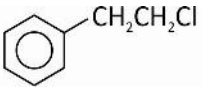
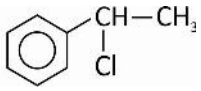
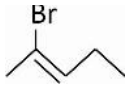
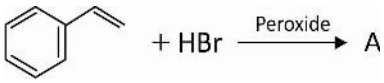
# UNIT-10: HALOALKANES AND HALOARENES

| **One mark questions:** | |
|---|---|
| 1. Write the IUPAC name of $(CH_3)_3CCl$. | K |
| 2. Give an example for geminal dihalide. | K |
| 3. Which one of the following is a benzylic halide?<br>i)  ii)  | U |
| 4. Give the IUPAC name of  | K |
| 5. Identify A in the following reaction<br>  | U |
| 6. How many isomeric (structural) monochlorides can be obtained from 2-methylbutane? | A |
| 7. Identify A : $ROH + HCl \xrightarrow{A} RCl + H_2O$ | K |
| 8. Write the general equation for the preparation of alkyl chlorides from alcohol using $SOCl_2$. | K |
| 9. Why is sulphuric acid not used during the reaction of alcohol with KI? | U |
| 10. Name the reagent that brings about the conversion of benzene diazonium chloride to iodobenzene. | K |
| 11. Name the reaction: $CH_3Br + NaI \xrightarrow{\text{dry acetone}} CH_3I + NaBr$ | K |
| 12. What is the major product formed when n- propyl bromide is treated with alcoholic KOH? | K |
| 13. Ethyl chloride on heating with AgCN forms a compound X. Mention the functional isomer of X. | U |
| 14. What is the major product formed in the following reaction: $RX + NaOR' \longrightarrow$ | K |
| 15. What is optical activity? | K |
| 16. Write the IUPAC name of the first member of optically active chloroalkane. | U |
| 17. A haloalkane when boiled with aqueous KOH gives alcohol having inverted configuration. Name the mechanism involved in this reaction. | U |
| 18. Out of $CH_2$=CH–$CH_2Cl$ and $CH_3$–$CH_2$–$CH_2Cl$ which is more reactive towards $S_N1$ reaction? | U |
| 19. In the following pair of halogen compounds, which compound undergoes $S_N1$ reaction faster? | U |

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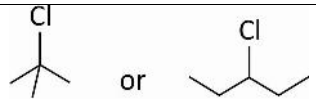
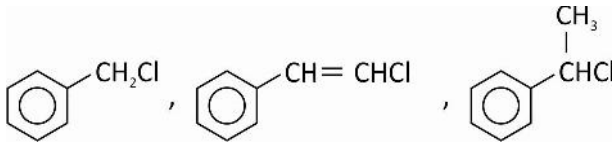
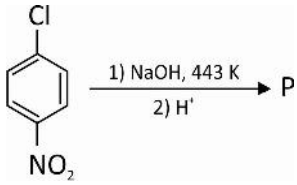
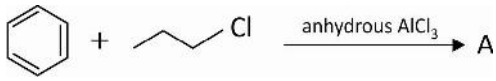
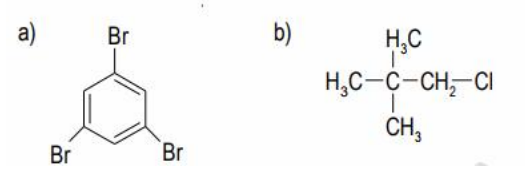
|  | |
| 20. Why are allylic and benzylic halides highly reactive towards $S_N1$ reaction? | U |
| 21. Tertiary alkyl halide undergoes $S_N1$ reaction very fast. Why? | U |
| 22. Arrange the following in decreasing order towards $S_N1$ reaction:  | U |
| 23. Which of the following is most reactive towards $S_N2$ reaction $(CH_3)_3CBr$, $CH_3Br$, $(CH_3)_2CHBr$? | U |
| 24. Tertiary alkyl halides are practically inert to $S_N2$ substitution reaction? Give reason. | U |
| 25. Identify the product P:  | U |
| 26. Arrange the following compounds in increasing order of their reactivity with sodium hydroxide solution: o-nitro chlorobenzene, chlorobenzene, benzylchloride | U |
| 27. What is the major product formed when chlorobenzene is treated with acetyl chloride + anhy. $AlCl_3$? | K |
| 28. Complete the equation : $R–Mg–X + H_2O \longrightarrow$ | K |
| 29. Mention the product formed when 2 molecules of isopropyl chloride is treated with metallic sodium in dry ether. | K |
| 30. Identify the major product A in the following reaction:  | K |
| 31. Name the synthetic halogen compound used for the treatment of malaria. | A |
| 32. What are freons? | K |
| **Two mark questions**: | |
| 1. Write the structure and IUPAC name for neo – pentyl bromide. | U |
| 2. Write the IUPAC name of the following compounds:  | K |

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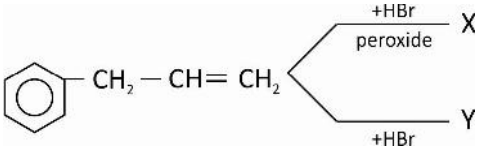
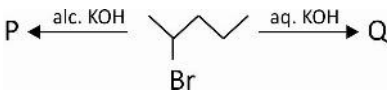
| 3. How many structural isomers are possible for $C_4H_9Cl$? Name the isomer that is optically active. | A |
| 4. What are X and Y?   | A |
| 5. Explain Finkelstein reaction with an example. | K |
| 6. i) Boiling points of alkyl halides are higher than hydrocarbons of comparable molecular mass. Give reason<br>ii) What happens to the boiling point of isomeric haloalkanes with increase in branching? | U |
| 7. Arrange R – Cl, R – I, R – Br, R – F as directed :<br>(i) increasing order of density (ii) increasing order of boiling points | U |
| 8. Name the class (family) of the main product formed when R–X reacts with i) $LiAlH_4$ ii) $RNH_2$. | K |
| 9. Write the differences between $S_N1$ and $S_N2$ mechanism with respect to i) order of reaction ii) Solvent used. | K |
| 10. i) How do polar protic solvents help the first step in $S_N1$ reaction?<br>ii) Iodination of arenes by electrophilic substitution requires an oxidizing agent. Why? | U |
| 11. Write the mechanism ($S_N2$) involved in the reaction between methylchloride and hydroxyl ion. What is the order of the reaction? | K |
| 12. Which compound in the following couple will react faster in $S_N2$ displacement and why?<br>1 - bromopropane or 2 - bromopropane | U |
| 13. Arrange the following compounds in decreasing order of reactivity towards $S_N2$ displacement reaction:<br>i) $C_2H_5Br$, $C_2H_5I$, $C_2H_5Cl$ ii) $(CH_3)_3CBr$, $CH_3CH_2CHBrCH_3$, $CH_3CH_2CH_2CH_2Br$ | U |
| 14. Write the structures of the compounds formed when an aromatic compound A ($C_7H_8$) is treated with $Cl_2$ in the presence of $FeCl_3$. | S |
| 15. Identify A and B: $C_2H_5OH \xrightarrow{HCl + \text{anhydrous } ZnCl_2} A \xrightarrow{Na/Ether} B$ | U |
| 16. Identify P and Q (major products):   | U |

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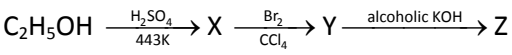
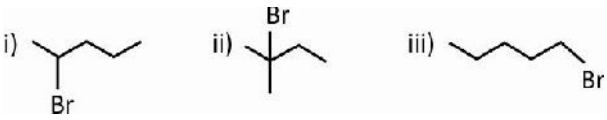
| 17. State Zaitsev rule. | K |
| 18. i) What is a chiral carbon or asymmetric carbon? | |
| ii) How many asymmetric carbon atoms are in 2, 3-dichlorobutane? | K |
| 19. a) What is chirality? | |
| b) Identify chiral and achiral molecule in the following pair of compounds.  | K |
| 20. i) What is racemisation? | |
| ii) A racemic mixture is optically inactive. Give reason. | K |
| 21. i) Write the general formula of Grignard reagent. | |
| ii) Why is it necessary to avoid even traces of moisture during the preparation and use of Grignard reagent? | K |
| 22. i) Write the general equation of Wurtz reaction. | |
| ii) How many alkanes are formed if $CH_3I$ and $C_2H_5I$ are mixed in equal proportions and the mixture is treated with metallic sodium in dry ether? | K |
| 23. Give reasons: halogen atom in haloarene is ring deactivating and also ortho-para directions. | U |
| 24. Out of ortho and para dibromobenzene which one has higher melting point? Why? | U |
| 25. Aryl halides are less reactive towards nucleophilic substitution compared to alkyl halides. Give two reasons. | U |
| 26. What are polyhalogen compounds? Give one example. | K |
| 27. Give reasons : | |
| i) chloroform stored in dark coloured bottles. | |
| ii) ortho and para halotoluenes can be separated easily. | U |
| **Three mark questions**: | |
| 1. Complete the following reaction by identifying X, Y and Z.  | U |
| 2. Write the mechanism involved in the reaction between tertiary butyl bromide and aqueous KOH. Mention its order. | K |
| 3. Following compounds are given to you:  Identify the compound which is | |

i) most reactive towards $S_N2$ reaction.

ii) optically active

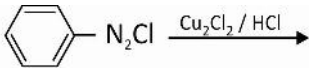
iii) most reactive towards β - elimination reaction. — A

4. a) What are ambident nucleophiles?

   b) Name the compounds formed when ethyl bromide reacts with the following compounds: i) alcoholic $KNO_2$ ii) alcoholic $AgNO_2$ — K

5. Complete the following:

   i) $C_2H_5Br + KCN \longrightarrow$ -------- + ---------

   ii) 


   iii) $3\ R-OH + PX_3 \longrightarrow$ ---------- + ----------

   — K

6. Match the columns P, Q and R

| | P | Q | R |
|---|---|---|---|
| a) | $R-X + NH_3$ | R – NC | Nitroalkane |
| b) | R – X + KCN | $R-NH_2$ | alkyl nitrile |
| c) | $R-X + AgNO_2$ | R – CN | alkyl isonitrile |
| | | $R-NO_2$ | Primary amine |

A

**Five mark questions**:

1. Name the reagent used to convert

   a) 1 – chloropropane to 1 – nitropropane b) Bromoethane to ethoxyethane

   c) Chloroethane to butane d) Bromoethane to ethyl acetate

   e) ethene to iodoethane — A

2. a) Primary alkyl halide $C_4H_9Br$ (A) reacted with alcoholic KOH to give compound (B). Compound (B) reacts with HBr to give (C) which is an isomer of (A). When (A) is treated with sodium metal it gives compound (D), $C_8H_{18}$ which is different from the compound formed when n-butyl bromide is reacted with sodium. Give the structural formulae of A, B, C and D.

   b) Between chlorobenzene and chloromethane which is more reactive towards nucleophilic substitution reaction? — A

3. a) How do you prepare the following compounds from chlorobenzene. Write the equations and name the reactions: i) diphenyl ii) toluene

   b) What are enantiomers? — U