.



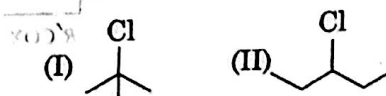
## 1 Mark Questions

- Why is *t*-butyl bromide more reactive towards  $\text{S}_{\text{N}}1$  reaction as compared to *n*-butyl bromide?
- Predict the major product formed when sodium ethoxide reacts with tert.butyl chloride
- Out of chlorobenzene and benzyl chloride, which one gets easily hydrolysed by aqueous NaOH and why?
- Write the structure of an isomer of compound  $\text{C}_4\text{H}_9\text{Br}$  which is most reactive towards  $\text{S}_{\text{N}}1$  reaction.

10. What happens when  $\text{CH}_3-\text{Br}$  is treated with KCN?

11. What happens when ethyl chloride is treated with aqueous KOH?

12. Which compound in the following pair undergoes faster towards  $\text{S}_{\text{N}}1$  reaction?



13. How methyl bromide be preferentially converted to methyl isocyanide?

14. Predict the order of reactivity of four isomeric bromobutanes in  $S_N1$  reaction.

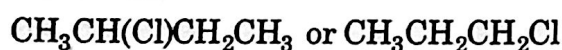
15. Which will react faster towards  $S_N2$  reaction, 1-bromopentane or 2-bromopentane and why?

16. A solution of KOH hydrolyses  $CH_3CHClCH_2CH_3$  and  $CH_3CH_2CH_2CH_2Cl$ . Which one of these is more easily hydrolysed?

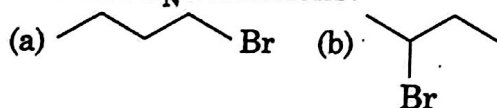
17. Explain the following reactions with an example: Friedel-Craft's reaction.

## 2 Marks Questions

18. Which one of the following compounds is more reactive towards  $S_N2$  reaction and why?



19. (i) Which alkyl halide from the following pair is chiral and undergoes faster towards  $S_N2$  reactions?



(ii) Out of  $S_N1$  and  $S_N2$ , which reaction occurs with

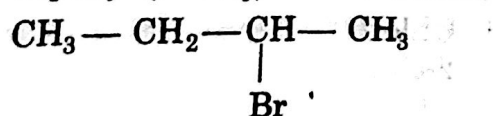
- (a) Inversion of configuration?  
(b) Racemisation?

20. Write chemical equations when

(i) ethyl chloride is treated with aqueous KOH.

(ii) chlorobenzene is treated with  $CH_3COCl$  in the presence of anhydrous  $AlCl_3$

21. (i) Which alkyl halide from the following pair would you expect to react more rapidly by an  $S_N2$  mechanism and why?



$CH_3 - CH_2 - CH_2 - CH_2 - Br$   
(ii) Racemisation occurs in  $S_N1$  reactions. Why?

22. Which compound in each of the following pairs will react faster towards  $S_N2$  reaction with  $-OH$ ? Why?

(i)  $CH_3Br$  or  $CH_3I$

(ii)  $(CH_3)_3CCl$  or  $CH_3Cl$

23. Write the chemical equations when,

(i) methylchloride is treated with  $AgNO_2$ .

(ii) bromobenzene is treated with  $CH_3Cl$  in the presence of anhydrous  $AlCl_3$ .

24. What are ambident nucleophiles? Give an example.

25. Account for the following :

(i) The C—Cl bond length in chlorobenzene is shorter than that in  $CH_3 - Cl$ .

(ii) Chloroform is stored in closed dark brown bottles.

26. Chlorobenzene is extremely less reactive towards a nucleophilic substitution reaction. Give two reasons for the same.

27. Explain. Why

(i) alkyl halides, though polar, are immiscible with water?

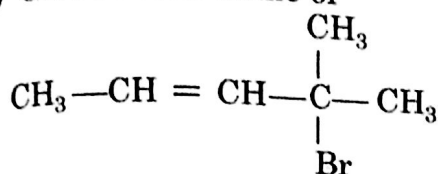
(ii) Grignard's reagent should be prepared under anhydrous conditions?

## 3 Marks Questions

28. (a) Write equation for preparation of 1-iodobutane from 1-chlorobutane.

(b) Out of 2-bromopentane, 2-bromo-2-methylbutane and 1-bromopentane, which compound is most reactive towards elimination reaction and why?

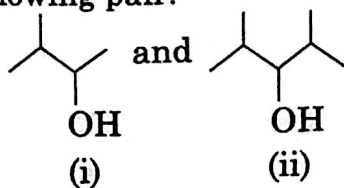
(c) Give IUPAC name of



29. Give reasons for the following :

- The presence of  $-\text{NO}_2$  group at *ortho* or *para* position increases the reactivity of haloarenes towards nucleophilic substitution reactions.
  - p*-dichlorobenzene has higher melting point than that of *ortho* or *meta* isomer.
  - Thionyl chloride method is preferred for preparing alkyl chloride from alcohols.
30. (i) Out of  $(\text{CH}_3)_3\text{C}-\text{Br}$  and  $(\text{CH}_3)_3\text{C}-\text{I}$ , which one is more reactive towards  $\text{S}_{\text{N}}1$  and why?
- (ii) Write the product formed when *p*-nitrochlorobenzene is heated with aqueous  $\text{NaOH}$  at 443 K followed by acidification.
- (iii) Why *dextro* and *laevo*-rotatory isomers of butan-2-ol are difficult to separate by fractional distillation?

31. (i) Identify the chiral molecule in the following pair:



- Write the structure of the product when chlorobenzene is treated with methyl chloride in the presence of sodium metal and dry ether.
  - Write the structure of the alkene formed by dehydrohalogenation of 1-bromo-1-methylcyclohexane with alcoholic  $\text{KOH}$ .
32. Write the product(s) formed when
- 2-bromopropane undergoes dehydrohalogenation reaction.
  - Chlorobenzene undergoes nitration reaction.

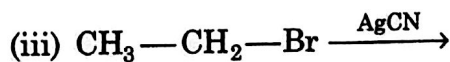
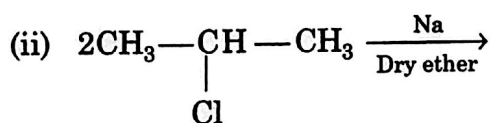
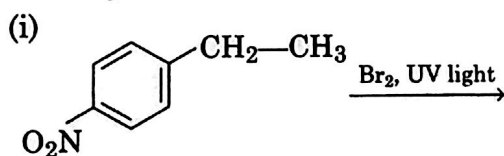
(iii) Methylbromide is treated with  $\text{KCN}$ .

33. Following compounds are given to you:

2-bromopentane, 2-bromo-2-methylbutane, 1-bromopentane

- Write the compound which is most reactive towards  $\text{S}_{\text{N}}2$  reaction.
  - Write the compound which is optically active.
  - Write the compound which is most reactive towards  $\beta$ -elimination reaction.
34. How do you convert the following?
- Chlorobenzene to biphenyl.
  - Propene to 1-iodopropane.
  - 2-bromobutane to but-2-ene.

35. Write the major product(s) in the following:



36. Give reasons.

- $\text{C}-\text{Cl}$  bond length in chlorobenzene is shorter than  $\text{C}-\text{Cl}$  bond length in  $\text{CH}_3-\text{Cl}$ .
- The dipole moment of chlorobenzene is lower than that of cyclohexyl chloride.
- $\text{S}_{\text{N}}1$  reactions are accompanied by racemisation in optically active alkyl halides.

37. How can the following conversions be carried out?

- Aniline to bromobenzene
- Chlorobenzene to 2-chloroacetophenone
- Chloroethane to butane

38. What happens when
- chlorobenzene is treated with  $\text{Cl}_2/\text{FeCl}_3$ ?
  - ethyl chloride is treated with  $\text{AgNO}_2$ ?
  - 2-bromopentane is treated with alcoholic  $\text{KOH}$ ?

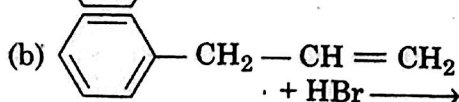
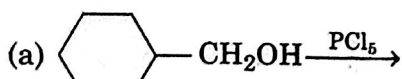
Write the chemical equations in support of your answer

39. Give reasons:

- n*-butyl bromide has higher boiling point than *t*-butyl bromide.
- Racemic mixture is optically inactive.
- The presence of nitro group ( $-\text{NO}_2$ ) at *o/p*-positions increases the reactivity of haloarenes towards nucleophilic substitution reactions.

40. (i) Why are alkyl halides insoluble in water?
- (ii) Why is butan-1-ol optically inactive but butan-2-ol is optically active?
- (iii) Although chlorine is an electron withdrawing group, yet it is *ortho*, *para*-directing in electrophilic aromatic substitution reactions. Why?

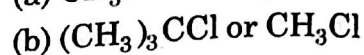
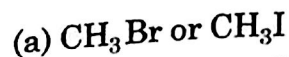
41. (i) Draw the structures of major monohalo products in each of the following reactions:



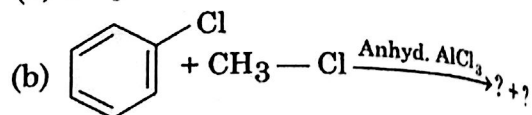
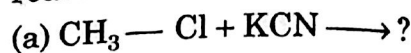
- (ii) Which halogen compound in each of the following pairs will react faster towards  $\text{S}_{\text{N}}2$  reaction?

- $\text{CH}_3\text{Br}$  or  $\text{CH}_3\text{I}$
- $(\text{CH}_3)_3\text{C}-\text{Cl}$  or  $\text{CH}_3-\text{Cl}$

42. (i) Which compound in each of the following pairs will react faster towards  $\text{S}_{\text{N}}2$  reaction with  $-\text{OH}$  group?



- (ii) Write the product(s) of the following reactions.



43. Give reasons for the following :

- Ethyl iodide undergoes  $\text{S}_{\text{N}}2$  reaction faster than ethyl bromide.
- $(\pm)$  2-butanol is optically inactive.
- $\text{C}-\text{X}$  bond length in halobenzene is smaller than  $\text{C}-\text{X}$  bond length in  $\text{CH}_3-\text{X}$ .

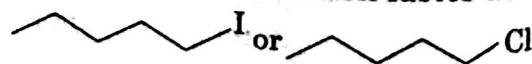
44. Explain the following:

- The dipole moment of chlorobenzene is lower than that of cyclohexyl chloride.
- Alkyl halides, though polar, are immiscible with water.
- Grignard's reagents should be prepared under anhydrous conditions.

45. Although, chlorine is an electron withdrawing group, yet it is *ortho*, *para*-directing in electrophilic aromatic substitution reactions. Explain, why is it so?

46. Answer the following questions:

- What is meant by chirality of a compound? Give an example.
- Which one of the following compounds is more easily hydrolysed by  $\text{KOH}$  and why?  
 $\text{CH}_3\text{CHClCH}_2\text{CH}_3$   
 or  $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{Cl}$
- Which one undergoes  $\text{S}_{\text{N}}2$  substitution reaction faster and why?



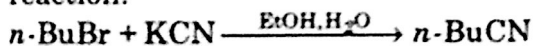
47. Answer the following:

- (i) Haloalkanes easily dissolve in organic solvents. Why?
- (ii) What is the racemic mixture? Give an example.
- (iii) Of the two bromo derivatives,  $C_6H_5CH(CH_3)Br$  and  $(C_6H_5)_2CHBr$ , which one is more reactive towards  $S_N1$  substitution reaction and why?

48. Rearrange the compounds of each of the following sets in order of reactivity towards  $S_N2$  displacement.

- (i) 2-bromo-2-methylbutane, 1-bromopentane, 2-bromopentane.
- (ii) 1-bromo-3-methylbutane, 2-bromo-2-methylbutane, 3-bromo-2-methylbutane.
- (iii) 1-bromobutane, 1-bromo-2, 2-dimethylpropane, 1-bromo-2-methylbutane, 1-bromo-3-methylbutane.

49. (i) Write the mechanism of the following reaction:



- (ii) Why is the dipole moment of chlorobenzene lower than that of cyclohexyl chloride?

50. (i) Write a chemical test to distinguish between

- (a) chlorobenzene and benzyl chloride
  - (b) chloroform and carbon tetrachloride
- (ii) Why is methyl chloride hydrolysed more easily than chlorobenzene?

51. (i) State one use of DDT and iodoform.

- (ii) Which compound in the following couples will react faster towards  $S_N2$  displacement and why?
  - (a) 1-bromopentane or 2-bromopentane
  - (b) 1-bromo-2-methyl butane or 2-bromo-2-methyl butane

52. How would you differentiate between  $S_N1$  and  $S_N2$  mechanism of substitution reactions? Give one example of each.

53. Explain. Why

- (i) the dipole moment of chlorobenzene is lower than that of cyclohexyl chloride?
- (ii) alkyl halides though polar are immiscible with water?
- (iii) in the pair,  $(CH_3)_3C-Cl$  and  $CH_3Cl$ ,  $CH_3Cl$  will react faster in  $S_N2$  reaction with  $-OH^-$ ?