CHEMISTRY

BOOKS - S DINESH & CO CHEMISTRY (HINGLISH)

HALOALKANES AND HALOARENES

Example

1. Write the structural formula and IUPAC name of

(i) Iso-butyl chloride

(ii) Tert-amyl bromide

(iii). Sec-butyl chloride

(iv). Neo-pentyl chloride.

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2. Write the IUAPC names of the following compounds.: 

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3. 

Write the IUPAC names of the following compounds:

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4. Draw the structures of all the eight structural isomers that have the molecular formula $C_5H_{11}Br$. Name each isomer according to IUPAC system and classify them as primary, secondary or tertiary bromides.

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5. Why are hydrogen halides and not halogen acids preferred for preparing haloalkanes from alkenes?

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6. Give the structures of the major products from 3-ethylpent-2-ene under each of the following conditions.

a) HBr in presence of peroxide.

b) Br_2 / H_2O

c) $Hg(OAc)_2 / H_2O$, $NaBH_4$.

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7. Anhydrous $ZnCl_2$ is required when $HCl(g)$ is passed through propan-2-ol but not when it is passed through 2-methylpropan-2-ol. Explain.

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8. Monochlorination of ethane to ethyl chloride is more practicable than the monochlorination of n-pentane. Assign reason.

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9. How many monochloro derivatives are formed by the chlorination of 2,4,4-trimethylhexane? Give their IUPAC names.

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10. Arrange the following species in order of decreasing nucleophilicity in a polar protic solvent.

(I). $CH_3CH_2CH_2O^-$,

(II). $CH_3CH_2CH_2S^-$

(III). $CH_3 - CH_2 - \overset{O}{\overset{||}{C}} - \overline{O}$

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11. What mass of propene $(CH_3 - CH = CH_2)$ is obtained from $34 \cdot 0g$ of 1-iodopropane by treating with ethanolic KOH if the yield of propene is 36 percent?

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12. An optically active compound having molecular formula $C_7H_{15}Br$ reacts with aqueous KOH to give a racemic mixture of products write the mechanism involved in the reaction.

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13. (a). Which of the following two compounds would react faster by S_{N^2} pathway, 1-bromobutane or2-bromobutane and why?

(b). Allyl chloride is more reactive than n-propyl chloride towards nucleophilic substitution reaction. Explain why?

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14. In each of the following pairs of organic compounds, identify the compound which will undergo S_{N^1} reaction. Faster.

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Problem For Practice

1. What is the common name of $(CH_3)_2CHCH_2Br$?

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2. What is the nature of neo-pentyl bromide?

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3. Which is the major product when propane is reacted with Br_2 in the presence of light

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4. Give the decreasing order of bond dissociation enthalpy of halogen acids.

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5. Out of PCl_5 and $SOCl_2$ which is preferred for preparing chloroalkanes from alcohols?

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6. Can ethanol be converted into iodoethane by heating with NaI and conc. H_2SO_4?

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7. Write the IUPAC name of $CH_3 - \underset{\underset{C_2H_5}{|}}{C}H - CH_2 - Cl.$

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8. Predict the product of the following reaction:

$CH_3 - CH = C(CH_3)_2 + HCl$

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9. Are isobutyl chloride and secondary butyl chloride same?

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10. Can chloroethane be prepared by halide exhange reaction?

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11. Write the structural formula of 4-chloropent-2-ene.

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12. how will you prepare 1-bromopropane from propene?

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13. Give the IUPAC name of the compound $CH_3CH = \underset{CH_3}{\overset{|}{C}} - \underset{Br}{\overset{|}{CH}} - CH_3$.

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14. Which of the following is maximum reactive towards Lucas reagent?

$CH_2 = CH - CH_2OH, CH_3 - \underset{OH}{\overset{|}{C}}H - CH_3, CH_3 - CH_2 - CH_2OH$

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15. Among the isomeric alkanes formula C_5H_{12}, identify the one that on photochemical chlorination yields only monochloro derivative.

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16. C_4H_8 has isomers with the following properties:

(a). Gives same product with HBr in the presence or absence of peroxide

(b). Gives tertiary alkyl halide with HX

(c). Does not contain C=C bond

(d). Does not form geometrical isomer but has C=C bond. Identify the isomers.

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17. Name a reagent used for the bromination at the allylic carbon atom.

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18. Write the structural formula of a compound fo molecular formula $C_5H_8Cl_4$ in which there is one quaternary carbon and four methylene groups.

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19. Bromination of 2-Methylpropane (siobutane) in the presence of light can give two monobromo products. Give their structures.

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20. Arrange the following in order of their incresing ractivity towards nucleophilic substitution reaction:

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21. Which is the most reactive towards S_{N^2} reaction?

$CH_3CH_2Br, (CH_3)_2CHBr, (CH_3)_3CBr$

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22. Arrange the following in decreasing order of nucleophilicity

(i) F^-, Br^-, Cl^-, I^-

(ii). $RCOO^-, \overline{O}(R), \overline{O}H, H_2O$

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23. Under what conditions can 2-methylpropene be converted into iso butyl bromide on reacting with HBr?

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24. Which is the main product obtained when the following haloalkanes are treated with alcoholic KOH?

(i). $CH_3CH_2CHICH_3$

(ii). $CH_3CH_2C(CH_3)_2Br$

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25. Predict the major product in the following reactions

(i). $CH_3 - CH = CH_2 + HBr \xrightarrow{(\text{Peroxide})}$

(ii). $C_2H_5Br + AgCN \rightarrow$

(iii). $CH_3CH_2Br + Na \rightarrow$

(iv). $CH_3 - \underset{\underset{Br}{|}}{CH} - CH_3 + aqKOH \rightarrow$

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26. Name the reagents which can convert

(a). 1-Chloropropane into 1-Nitropropane (b) Bromoethane to But-1-yne

(c). Bromoethane to Butane.

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27. The major product obtained by the addition of HBr to 4-Methylpent-1-ene in the presence of an organic peroxide is

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28. Arrange the following compounds in correct decreasing order of reactivity towards S_{N^2} displacement reactions:

(i). 1-Bromo-2-methylbutane

(ii). 1-Bromo-2,2-dimethylpropane

(iii). 1-bromo- methylbutane

(iv). 1-Bromobutne

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29. From the given list, select the compound which can be converted into corresponding alkyl bromide more quickly on reacting with hydrogen bromide.

(a). Butn-1-ol or Butan-2-ol

(b). Butan-2-ol or 2-methylbutan-2-ol

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30. Name the forces which influence the boiling points of alkyl halides.

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31. Arrange the following compounds in order of ease of dehydrogenation by alcoholic KOH.

(a). $CH_3\underset{\underset{CH_3}{|}}{C}HCH_2CH_2Br$

(b). $CH_3CH_2\overset{\overset{Br}{|}}{\underset{\underset{CH_3}{|}}{C}}CH_3$

(c). $CH_3\underset{\underset{CH_3}{|}}{C}H\overset{\overset{Br}{|}}{C}HCH_3$.

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32. 

Identify the major product in the following reaction:

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33. What is the correct order of decreasing nucleophilicity in non-polar solvents: $OH^-, NH_2^-, F^-, CH_3^-$

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34. 

In the following pairs, which undergoes S_{N^2} reaction more readily?

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35. Name the product formed when benzene diazonium chloride is warmed with KI solution?

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36. What is directional nature of halogen atom when attached to the benzene ring?

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37. Out of chlorobenzene and chloroethane which is more readily hydrolysed with aqueous KOH?

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38. What happens when bromobenzene is boiled with 50% NaOH solution?

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39. Out of vinyl chloride and ethyl chloride which is more easily hydrolysed?

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40. Identify X, Y and Z in the following reaction

(i). $C_6H_6 \xrightarrow{Cl_2/Fe} X \xrightarrow[\text{Pyridine}]{CuCN} Y \xrightarrow{\text{Hydrolysis}} Z$

(ii). $C_6H_5NH_2 \xrightarrow{NaNO_2/HCl} X \xrightarrow{CuBr} Y \xrightarrow[623K/\text{Pressure}]{NaOH} Z.$

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41. Out of benzyl chloride and chlorobenzene, which will give a white precipitate with $AgNO_3$ solution?

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42. Arrange the following in decreasing order of reactivity towards aqueous KOH.

(i). $CH_2 = CH - Cl$

(ii). $C_6H_5CH_2Cl$

(iii). $CH_2 = CH - CH_2Cl$

(iv). $C_2H_5 - Cl$

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43. 

Identify the product of the following reaction:

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44. 

what is the correct order of the reactivity of the following compounds towards nucleophilic substitution reaction.

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Ncert

1. Write the strutures of the following compounds:

(i). 2-Chloro-3-methylpentane

(ii). 1-Chloro-4-ethycyclohexane

(iii). 4-tert, butyl-4-iodoheptane

(iv). 1,4-dibromobut-2-ene

(v). 1-Bromo-4-ene butyl-2-methylbenzene.

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2. Why is sulphuric acid not used during the reaction of alcohols with KI?

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3. Write the structures of different dihalogen derivatives of propane.

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4. Among the isomeric alkanes of molecular formula C_5H_{12}, identify the one that on photochemical chlorination yields

(i) A single monochloride.

(ii) Three isomeric monochlorides.

(iii) Four isomeric monochlorides.

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5. Draw the structures of the major monohaloproducts in each of the following reaction:

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6. Arrange each set of compounds in order of increasing boiling points:

(ii) 1-Chloropropane, isopropylchloride, 1-chlorobutane.

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7. Which alkyl halide from the following pairs would you expect to react more rapidly by S_{N^2} mechanism?

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8. In the following pairs of halogen compounds, which compound undergoes S_{N1} reaction faster?

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9. 

Identify A, B, C, D, E, R and R' in the following:

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10. Name the following compounds according to IUPAC system and classify them as alkyl, allyl, benzyl (primary, secondary, tertiary) vinyl or aryl halides.

(i). $(CH_3)_2CHCH(Cl)CH_3$

(ii). $CH_3CH_2CH(CH_3)CH(C_2H_5)Cl$

(iii). $CH_3CH_2C(CH_3)_2CH_2I$

(iv). $CH_3C(Cl)(C_2H_5)CH_2CH_3$

(v). $CH_3 > C(C_2H_5)CH_2Br$

(vi). $CH_3CH = C(Cl)CH_2CH(CH_3)_2$

(vii). $CH_2 = CH - CH_2 - Br$

(viii). $CH_3CH = CHC(Br)(CH_3)_2.$

(ix). $m - ClCH_2C_6H_4CH_2C(CH_3)_3$

(x). $o - BrC_6H_4CH(CH_3)CH_2CH_3$

(xi). $(CH_3)_3CCH_2CH(Br)C_6H_5$

(xii). $p - ClC_6H_4CH_2CH(CH_3)_2.$

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11. Give the iUPAC names of the following compounds:

(i). $CH_3CH(Cl)CH(Br)CH_3$

(ii). $CHF_2CBrCIF$

(iii). $ClCH_2C \equiv CCH_2Br$

(iv). $(CCl_3)_3CCl$

(v). $CH_3C(p-ClC_6H_4)_2CH(Br)CH_3$

(vi). $(CH_3)_3CCH=C(Cl)C_6H_4I-p.$

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12. Write the structure sof the following compounds:

(i). 2-Chloro-3-methylpentane

(ii). 1-Chloro-4-ethylcyclohexane

(iii). 2-(2-Chlorophenyl)-1-iodooctane

(iv). 4-tert, butyl-3-iodoheptane

(v). 1,4-Dibromobut-2-ene

(vi). 1-Bromo-4-sec. butyl-2-methylbenzene.

(vii). p-Bromochlorobenzene.

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13. Which one of the following has the highest dipole moment?

(i) CH_2Cl_2, $(ii)CHCl_3$, $(iii)CCl_4$

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14. A hydrocarbon C_5H_{10} does not react with chlorine in dark but gives a single monochloro compound C_5H_9Cl in bright sunlight. Identify the hydrocarbon.

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15. Write the isomers of the compound having formula C_4H_9Br.

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16. Write the equations for the preparation of 1-iodobutane from

(i) 1-butanol , (ii) 1-chlorobutane , (iii) but-1-ene.

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17. What are ambident nucleophiles? Explain with an example.

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18. Which compound in the following pairs will react faster in S_N^2 reaction?

(a). CH_3Br or CH_3I

(b). $(CH_3)_3CCl$ or CH_3Cl

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19. Predict all the alkenes that would be formed by dehydrohalogenation of following alkyl halides with sodium ethoxide in ethanol.

(i) 1-Bromo-1-methylcyclohexane

(ii) 2-Chloro-2-methylbutane

(iii). 3-Bromo-2,2,3-trimethylpentane.

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20. How will you bring about the following conversions?

(i). Ethanol to but-1-yne

(ii). Ethane to bromoethane

(iii). Propene to 1-nitropropane

(iv). Toluene to benzyl alcohol

(v). Propene to propyne

(vi). Ethanol to ethyl fluoride

(vii). Bromomethane to propanone

(viii). But-1-ene to but-2-ene

(ix). 1-Chlorobutane to n-octane

(x). Benzene to biphenyl.

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21. Explain: (i) Dipole moment of chlorobenzene is lower than that of cyclohexylchloride

(ii). Alkyl halide though polar, are immiscible with water.

(iii). Grignard reagents should be prepared under anhydrous conditions.

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22. Write the structures of the major products in each of the following reaction:

(i). $CH_3 - CH - CH_2 - Cl + NaI \xrightarrow[(heat)]{(\text{acetone})}$

(ii). $(CH_3)_3CBr + KOH \xrightarrow[(heat)]{(Ethanol)}$

(iii). $CH_3CH(Br)CH_2CH_3 + NaOH \xrightarrow{\text{Water}}$

(iv). $CH_3CH_2Br + KCN \xrightarrow{\text{Ethanol (aq)}}$

(v). $C_6H_5ONa + C_2H_5Cl \rightarrow$

(vi). $CH_3CH_2CH_2OH + SOCl_2 \rightarrow$

(vii). $CH_3CH_2CH = CH_2 + HBr \xrightarrow{(\text{peroxide})}$

(viii). $CH_3CH = C(CH_3)_2 + HBr \rightarrow$

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23. Explain the following reaction:

$nBuBr + KCN \xrightarrow{\text{Et-OH / } H_2O} nBuCN$

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24. Arrange the compound of each set in order of decreasing reactivity towards (S_{N^2}) displacement.

(a). 2-bromo-2-methylbutane,1-Bromopentane,2-Bromopentane

(b). 1-Bromo-3-methylbutane,2-Bromo-2-methylbutane, 2-Bromo-3-methylbutane

(c). 1-Bromobutane, 1-Bromo-2,2-dimethylpropane, 1-Bromo-2-methylbutane, 1-Bromo-3-methylbutane.

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25. Out of $C_6H_5CH_2Cl$ and $C_6H_5CHClC_6H_5$, which is more easily hydrolysed by aqueous KOH.

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26. p-Dichlorobenzene has higher m.p. than those of o- and m-isomers. Discuss

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27. How the following conversions can be carried out?

(i). Propene to propane-1-ol

(ii). Ethanol to but-1-yne

(iii). 1-Bromopropane to 2-bromopropane

(iv). Toluene to benzyl alcohol

(v)Benzene to 4-Bromonitrobenzene

(vi). Benzyl alcohol to 2-phenylethanoic acid

(vii) Ethanol to propanenitrite

(viii). Aniline to chlorobenzene

(ix). 2-Chlorobutane to 3,4-dimethylhexane

(x). 2-Methylpropene to 2-chloro-2-methylpropane

(xi). Ethyl chloride to propanoic acid

(xii). But-1-ene to n-butyl iodie

(xiii). 2-Chloropropane to propan-1-ol

(xiv). Isopropyl alcohol to iodoform

(xv). Chlorobenzene to p-nitrophenol

(xvi). 2-Bromopropane to 1-bromopropane

(xvii) Chloroethane to butane

(xviii) Benzene to diphenyl

(xix). tert-Butyl bromide to isobutyl bromide

(xx). Aniline to phenyl isocyanide.

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28. The treatment of alkyl chlorides with aqueous KOH leads to the formation of alcohols but in the presence of alcoholic KOH, alkenes are major products. Explain.

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29. Primary alkyl halide (a) C_4H_9Br was reacted with alcoholic KOH to ive compound (b). Compound (b) was reacted with HBr to give (c) which was

an isomer of (a). When (a) was reacted with sodium metal, it have a compound (d) C_8H_{18}, that was different than the compound when n-butyl bromide was reacted with sodium. give the structural formula of (a) and write the equations for all the reactions.

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30. What happens when

(i) n-butyl chloride is treated with alcoholic KOH,

(ii) bromobenzene is treated with Mg in the presence of dry ether,

(iii) chlorobenzene is subjected to hydrolysis,

(iv) ethyl chloride is treated with aqueous KOH,

(v) methyl bromide is treated with sodium in the presence of dry ether,

(vi) methyl chloride is treated with KCN?

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Short Answer Type Questions

1. Aryl chlorides and bromides can be easily prepared by electrophilic substitution of arenas with chlorine and bromine respectively in the presence of Lewis acid catalyst. But why does preparation of aryl iodides requires presence of an oxidising agent?

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2. Out of o- and p-dibromobenzene, which one has higher melting point and why?

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3. Which of the compounds will react faster in S_N1 reaction with ^-OH ion?

$CH_3 - CH_2 - Cl$ or $C_6H_5 - CH_2 - Cl$

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4. Why iodoform has appreciable antiseptic property?

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5. Haloarenas are less reactive than haloalkanes and haloalkenes. Explain.

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6. Discuss the role of Lewis acids in the preparation of aryl bromides and chlorides in the dark.

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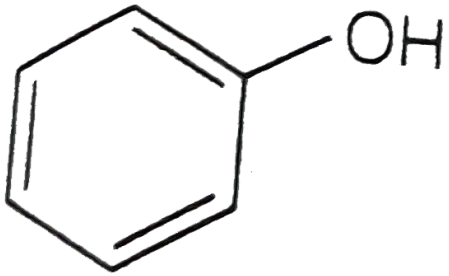
7. Which of the following compounds (i) and (ii) will not react with a mixture of NaBr and H_2SO_4. Explain why ?

(i) $CH_3CH_2CH_2OH$ (ii)

(ii)



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8. Which of the products will be major product in the reaction given below? Explain

$$CH_3CH = CH_2 + Hi \rightarrow \underset{(A)}{CH_3CH_2I} + \underset{(B)}{CH_3CHICH_3}$$

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9. Why is the solubility of haloalkanes in water very low ?

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10. Draw other resonating structures related to the given structure and find out whether the functional group present in the molecule is ortho, para directing or meta directing.

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11. Classify the following compounds as primary, secondary and tertiary halides.

(i) 1-bromobut-2-ene

(ii). 4-Bromopent-2-ene

(iii). 2-Bromo-2-methylpropane

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12. Compound 'A' with molecular formula C_4H_9Br is treated with aq. KOH solution. The rate of this reaction depends upon the the concentration of the compounds 'A' only. When another optically active isomer 'B' of this

compound was treated with aq. KOH solution, the rate of reaction was found to be dependent on concentration of compound and KOH both.

(i) Write down the structural formula of both compounds 'A' and 'B'.

(ii) Out of these two compounds, which one will be converted to the product with inverted configuration.

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13. Write the structures and names of the compounds formed when compound 'A' with molecular formula C_7H_8 is treated with Cl_2 in the presence of $FeCl_3$

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14. Identify the product A and B formed in the following reaction:

$$CH_3 - CH_2 - CH = CH - CH_3 + HCI \rightarrow A + B$$

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15. 

Which of the following compouds will have the highest melting point and why?

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16. Write down the structures and IUPAC name for neo-pentylbromide.

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17. A hydrocarbon of molecular mass 72 g mol^{-1} gives a single monochloro derivative and two dichloro derivatives on photo chlorination. Give the structure of the hydrocarbon.

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18. Name of the alkene which will yield/chloro 1-methylcyclohexane by its reaction with HCl. Write the reaction involved.

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19. Which of the following haloalkanes reacts with aqueous KOH most easily ? Explain giving reason.

(i). 1-Bromobutane

(ii) 2-Bromobutane

(iii) 2-Bromo-2-methylpropane

(iv). 2-Chlorobutane.

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20. Why can aryl halides not be prepared by reaction of phenol with HCl in the presence of $ZnCl_2$?

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21. 

which of the given compounds would undergo S_{N^1} reaction faster and

why?

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22. Allyl chloride is hydrolysed more readily than n-propyl chloride. Why ?

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23. Why is it necessary to avoid even traces of moisture during the use of a Grignard reagent ?

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24. How do polar solvents help in the first step in S_N1 mechanism?

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25. Write a test to detect the presence of double bond in a molecule.

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26. Diphenyls are potential threat to the envioronment. How are these produced from aryl halides?

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27. What are the IUPAC names of the insecticide DDT and benzene hexachloride? Why is their use banned in India and other countries?

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28. Elimination reaction (especially β - elimination) are as common as the nucleophilic substitution reaction in case of alkyl halides. Specify the reagents used in both cases.

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29. How will you obtain bromobenzene from aniline?

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30. Aryl halides are extremely less reactive towards nucleophilic substitution. Predict and explain the order of reactivity of the following compounds towards nucleophilic substitution.

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31.  Predict the major product formed when HCl is added to isobutylene. Explain the mechanism involved.

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32. How can you obtain iodoethane from ethanol when no other iodine containing reagent except NAI is available in the laboratery?

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33. Cyanide ion acts as an ambident nucleophille. From which end it acts as a strong nucleophile in aqueous medium? Give reason for your answer.

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Long Answer Type Question

1. Some alkylhalides undergo substitution whereas some undergo elimination reaction on treatment with bases discuss the structural features of alkyl halides with the help of examples which are responsible for this difference.

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2. Some halogen containing compounds are useful in daily life. Some compounds of this class are responsible for exposure of flora and fauna to more and more of UV light which causes destruction to a great extent. Name the class of these halocompounds. In you opinion, what should be done to minimise harmful effects of these compounds.

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3. Why are aryl halides less reactive towards nucleophilic substitution reactions than alkyl halides? How can we enhance the reactivity of aryl halides?

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Additional Important Questions

1. Classify the following as alkyl, allyl and vinyl halides

(i) $CH_2CH = CFCH_2CH_3$

(ii). $(CH_3)_2CClCH_3$

(iii). $CH_2 = CHCH_2I$

(iv).  .

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2. What is the decreasing order of reactivity of the following in S_{N^2} reaction?

1-Bromo-2-methylbutane, 1-Bromo-2-2-dimethylpropane, 1-bromopentane.

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3. What happens when chlorine is passed through boiling toluene?

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4. What is the difference between haxachlorobenzene and benzene hexachloride?

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5. Out of Br^- and I^- ions, which is a stronger nucleophile?

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6. Arrange the following halides in order increasing S_{N^2} reactivity $CH_3Cl, CH_3Br, CH_3CH_2Cl, (CH_3)_2CHCl.$

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7. The reaction of primary alkyl halide with nitrile salt produces both RNO_2 and RONO. Account for this behaviour.

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8. The hydrocarbon styrene $(C_6H_5CH = CH_2)$ can be prepared by the dehydrohalogenation of either 1-Bromo-2-phenylethane or 1-bromo-1-phenylethane using alcoholic KOH. Which alkyl halide will take part in the reaction?

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9. Among the aromatic compound with molecular formula C_7H_7Cl, how many isomers are possible ? Which of these is maximum reactive in nature?

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10. A compound is formed y the substitution of two chlorine atoms by two hydrogen atoms in propane. What is the number of structural isomers possible?

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11. Which compound in the following pairs would react faster in S_{N^2} displacement reactions?

(i). 1-Bromopentane or 2-Bomopentane.

(ii). 1-Bromo-2-methylbutane or 2-Bromo-2-methylbutane.

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12. 

Arrange the following compounds in increasing order of their densities:

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13. predict the product of the following reaction

$$CH_3 - \underset{CH_3}{\overset{|}{C}}H - I \xrightarrow{Na/\text{ether}}$$

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14. Which product is formed when trans-2-phenyl-1-bromocyclopentane is treated with alcoholic KOH?

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15. Alkyl chlorides can be prepared by refluxing alcohol with thionyl chloride in the presence of pyridine. Why is pyridine used?

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16. Why is chlopropyl chloride less reactive than cyclopentyl chloride towards S_{N^1} reaction?

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17. When heated to $300^\circ C$ neopentyl chloride forms 2-chloro-2-methylbutane. Why?

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18. Perfluorocarbons are remarkable stable, why?

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19. Identify the compound in the following pair that reacts with sodium iodide in acetone at a faster rate towards S_{N^2} mechanism. 1-Chlorohexane or cyclohexyl chloride:

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20. Give the major products when 2-Bromo 3-methylbutane is reacted with sodium ethoxide.

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21. Two alkyl halides A and B with molecular formula $C_7H_{15}Cl$ have different boiling points. These are optically active in nature. On reacting with Mg dissolved in anhydrous ether and then with water, each compound gives 2,4-dimethylpentane. Suggest structures for these compounds.

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22. Why does not ammo0nolysis of alkyl halides yield pure amines?

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23. 2-Bromopentane is treated with alcoholic KOH solution. What is the major product formed in this reaction? What is the name of the reaction?

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24. Explain why displacement of cyanide ion and amide ion by other nucleophiles is not observed in nucleophilic substitution reaction.

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25. Why is chloroform not used as anaesthetic these days? What is the commonly used anaesthetic?

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26. Explain the formation of the products in the following reaction.

$CH_3CH = CHCH_2Br + H_2O \rightarrow CH_3CH = CHCH_2OH + CH_3CH(O$

.

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27. Arrange the following compounds in increasing order of S_{N^1} reactivity.

(a). (I). $ClCH_2CH = CHCH_2CH_3$, (II). $CH_3C(Cl) = CHCH_2CH_3$, (III). $CH_3CH = CHCH_2CH_2Cl$

(b). (I). CH_3CH_2Br, (II). $CH_2 = CHCH(Br)CH_3$, (III). $CH_2 = CHBr$, (IV). $CH_3CH(Br)CH_3$

(c). (I). $(CH_3)_3CBr$, (II). $(CH_3)_2CHBr$, (III). $CH_3CH_2CH_2Br$,

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28. Explain why reaction of HCl with $CF_2CH = CH_2$ proceeds according to antiomarkownikov's rule.

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29.

Predict the order of reactivity of following compound in S_{N^1} reactions.

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30. Out of $CH_3\overset{\oplus}{C}HCH_3$ and $CF_3\overset{\oplus}{C}HCH_3$ which is ore reactive and why?

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Question From Board Examinations

1. Write the formulae of the main products formed by the following chemical reactions:

(i) $(CH_3)_2CHCl \xrightarrow{Na/\,(dry\ \text{ether})}$

(ii). $CH_3Br + AgF \xrightarrow{heat}$

(iii). $CH_3CH_2Br + NaI \xrightarrow{\text{dry acetone}}$

(iv). 

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2. Which will have a higher boiling point: 1-Chloropentane or 2-Chloro-2-methylbutane?

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3. Give the IUPAC name of the compound $CH_3CH = \underset{CH_3}{\overset{|}{C}} - \underset{Br}{\overset{|}{CH}} - CH_3$.

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4. Which compound in the following pairs will react faster in S_N^2 reaction?

(a). CH_3Br or CH_3I

(b). $(CH_3)_3CCl$ or CH_3Cl

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5. Complete the following chemicals equation

$CH_3CH_2CH = CH_2 + HBr \xrightarrow{(\text{peroxide})}$

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6. Complete the following equation:

(i). $C_6H_5N_2Cl + Ki \rightarrow$

(ii). $H_2C = CH_2 + Br_2 \xrightarrow{CCl_4}$

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7. 

Which of the following compound will react faster I the S_{N^1} reaction and why?

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8. What happens when bromine reacts with $CH_3C \equiv CH$?

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9. Write the structures of the product of the following reactions:

(i) $CH_3CH = C(CH_3)_2 + HBr \rightarrow$

(ii). $C_6H_5ONa + C_2H_5Cl \rightarrow$

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10. How will you convert methyl into ehtyl chloride?

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11. Which of the following pairs of substances undergoes S_{N^2} substitution reaction faster and why?

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12. Complte the following reaction equation 

(ii) 

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13. Complete the following question

(i). 

(ii). $CH_3CH_2CH = CH_2 + HBr \rightarrow$

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14. A solution of aqueous of KO hydrolysis $CH_3CHClCH_2CH_3$ and $CH_3CH_2CH_2CH_2Cl$. Which one of these is more easily hydrolysed.?

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15. Which compound in the following couples will react faster in S_{N^2} displacement and why?

(a). 1-Bromopentane or 2-Bromopentane

(b). 1-Bromo-2-methylbutane or 2-Bromo-2-methylbutane?

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16. Complete the following (a). $C_2H_5Cl + AgCN(Alc.) \xrightarrow{heat}$

(b). $C_6H_5Cl + conc(HNO_3) + H_2SO_4 \xrightarrow{Heat}$

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17. Account for the following

Chloromethane reacts with KCN to form ethanenitrile as the main product and wit AgCN to form methyl isocyanide as the chief product.

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18. Complete the following reaction:

$$CH_3 - CH = CH_2 \xrightarrow[\text{Peroxide}]{\text{HBr}} X \xrightarrow[\text{Acetone}]{NaI} Y.$$

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19. Propose the mechanism of the reaction taking place when:

(a). (-)-2-Bromooctane reacts with sodium hydroxide to form (+)-Octane-2-ol.

(b). 2-Bromopentane is heated with KOH (alc). To form alkene.

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20. Write the structure of the compound 1-Bromo-4-sec-butyl-2-methylbenzene.

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21. Arrange the following compounds in decreasing order of reactivity towards S_{N^2} displacement reaction and give reasons in support of your answer.

(a). C_2H_5Br, $C_2H_5IC_2H_5Cl$

(b). $(CH_3)_3CBr$, $CH_3CH_2CHBrCH_3$, $CH_3CH_3CH_2CH_2Br$.

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22. Which will react faster in S_{N^2} displacement reaction, 1-Bromopentane or 2-Bromopentane and why?

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23. Complete the following reactions:

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24. Why do haloalkanes dissolve in organic solvents?

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25. What is a racemic mixture? Give an example

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26. Out of the two bromoderivatives, $C_6H_5CH(CH_3)Br$ and $C_6H_5CH(C_6H_5)Br$, which one is more reactive in S_{N^1} reaction and why?

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27. Write the IUPAC name of the compound

$CH_3 - C \equiv C - CHClCH_3$.

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28. Identify A and B in the following reaction. 

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29. Although chlorine is an electron withdrawing group, yet it is ortho-, para- directing in electrophilic aromatic substitution reactions. Why?

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30. What is meant by chirality of a compound? Give an example

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31. What happens when bromine attacks on $CH_2 = CH - CH_2 - CH = CH_2$?

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32. What are ambident nucleophiles? Explain with an example.

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33. How will you distinguish between the following pairs of compounds

(i). Chloroform and carbon tetrachloride.

(ii). Benzyl chloride and chlorobenzene.

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34. Write chemical equations to illustrate the following reaction:

(i). Fittg reaction

(ii). Finkelstein reaction.

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35. What happens when chlorobenzene is subjected to hydrolysis?

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36. What happens when $CH_3 - Br$ is treated with KCN?

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

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38. Give the structures of the products A, B and C in the following reaction:

$$CH_3CH_2Br \xrightarrow{KCN} A \xrightarrow{LiAlH_4} B \xrightarrow[0^\circ C]{NaNO_2} C$$

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39. Chloroform is stored in dark coloured bottles. Explain in not more than two sentences.

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40. How will you convert methyl chloride to ethyl amine?

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41. What happens when iodoform is heated with silver powder ?

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42. Haloarenas are less reactive than haloalkanes and haloalkenes. Explain.

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43. Complete the following reaction:

$$CH_3 - CH = CH_2 \xrightarrow[\text{Peroxide}]{\text{HBr}} X \xrightarrow[\text{Acetone}]{NaI} Y.$$

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44. 

Which alkyl halide from the following pair is chiral and undergoes S_{N^2} reaction faster?

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45. Out of S_{N^1} and S_{N^2} which reaction occurs with (a) inversion of configuration (b) racemisation.

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46. Draw the structures of the major nucleophilic products in each of the following

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47. Write mechanism of the following reaction:

$CH_3CH_2Oh \xrightarrow{HBr} CH_3CH_2Br + H_2O.$

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48. Primary alkyl halide C_4H_9Br (A) is reacted with alcoholic KOH to give compound (B). The ompound (B) is reacted with HBr to give (C) which is an isomer of compound (A). Write the structures of the compounds (A), (B) and (C).

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49. Write the structures of different dihalogen derivatives of propane.

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50. What are enantiomers? What is the necessary and sufficient condition for a molecule to show enantiomerism? Give two examples to support your answer.

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51. Write any two differences between S_{N^2} and S_{N^1} reaction.

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52. Complete the following

(i). $CH_3COOAg + Br_2 \xrightarrow[\text{Reflux}]{CCl_4}$

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53. (a). Why are alkyl halides insoluble in water?

(b). Why is butan-1-ol optically inactive but butane-2 ol is optically active

in nature?

(c). Although chlorine is an electron withdrawing group yet it is ortho para directing in electrophilic aromatic substitution reaction. Why?

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54. Which would undergo S_{N^2} reaction faster in the following pair and why?

$$CH_3 - CH_2 - Br \text{ and } CH_3 - \overset{\overset{CH_3}{|}}{\underset{\underset{CH_3}{|}}{C}} - Br.$$

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55. How will you convert:

(i). Bromobenzene to 2-Bromoacetophenone.

(ii). 2-Bromobutane to But-2-ene.

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56. What happens when:

(i). Ethyl chloride is treated with NaI in the presence of acetone

(ii). Chlorobenzene is treated with Na metal in the presence of dry ether

(iii). Methyl chloride is treated with KNO_2.

Write chemical equation in support of your answer.

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57. Give a brief account of the following with one example of each:

(i). Markownikov's rule

(ii). Kharasch effect

(iii). Saytzeff's rule.

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58. Complete the following chemical reactions:

(ii). $CH_3 - CH_2 - Cl + KCN \xrightarrow{Heat}$

(iii). $CH_3 - CH = CH_2 + Hi \rightarrow$

(iv). $CH_3 - CH_2 - OH + NaBr + H_2SO_4$.

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59. (a). Complete the reaction:

$CH_3CH_2Br + KOH(alc.)$

(b). Explain why the use of chloroform as Anaesthetic is decreasing

(c). What happens when bromobenzene is treated with magnesium is the presence of dry ether?

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60. Complete the following

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61. Which of the following two reactions is S_{N^2} and why? 

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62. Give reasons:

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

(ii). The dipole moment of chlorobenzene is less than of cyclohexyl chloride.

(c). S_{N^1} reactions are are accompanied by racemisation is optically active alkyl halides.

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63. How do you convert:

(i). Chlorobenzene to biphenyl

(ii). Propene to 1-iodopropane

(iii). 2-bromobutane to but-2-ene.

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64. Explain the mechanism of S_{N1} and S_{N2} reactions with examples.

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65. (a). Out of  which is an example of vinylic halide?

(b). Out of  whish is an example of benzylic halide?

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66. The following compounds are given to you:

2-Bromopentane, 2-Bromo-2-methylbutane, 1-Bromopentane.

(a). Write the compound which is most reactive towards S_{N2} reaction.

(b). Write the compound which is optically active.

(c). Write the compound which is most reactive towards β-elimination reaction.

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67. Identify A,B,C, and D

$$C_2H_5Br + KOH(aq) \rightarrow [A] \xrightarrow{CaOCl_2} [B] \xrightarrow{Ag} [C] \xrightarrow[H^+]{Hg^{2+}} [D]$$

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68. A compounds is formed by the substitution of two chlorine atoms for two hydrogen atoms in propane. Write the structures of the possible isomers. Give their IUPAC names and identify the one which can exhibit optical isomerism.

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69. Write the structure of alkene formed by the dehydrohalogenation of 1-Bromo-1-methylcyclohexane with alcoholic KOH.

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70. Write the mechanism of the following reactions

(i). $CH_2Cl + OH^- \rightarrow CH_3OH + Cl^-$

(ii).

$$CH_3 - CH_2 - \overset{\overset{Cl}{|}}{CH} - CH_3 + OH^- \rightarrow CH_3 - CH = CH - CH_3 + Cl^-$$

.

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71. Out of S_{N^1} and S_{N^2} reaction, which is accompanied by inversion of configuration?

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72. (a). Write the equations for the steps in S_{N^1} mechanism of the conversion of tert-butyl bromide into tert-bytyl alcohol.

(b). Explain fittig reaction.

(c). Name the reagent used in the dehydrohalogenation of haloalkans.

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Higher Order Thinking Skills Questions

1. Rearrange the followig in order of increasing ease of dehydrogenation: $CH_3CH_2CH_2Cl$, $CH_3CHClCH_3$, $CH_3CCl(CH_3)_2$. ltBrgt Give reason.

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2. When propene is heated with chlorine at 773K, the product is substituted and not addition in nature, explain.

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3. n-butane is produced by the monobromination of ethane followed by Wurtz reaction. Calculate the volume of ethane at NTP to produce $55g$ n-butane if the bromination takes place with $90\,\%$ yield and the Wurtz reaction with $85\,\%$ yield.

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4. What will be the major organic product of the reaction? Explain.

$C_6H_5C_2H_5 \xrightarrow{Br_2\,(hv)}$

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5. Vinyl halides are inert towards both S_{N^1} and S_{N^2} reactions. Assign reason.

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6. When

reacts with alcoholic KCN, a mixture of isomeric products is obtained. Explain.

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7. Nucleophilic substitution of primary alkyl chlorides with sodium acetate is catalysed by sodium iodide. Discuss

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8. The dipole moment of  is 1.5D what will be the dipole moment of 

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9. $9 \cdot 65D$ C of electric current is passed through fused anhydrous magnesium chloride. The magnesium metal thus, obtained is completely converted into a grignard reagents. What is the number of moles of grignard reagent obtained?

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Some Typical Work Problems Based On Coversions

1. Complete the missing links in the following

(i). $CH_3CH_2CH_2OH \xrightarrow{PBr_3} [A] \xrightarrow{alc.KOH} [B] \xrightarrow{HBr} [C] \xrightarrow{NH_3} [D]$

(ii). $CH_3CH_2CH_2I \xrightarrow{alc.KOH} [A] \xrightarrow{H^+/H_2O} [B] \xrightarrow{SOCl_2} [C] \xrightarrow{LiAlH_4} [D]$

(iii). $CH_3CHBrCH_3 \xrightarrow{alc.KOH} [A] \xrightarrow[\text{Peroxide}]{HBr} [B] \xrightarrow[\text{Acetone}]{NaI} [C] \xrightarrow[\text{Ether}]{Mg} [D]$

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2. Write the structural formulae of the organic compounds A,B,C and D in the following sequence of reactions.

$$CH_3 - \underset{\underset{Br}{|}}{CH} - CH_2 - CH_2 - CH_3 \xrightarrow{alc.KOH} A \xrightarrow{Br_2} B \xrightarrow{alc.KOH} C \xrightarrow[Hg^{2+}/H^+]{H_2O}$$

.

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3. $R - Mg - Br(A)$ on reaction with H_2O forms a gas (B), which occupied $1.4L/g$ at NTP. What is product when $R - Br$ reacts with

benzene in presence of $AICI_3$?

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4. Hydrocarbon [A] with molecular formula C_8H_8 gave the following reaction:

(a). On shaking with bromine, a bromoderivative $[B]C_8H_8Br_2$ was formed

(b). Vigorous oxidation of hydrocarbon with alkaline $KMnO_4$ gave the monobasic acid [C]. ltBrgt (c). Acid [C] on distillation with sodalime gave C_6H_6

Deduce the structures of [A]. [B] and [C] and write the reactions involved.

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5. An aromatic compound 'X' $(C_8H_8Br_2)$ on treatment with aqueous KOH gives 'y' (C_8H_9BrO). On heating 'X' with alcoholic KOH, 'Z' (C_8H_7Br) is formed the compound 'Z' on reacting Br_2/CCl_4 forms 'A'. The compound

'A' reacts with fused KOH to give 'B'. Identify all the compound that are involved.

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6. An alkyl halide C_4H_9Br, $[A]$ reacts with alcoholic KOH and formes an alkene [B] which reacts with bromine to give a dibromide [C]. The compound [C] is converted to a gas [D] upon reacting with sodalide. The gas when passed through ammoniacal silver nitrate solution, gives a white precipitate. give the structural formula of the compounds [A],[B],[C] and [D].

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Single Correct Option

1. The order of reactivity of following alcohols with halogen acids is.....

(A) $CH_3CH_2-CH_2-OH$ (B) $CH_{3CH_2-\underset{CH_3}{\underset{|}{CH}}-OH}$

$$(C)CH_3CH_2 - \overset{\overset{CH_3}{|}}{\underset{\underset{CH_3}{|}}{C}} - OH$$

A. (A)gt(B)gt(C)

B. (C)gt(B)gt(A)

C. BgtAgtC

D. AgtCgtB

Answer: B

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2. Which of the following alcohols will yield the corresponding alkyl chloride on reaction with concentrated HCl at room temperature ?

Thinking process

To solve this problem, students keep in mind that tertiary alcohol being most reactive react at room temperature.

A. $CH_3CH_2 - CH_2 - OH$

B. $CH_3CH_2 - \underset{\underset{CH_3}{|}}{C}\ H - OH$

C. $CH_3CH_2 - \underset{\underset{CH_3}{|}}{\overset{\overset{CH_3}{|}}{C}}\ H - CH_2OH$

D. $CH_3CH_2 - \underset{\underset{CH_3}{|}}{\overset{\overset{CH_3}{|}}{C}}\ - OH$

Answer: D

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3. Identify the compound Y in the following reaction.

A. 

B. 

C. 

D. 

Answer: A

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4. Toluene react with a halogen in the presence of iron (III) chloride giving ortho andpara halo compounds. The reactions is

A. Electrophilic elimination reaction.

B. Electrophilic substitution reaction

C. Free radical addition reaction

D. Nucleophilic substitution reaction.

Answer: B

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5. Which of the following is halogen exchange reaction ?

A. $RX + Na < oRI + NaX$

B. 

C. $R-OH+Hx \xrightarrow{ZnCl_2} R-X+H_2O$

D. 

Answer: A

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6. Which reagent will you use for the following reaction ?

$CH_3CH_2CH_2CH_3 \rightarrow CH_3CH_2CH_2CH_2Cl + CH_3CH_2CHClCH_3$

A. Cl_2/UV light

B. $NaCl + H_2SO_4$

C. Cl_2 has in the dark

D. Cl_2 gas in the presence of iron in dark.

Answer: A

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7. Arrange the following compounds in the increasing order of their densities.

 .

A. $(i) < (ii) < (iii) < (iv)$

B. $(ii) < (iii) < (iv) < (ii)$

C. $(iv) < (iii) < (ii) < (i)$

D. $(ii) < (iv) < (iii) < (i)$.

Answer: A

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8. Arrange the following compounds in the increasing order of their boiling points.

(i). 

A. $(ii) < (i) < (iii)$

B. $(i) < (ii) < (iii)$

C. $(iii) < (i) < (ii)$

D. $(iii) < (ii) < (i)$

Answer: C

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9. 

In which of the following molecules, carbon atom marked with asterisk (*) is asymmetric?

A. (i),(ii),(iii),(iv)

B. (i),(ii),(iii)

C. (ii),(iii),(iv)

D. (i),(iii),(iv)

Answer: B

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10. 

Which of the following structures is enantiomeric with the molecule (A) given below?

A. 

B. 

C. 

D. 

Answer: A

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11. Which of the following is an example of vic-dihalide?

A. Dichloromethane.

B. 1,2-dichloroethane

C. Ethylidene chloride.

D. Allyl chloride.

Answer: B

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12. The position of Br in the compound in $CH_3 = CHC(Br)(CH_3)_2$ can be classified as.....

A. Allyl

B. Aryl

C. Vinyl

D. Secondary.

Answer: A

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13. Cholorobenzene is formed by reaction of chlorine with benzene in the presence of $AlCl_3$. Which of the following species attacks the benzene ring in this reaction?

A. Cl^-

B. Cl^+

C. $AlCl_3$

D. $[AlCl_4]^-$.

Answer: B

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14. Ethylidene chloride is a/an.....

A. vic-dihalide

B. gem-dihalide

C. allylic halide

D. vinylic halide.

Answer: B

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15. ltBrgt What is 'A' in the following reaction?

A. 

B. 

C. 

D. 

Answer: C

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16. A primary alkyl halide would prefer to undergo :-

A. S_{N^1} reaction

B. S_{N^2} reaction.

C. α-Elimination

D. Racemisation.

Answer: B

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17. Which of the following alkyl halides will undergo S_N1 reaction most redily ?

A. $(CH_3)_3C - F$

B. $(CH_3)_3C - Cl$

C. $(CH_3)_3C - Br$

D. $(CH_3)_3C - l$

Answer: D

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18. Which is the correct IUPAC name for $CH_3 - \underset{\underset{C_2H_5}{|}}{\text{CH}} - CH_2 - Br$?

A. 1-Bromo-2-ethylpropane

B. 1-Bromo-2-ethyl-2-methylethane

C. 1-Bromo-2 methylbutane

D. 2-Methyl-1-bromobutane.

Answer: C

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19. What should be the correct IUPAC name for diethylbromomethane?

A. 1-Bromo-1,1-diethylmethane

B. 3-Bromopentane

C. 1-Bromo-1-ethylpropane

D. 1-Bromo-1-ethylpropane

Answer: B

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20. The reaction of toluene with chlorine in the presence of iron and in the absence of light yields .....

A. 

B. 

C. 

D. Mixture of (b) and (c).

Answer: D

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21. Chloromethane on treatment with excess of ammonia yields mainly

A. N,N-Dimethylmethanamine

B. N-methylmethanamine

$(CH_3 - NH - CH_3)$

C. Methanamine (CH_3NH_2)

D. Mixture containing all these in equal proportions.

Answer: C

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22. Molecules whose mirror image is non-superimposable over them are known as chiral. Which of the following molecules is chiral in nature?

A. 2-Bromobutane

B. 1-Bromobutane

C. 2-Bromopropane

D. 2-Bromopropane-2-ol

Answer: A

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23. Reactions of $C_6H_5CH_2Br$ with aqueous sodium hydroxide follows.....

A. S_{N^1} mechanism

B. S_{N^2} mechanism

C. Any of the above two depending upon the temperature of reaction.

D. Saytzeff rule.

Answer: A

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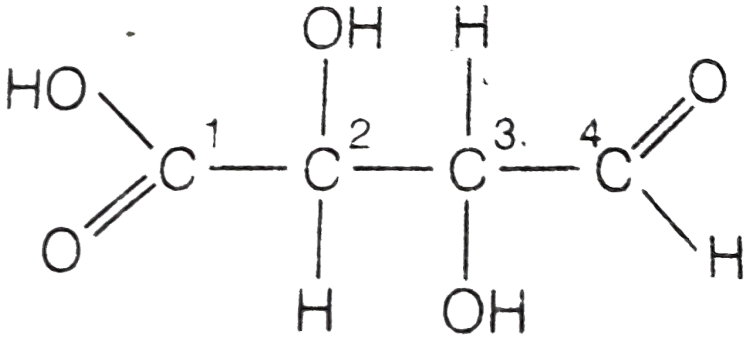
24. Which of the carbon atoms present in the molecule given below are asymmetric ?



A. 1,2,3,4

B. 2,3

C. 1,4

D. 1,2,3

Answer: B

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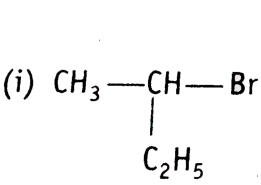
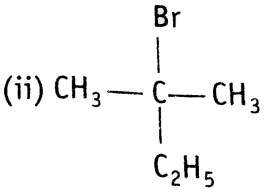
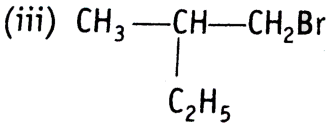
25. Which of the following compounds will give racemic mixture on nucleophillic substitution by OH^- ion?







A. (i)

B. (i),(ii),(iii)

C. (ii),(iii)

D. (i),(iii)

Answer: A

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26.

A. $(i) < (ii) < (iii)$

B. $(iii) < (ii) < (i)$

C. $(i) < (iii) < (ii)$

D. $(iii) < (i) < (ii)$

Answer: C

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27.

A. $(i) < (ii) < (iii)$

B. $(i) < (iii) < (ii)$

C. $(iii) < (ii) < (i)$

D. $(ii) < (iii) < (i)$

Answer: D

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28. 

A. $(iii) < (ii) < (i)$

B. $(ii) < (iii) < (i)$

C. $(i) < (iii) < (ii)$

D. $(i) < (ii) < (iii)$.

Answer: D

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29. 

A. $(i) < (ii) < (iii)$

B. $(ii) < (i) < (iii)$

C. $(iii) < (ii) < (i)$

D. $(i) < (iii) < (ii)$.

Answer: C

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30. Which is the correct increasing order of boiling points of the following compounds ?

1-bromoethane, 1-bromobutane, 1-bromopropane, 1-bromobenzene

A. Butane $<$ 1-Chlorobutane $<$ 1-Bromobutane $<$ 1-Iodobutane

B. 1-Iodobutane $<$ 1-Bromobutane $<$ 1-Chlorobutane $<$ Butane

C. Butane $<$ 1-Iodobutane $<$ 1-Bromobutane

$<$ 1-Chlorobutane

D. Butane $<$ 1-Chlorobutane $<$ 1-Iodobutane

$<$ 1-Bromobutane.

Answer: A

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31. Which is the correct increasing order of boiling points of the following compounds ?

1-bromoethane, 1-bromobutane, 1-bromopropane, 1-bromobenzene

A. Bromobenzene $<$ 1-Bromobutane $<$ 1-Bromopropane $<$ 1-Bromoethane

B. Bromopropane $<$ 1-bromoethane $<$ 1-bromopropane $<$ 1-romobutane.

C. 1-Bromopropane $<$ 1-Bromobutane $<$ 1-bromoethane $<$ Bromobenzene

D. 1-Bromoethane $<$ 1-bromopropane $<1-$ bromobutane $<$ bromobenzene.

Answer: D

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32. 

Which of the statements are correct about above reaction?

A. (i) and (v) both are nucleophiles.

B. In (iii), arbon atom is sp^3 hybridised.

C. In (iv), carbon atom is sp^3 hybridised.

D. (i) and (v) botha re electrophiles.

Answer: A::C

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33. Which of the following statements are correct about this reaction?

A. The given reaction follows S_{N^2} mechanism.

B. (ii) and (iv) have opposite configuration.

C. (ii) and (iv) have same configuration.

D. The given reaction follows S_{N1} mechanism.

Answer: A::B

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34.

Which of the following statements are correct about the reaction intermediate?

A. Intermediate (iii) is unstable because in this carbon is attached to 5 atoms.

B. Intermediate (iii) is unstable because carbon atom is sp^2 hybridised.

C. Intermediate (iii) is stable because carbon atom is sp^2 hybridised.

D. Intermediate (iii) is less stable than the reactant (ii).

Answer: A::D

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35.

Which of the following statements are correct about the mechanism of this reaction?

A. A carbocation will be formed as an intermediate in the reaction.

B. OH^- will attach the substrate (ii) from one side nd Cl^- will leave it simultaneously from the other side.

C. An unstable intermediate will be formed in which OH^- and Cl^- ions will be attached by weak bonds.

D. Reaction proceeds through S_{N1} mechanism.

Answer: A::D

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36.

Which of the following statements are correct about the kinetics of this reactions?

A. The rate of reaction depends on the concentration of only (ii)

B. The rate of reaction depends on concentration of both (i) and (ii)

C. Molecularity of reaction is one.

D. Molecularity of reaction is two.

Answer: A::C

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37. Haloalkanes contain halogen atom(s) attached to the sp^3hybridised carbon atom of an alkyl group. Identify haloalkene from the following compounds.

A. 2-Bromopentane.

B. Vinyl chloride (chloroethene)

C. 2-chloroacetophenone

D. Trichloromethane

Answer: A::D

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38. Ethylene chloride and ethylidene chloride are isomers. Identify the correct statements.

A. Both the compounds form same product on treatment with alcoholic KOH.

B. Both the compounds form same product on treatment with aq. NaOH.

C. Both the compounds form same product on reduction.

D. Both the compounds are optically active.

Answer: A::C

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39. Which of the following compounds are gem-dihalides?

A. Ethylidene chloride

B. Ethylene dichloride

C. Methylene chloride

D. Benzyl chloride.

Answer: A::C

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40. Which of the following are secondary bromides ?

A. $(CH_3)_2CHBr$

B. $(CH_3)_3CCH_2Br$

C. $CH_3CH(Br)CH_2CH_3$

D. $(CH_3)_2CBrCH_2CH_3$

Answer: A::C

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41. Which of the following compounds can beclassified as aryl halides ?

A. $p - ClC_6H_4CH_2CH(CH_3)_2$

B. $p - CH_3CHCl(C_6H_4)CH_2CH_3$

C. $o - BrH_2C - C_6H_4CH(CH_3)CH_2CH_3$

D. $C_6H_5 - Cl$

Answer: A::D

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42. Alkyl halides are prepared from alcohols by treating with

A. $HCl + ZnCl_2$

B. Red $P + Br_2$

C. $H_2SO_4 + KI$

D. All the above.

Answer: A::B

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43. Alkyl fluorides are synthesised by alkyl chloride/bromide in presence of.....or..... .

A. CaF_2

B. CoF_2

C. Hg_2F_2

D. NaF

Answer: B::C

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44. Match the compounds given in column I with the effects given in column II.

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45. Match the items of column I and column II.

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46. Match the structures of compounds given in column I with the classes of compounds given in column II.

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47. Match the reactions given in column I with the types of reactions given in column II.

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48. Match the structures given in column I with the names in column II.

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49. Match the reactions given in column I with the names given in column II.

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Assertion Reason Type

1. Assertion: Phosphoruchlorides (tri and penta) are preferred over thionyl chloride for the preparation of alkyl chlorides from alcohols.

Reason: Phosphorus chlorides give pure alkyl halides.

A. Assertion and reason both are correct and reason is correct explanaion of assertion.

B. Assertion and reason both are wrong statements.

C. Assertion is correct but reason is wrong statement.

D. Assertion is wrong but reason is correct statement.

Answer: B

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2. Assertion: The boiling points of alkyl halides decrease in the order $RI > RBr > RCl > RF.$

Reason: The boiling points of alkyl chlorides, bromides and iodides are considerably higher than that of the hydrocarbon of comparable molecular mass.

A. Assertion and reason both are correct and reason is correct explanaion of assertion.

B. Assertion and reason both are wrong statements.

C. Assertion is correct but reason is wrong statement.

D. Assertion and reason both are correct statements but reason is not correct explanation for assertion.

Answer: D

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3. Assertion: KCN reacts with methyl chloride to give methyl isocyanide

Reason: CN^- is an ambident nucleophile.

A. Assertion and reason both are correct and reason is correct explanaion of assertion.

B. Assertion and reason both are wrong statements.

C. Assertion is correct but reason is wrong statement.

D. Assertion is wrong but reason is correct statement.

Answer: D

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4. Assertion: tert-butyl bromide undergoes Wurtz reaction to give 2,2,3,3-tetramethylbutane.

Reason: In wurtz reaction, alkyl halides react with sodium in dry ether to give hydrocarbon containing double the number of carbon atoms present in the halide.

A. Assertion and reason both are correct and reason is correct explanaion of assertion.

B. Assertion and reason both are wrong statements.

C. Assertion is correct but reason is wrong statement.

D. Assertion is wrong but reason is correct statement.

Answer: A

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5. Assertion: Presence of a nitro group at ortho or para position increases the reactivity of haloarenes towards nucleophilic substitution.

Reason: Nitro group, being an electron withdrawing group decreases the electron density over the benzene ring.

A. Assertion and reason both are correct and reason is correct explanaion of assertion.

B. Assertion and reason both are wrong statements.

C. Assertion is correct but reason is wrong statement.

D. Assertion is wrong but reason is correct statement.

Answer: A

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6. Assertion: In monohaloarenes, further electrophilic substitution occurs at ortho and para position

Reason: Halogen atom is a ring deactivator

A. Assertion and reason both are correct and reason is correct explanaion of assertion.

B. Assertion and reason both are wrong statements.

C. Assertion is correct but reason is wrong statement.

D. Assertion and reason both are correct statements but reason is not correct explanation for assertion.

Answer: D

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7. Assertion: Aryl iodides can be prepared by reaction of arenes with iodine in the presence of an oxidising agent.

Reason: Oxidising agent oxidises I_2 into HI.

A. Assertion and reason both are correct and reason is correct explanaion of assertion.

B. Assertion and reason both are wrong statements.

C. Assertion is correct but reason is wrong statement.

D. Assertion is wrong but reason is correct statement.

Answer: C

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8. Assertion: It is difficult to replace chlorine by $-OH$ in chlorobenzene in comparison to that in chloroethane

Reason: Chlorine-carbon (C-Cl) bond in chlorobenzene has a partial double bond character due to resonance.

A. Assertion and reason both are correct and reason is correct explanaion of assertion.

B. Assertion and reason both are wrong statements.

C. Assertion is correct but reason is wrong statement.

D. Assertion is wrong but reason is correct statement.

Answer: A

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9. Assertion: Hydrolysis of (-)-2- bromooctane proceeds with inversion of configuration.

Reason: This reaction prioceeds through the formation of a carbocation.

A. Assertion and reason both are correct and reason is correct explanaion of assertion.

B. Assertion and reason both are wrong statements.

C. Assertion is correct but reason is wrong statement.

D. Assertion is wrong but reason is correct statement.

Answer: C

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10. Assertion: Nitration of benzene leads to the formation of m-nitro benzene.

Reason: $-NO_2$ roup is a m-directing group.

A. Assertion and reason both are correct and reason is correct explanaion of assertion.

B. Assertion and reason both are wrong statements.

C. Assertion is correct but reason is wrong statement.

D. Assertion is wrong but reason is correct statement.

Answer: D

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11. Assertion: S_{N^2} reactions do not proceed with retention of configuration.

Reason: S_{N^2} reactions proceed in a single step.

A. If both assertion and reason are correct and reason is correct explanation for assertion

B. If both assertion and reason are correct but reason is not correct explanation for assertion.

C. If assertion is correct but reason is incorrect.

D. if both assertion and reason are incorrect.

Answer: B

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12. Assertion: In the reaction of but-1-ene with HBr, 1-bromobutane is obtained in the presence of a peroxide.

Reason: The reaction involves the formation of a primary free radical.

A. If both assertion and reason are correct and reason is correct explanation for assertion

B. If both assertion and reason are correct but reason is not correct explanation for assertion.

C. If assertion is correct but reason is incorrect.

D. if both assertion and reason are incorrect.

Answer: C

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13. Assertion: Chloroform is generally stored in dark coloured bottles filled to the brim.

Reason: Chloroform reacts with glass in the presence of sun light..

A. If both assertion and reason are correct and reason is correct explanation for assertion

B. If both assertion and reason are correct but reason is not correct explanation for assertion.

C. If assertion is correct but reason is incorrect.

D. if both assertion and reason are incorrect.

Answer: C

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14. Assertion:

$$CH_3 - CH = CH_2 \xrightarrow{Cl_2, 773K} Cl - CH_2 - CH = CH_2 + HCl$$

Reason: At high temperature, Cl_2 dissociates into chlorine free radicals which bring about allylic substitutioin.

A. If both assertion and reason are correct and reason is correct explanation for assertion

B. If both assertion and reason are correct but reason is not correct explanation for assertion.

C. If assertion is correct but reason is incorrect.

D. if both assertion and reason are incorrect.

Answer: A

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15. Assertion: Chlorination of ethyl benzene with with Cl_2 in the presence of heat and light mainly yields 1-chloro-2-phenylethane.

Reason: The reaction occurs through the formation of $C_6H_5CH_2\overset{*}{C}H_2$ intermediate.

A. If both assertion and reason are correct and reason is correct explanation for assertion

B. If both assertion and reason are correct but reason is not correct explanation for assertion.

C. If assertion is correct but reason is incorrect.

D. if both assertion and reason are incorrect.

Answer: D

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16. Assertion: p-dichloroebenzene is less soluble in organic solvents than the corresponding o-isomer.

Reason: o-dichlorobenzene is polar while p-dichlorobenzene is not.

A. If both assertion and reason are correct and reason is correct explanation for assertion

B. If both assertion and reason are correct but reason is not correct explanation for assertion.

C. If assertion is correct but reason is incorrect.

D. if both assertion and reason are incorrect.

Answer: B

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17. Assertion: Ethyl chloride is more reactive than vinyl chloride towards nucleophilic substitution.

Reason: Vinyl group is electron donating in nature.

A. If both assertion and reason are correct and reason is correct explanation for assertion

B. If both assertion and reason are correct but reason is not correct explanation for assertion.

C. If assertion is correct but reason is incorrect.

D. if both assertion and reason are incorrect.

Answer: C

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18. Assertion: Ethyl bromide reacts with alcoholic silver cyanide solution to give ethyl carbylamine as the major product.

Reason: CN^- ion is an ambident nucleophile.

A. If both assertion and reason are correct and reason is correct explanation for assertion

B. If both assertion and reason are correct but reason is not correct explanation for assertion.

C. If assertion is correct but reason is incorrect.

D. if both assertion and reason are incorrect.

Answer: A

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19. Assertion: Nucleophilic substitution reaction in an optically active alkyl halide gives a mixture of enantiomers.

Reason: Reactio occurs by S_{N^1} mechanism.

A. If both assertion and reason are correct and reason is correct explanation for assertion

B. If both assertion and reason are correct but reason is not correct explanation for assertion.

C. If assertion is correct but reason is incorrect.

D. if both assertion and reason are incorrect.

Answer: A

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20. Assertion: Presence of $-NO_2$ group facilitates the nucleophilic substitution reactions in aryl halides.

Reason: the intermediate carbanion is stabiliised due to the presence of $-NO_2$ group.

A. If both assertion and reason are correct and reason is correct explanation for assertion

B. If both assertion and reason are correct but reason is not correct explanation for assertion.

C. If assertion is correct but reason is incorrect.

D. if both assertion and reason are incorrect.

Answer: A

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21. Assertion: Molecules that are not superimposable on their mirror images are chiral.

Reason: All chiral molecules hae chiral centres.

A. If both assertion and reason are correct and reason is correct explanation for assertion

B. If both assertion and reason are correct but reason is not correct explanation for assertion.

C. If assertion is correct but reason is incorrect.

D. if both assertion and reason are incorrect.

Answer: C

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22. Assertion: Primary allylic halides show higher reactivity in S_{N^1} reactions than other primary alkyl halides. ltBrgt Reason: Intermediate

carbocation in allyl halides is stabilised by resonance.

A. If both assertion and reason are correct and reason is correct explanation for assertion

B. If both assertion and reason are correct but reason is not correct explanation for assertion.

C. If assertion is correct but reason is incorrect.

D. if both assertion and reason are incorrect.

Answer: A

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23. Assertion: After using CCl_4 to extinguish fire, the room must be well-ventilated.

Reason: Atmospheric oxygen can convert CCl_4 into poisonous phosgene $(COCl_2)$ gas.

A. If both assertion and reason are correct and reason is correct explanation for assertion

B. If both assertion and reason are correct but reason is not correct explanation for assertion.

C. If assertion is correct but reason is incorrect.

D. if both assertion and reason are incorrect.

Answer: A

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24. Assertion: Diastereomers hae different physical properties.

Reason: These are non-superimporsable mirror images.

A. If both assertion and reason are correct and reason is correct explanation for assertion

B. If both assertion and reason are correct but reason is not correct explanation for assertion.

C. If assertion is correct but reason is incorrect.

D. if both assertion and reason are incorrect.

Answer: C

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25. Assertion: Vinyl halides are reactive towards nucleophilic substitution reactions.

Reason: Reactivity is due to the polarity of the carbon halogen bond.

A. If both assertion and reason are correct and reason is correct explanation for assertion

B. If both assertion and reason are correct but reason is not correct explanation for assertion.

C. If assertion is correct but reason is incorrect.

D. if both assertion and reason are incorrect.

Answer: D

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26. Assertion: Bromobenzene, upon reaction with Br_2/Fe gives 1,4-dibromobenzene as the major product.

Reason: In bromobenzene, the inductive effect of the bromo group is more dominant than the mesomeric effect in directing the incoming electrophile.

A. If both assertion and reason are correct and reason is correct explanation for assertion

B. If both assertion and reason are correct but reason is not correct explanation for assertion.

C. If assertion is correct but reason is incorrect.

D. if both assertion and reason are incorrect.

Answer: C

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27. Assertion: Thionyl chloride reacts with straight chain primary alcohols without any rearrangement.

Reason: SO_2 escapes from the reaction mixture.

A. If both assertion and reason are correct and reason is correct explanation for assertion

B. If both assertion and reason are correct but reason is not correct explanation for assertion.

C. If assertion is correct but reason is incorrect.

D. if both assertion and reason are incorrect.

Answer: B

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28. Assertion: Path (a) is better than path (b) to prepare (Y) and (X).

(b). Reason: Iodide ion $\left(I^{-}\right)$ is both an excellent nucleophile as well as leaving group.

A. If both assertion and reason are correct and reason is correct explanation for assertion

B. If both assertion and reason are correct but reason is not correct explanation for assertion.

C. If assertion is correct but reason is incorrect.

D. if both assertion and reason are incorrect.

Answer: A

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29. Assertion: Following reaction takes place according to Antimarkownikov's rule.

$CF_3CH = CH_2 + HC < oCF_3CH_2CH_2Cl$

Reason: Primary carboction is the intermediate.

A. If both assertion and reason are correct and reason is correct explanation for assertion

B. If both assertion and reason are correct but reason is not correct explanation for assertion.

C. If assertion is correct but reason is incorrect.

D. if both assertion and reason are incorrect.

Answer: B

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30. Assertion: Addition of Br_2 to but-1-ene gives two optical isomers.

Reason: The product contains one asymmetric carbon.

A. If both assertion and reason are correct and reason is correct explanation for assertion

B. If both assertion and reason are correct but reason is not correct explanation for assertion.

C. If assertion is correct but reason is incorrect.

D. if both assertion and reason are incorrect.

Answer: A

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31. Assertion: But-1-ene on reaction with HBr in the presence of peroxide produces 1-bromobutane.

Reason: It invovles the formation of a primary free radical.

A. If both assertion and reason are correct and reason is correct explanation for assertion

B. If both assertion and reason are correct but reason is not correct explanation for assertion.

C. If assertion is correct but reason is incorrect.

D. if both assertion and reason are incorrect.

Answer: C

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32. Assertion: $CH_3CHClCH_2CH_3 \xrightarrow[\text{acetone}]{NaI \text{ in}} A$ racemic mixture.

Reason: The reaction invovles Walden Inversion and the product is a mixture of dextro and laevo isomers.

A. If both assertion and reason are correct and reason is correct explanation for assertion

B. If both assertion and reason are correct but reason is not correct explanation for assertion.

C. If assertion is correct but reason is incorrect.

D. if both assertion and reason are incorrect.

Answer: A

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33. Assertion: Chloroform on reaction with air I the presence of light gives phosgene.

Reason:Phosgene is a poisonous gas.

A. If both assertion and reason are correct and reason is correct explanation for assertion

B. If both assertion and reason are correct but reason is not correct explanation for assertion.

C. If assertion is correct but reason is incorrect.

D. if both assertion and reason are incorrect.

Answer: B

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34. Assertion: 1,2-dichloroethane is optically active.

Reason: Meso compounds are optically active.

A. If both assertion and reason are correct and reason is correct explanation for assertion

B. If both assertion and reason are correct but reason is not correct explanation for assertion.

C. If assertion is correct but reason is incorrect.

D. if both assertion and reason are incorrect.

Answer: D

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Assignment

1. Write the IUPAC names of the following compounds:

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2. Write the structural formula and IUPAC names of :

(i). Secondary dutyl chloride

(ii) allyl chloride

(iii). BHC

(iv). Isobutyl chloride

(v). Cinnamyl chloride

(vi). Crotyl chloride

(vii). Propargyl bromide.

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3. How is bromoethane prepared from (i) ethanol (ii) ethane?

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4. Why do alkyl halides show nucleophilic substitution reactions?

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5. A compound is formed by the substitututio of two hydrogen atoms by two halogen atoms in propane. What is the number of structural isomers?

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6. Use markownikov's rule and predict the products of the following reaction:

(i). HCl with $CH_3CCl = CH_2$

(ii). HCl with $CH_3CH = C(CH_3)_2$.

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7. Discuss dehydrohalogenation of alkyl halides. What is saytzeff's rule?

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8. More alkylated alkene is formed in greater proportion compared with less alkylated alkene. Justify.

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9. With the help of chemical equation, how will you convert 1-bromopropane into 2-bromopropane in two steps?

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10. A sweety smelling organic compound 'A' is slowly oxidised by air in the presence of light to a highly poisonous gas. On warming with silver powder, it forms a gaseous substance 'B' whish is also formed by the action of calcium carbide on water. Identify 'A' and 'B'. writ ethe chemical equations involved.

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11. How will you convert?

(i). Methyl bromide to acetic acid

(ii). Methyl bromide to ethyl bromide.

(iii). 1-Bromoopropane to 2-bromopropane?

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12. Identify A and B in the following reaction

(i). $C_2H_5Br \xrightarrow{alc.KOH} [A] \xrightarrow{Br_2} [B]$

(ii). $CH_3 - CH = CH_2 \xrightarrow{HBr} [A] \xrightarrow{alc.KOH} [B].$

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13. Write the structures of the following compounds

(i). 2-Chloro-2-methylbutane

(ii). 1,4-Dibromobut-2-ene

(iii). 2-(2-chlorophenyl)-1-iodooctane

(iv). 4-Tertiarybutyl-2-iodoheptane

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14. Which compound in the following pairs will react faster in S_N^2 reaction?

(a). CH_3Br or CH_3I

(b). $(CH_3)_3CCl$ or CH_3Cl

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15. Complete the following chemicals equation

$$CH_3CH_2CH = CH_2 + HBr \xrightarrow{(\text{peroxide})}$$

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16. 

Which of the following compounds will react faster in S_{N^1}. Reaction and why?

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17. How will you prepare alkyl chloride by using

(i) HCl and (ii) PCl_5?

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18. How will you convert methyl chloride to ethyl amine?

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19. The treatment of alkyl chlorides with aqueous KOH leads to the formation of alcohols but in the presence of alcoholic KOH, alkenes are major products. Explain.

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20. Which of the following pairs of substances undergoes S_{N^2} substitution reaction faster and why?

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21. Which compound in the following couples will react faster in S_{N^2} displacement reaction and why?

(i). 1-Bromopentane or 2-Bromopentane

(ii). 1-Bromo-2-methylbutane or 2-bromo-2-methyl butane.

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22. Explain the mechanism of S_{N^1} and S_{N^2} reactions with examples.

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23. Explain wurtz reaction with the help of a chemical equation.

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24. Write the IUPAC name of the compound

$CH_3 - C \equiv C - CH(Cl)CH_3$.

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25. Identify A and B in the following reaction

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26. Which will react faster in S_{N^1} displacement reaction?

1-Bromopentane or 2-Bromopentane.

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27. What is a racemic mixture? Give an example

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28. Out of two bromoderivatives

$C_6H_5CH(CH_3)Br$ and $C_6H_5CH(C_6H_5)Br$, which one is more reactive in S_{N^1} reaction and why?

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29. What is meant by chirality of a compound ? Give an example.

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30. Identify A and B in the following sequence

$CH_3CH = CH_2 \xrightarrow{HBr} A \xrightarrow{aq.KOH} B.$

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31. What happens when:

(i). Methyl chloride is treated with alcoholic KCN.

(ii). Ethyl chloride is treated with alcoholic KOH.

(iii). Chloroform is heated with Ag powder.

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32. Write short notes on the following

(a). Saytzeff's rule

(b). Balz-Schiemann reaction.

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33. Explain the mechanism of S_{N^1} and S_{N^2} reactions with examples.

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34. Write the structures of different dihalogen derivatives of propane.

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35. Write the structural formula of a primary alkyl halide.

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36. Write any two differences between S_{N^2} and S_{N^1} reaction.

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37. Out of S_{N^1} and S_{N^2} which reaction occurs with (a) inversion of configuration (b) racemisation.

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38. Write the mechanism of the following reaction

$CH_3CH_2OH \xrightarrow{HBr} CH_3CH_2Br + H_2O.$

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39. Write chemical reaction for the preparation of chloroform in the laboratory.

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40. (i). Why are alkyl halides insoluble in water. ?

(ii). Although chlorine is an electron withdrawing group, yet it is ortho and para directing in electrophilic aromatic substitution.

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41. Which of the following would undergo S_{N^1} reaction faster in the following case:

$C_6H_5 - CH_2 - Br$ and $C_6H_5 - \overset{CH_3}{\underset{|}{C}}H - Br$

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42. Out of $CH_3 - \underset{CH_3}{\underset{|}{C}}H - CH_2 - Cl$ and $CH_3 - CH_2 - \underset{CH_3}{\underset{|}{C}}H - Cl$ which in more reactive towards S_{N^1} reaction and why?

View Text Solution

43. Write the products of the following reaction:

(i). $CH_3 - \underset{\underset{Cl}{|}}{CH} - CH_3 \xrightarrow{Na\,/\,Ether}$?

(ii). $CH_3CH_2 - Br \xrightarrow{AgCN}$?

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44. Complete the following:

$CH_3COCH_3 + I_2 + NaOH \xrightarrow{(\text{warm})}$.

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45. Explain iodoform reaction.

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Haloarenes

1. Write the IUPAC names of the following

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2. What are haloarenes? Mention difference between haloalkanes and haloarenes.

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3. Describe a method for the preparation of chlorobenzene from benzene diazonium chloride.

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4. Which is more reactive towards nucleophilic substitution: 2-nitrochlorobenzene or 2,4,6-trinitrochlorobenzene?

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5. Draw the structures of the possible isomers of the aromatic compound C_7H_7Cl. Which of them has the weakest $C-Cl$ bond?

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6. How will you distinguish between C_2H_5Br and C_6H_5Br?

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7. Why do alkyl halides undergo alkaline hydrolysis more easily than aryl halides.?

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8. Why is halogen atom when attached to benzene ring is ortho and para directing but somewhat deactivating in nature?

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9. Complete the follosing:

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10. Haloalkanes are more reactive than haloarenes. Explain with reason. How will you convert chlorobenzene to phenol?

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11. Chlorobenzene and benzyl chloride are distinguished by

Watch Video Solution

12. Identify A and B from the following

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13. Describe wurtz-fittig reaction.

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14. 

Complete the following equations:

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15. State one use each of D.D.T. and iodoform.

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16. Although chlorine is an electron withdrawing group, yet it is ortho-, para- directing in electrophilic aromatic substitution reactions. Why?

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17. Describe Fittig's reaction.

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18. Complete the reaction:

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19. 

View Text Solution

20. complete the reaction:

View Text Solution

21. Write notes an:

(i). Diazotisation reaction.

(ii). Sandmeyer's reaction.

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22. Identify the major product of the following reaction:

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Multiple Choice

1. Which of the following is a free radical substitution reaction?

A. 

B. 

C. 

D. $CH_3CHO + HCN \rightarrow CH_3CN(OH)CN$

Answer: A

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2. Allyl chloride on dehydrochlorination gives:

A. Propadiene

B. propylene

C. allyl alcohol

D. acetone

Answer: A

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3. Which of the following undergoes nucleophilic substitution exclusively by S_{N^1} mechanism?

A. Ethyl chloride

B. Isopropyl chloride.

C. Chlorobezene

D. Benzyl chloride.

Answer: D

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4. The major product formed in the reaction is:

$$CH_3 - \overset{\overset{CH_3}{|}}{\underset{\underset{H}{|}}{C}} - CH_2Br \xrightarrow[CH_3OH]{CH_3O^{\ominus}}$$

A. $CH_3 - \overset{\overset{CH_3}{|}}{\underset{\underset{H}{|}}{C}} - CH_2OCH_3$

B. $CH_3 - \underset{\underset{OCH_3}{|}}{C}\ H - CH_2 - CH_3$

C. $CH_3 - \overset{\overset{CH_3}{|}}{C}\ = CH_2$

D. $CH_3 - \overset{\overset{CH_3}{|}}{\underset{\underset{OCH_3}{|}}{C}} - CH_3.$

Answer: D

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5. For the following

$(i) I^- (ii) Cl^- (iii) Br^-$

the increasing order of nucleophilicity would be:

A. $Cl^- < Br^- < I^-$

B. $I^- < Cl^- < Br^-$

C. $Br^- < Cl^- < I^-$

D. $I^- < Br^- < Cl^-$

Answer: A

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6. In a S_N2 substitution reaction of the type

$$R - Br + Cl^- \xrightarrow{\text{DMF}} R - Cl + Br^+$$

which one of the following has the highest relative rate?

A. $CH_3 - \underset{\underset{CH_3}{|}}{\overset{\overset{CH_3}{|}}{C}} - CH_2 - Br$

B. $CH_3 - CH_2 - Br$

C. $CH_3 - CH_2 - CH_2 - Br.$

D. $CH_3 - \underset{\underset{CH_3}{|}}{C}H - CH_2 - Br.$

Answer: B

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7. Predict the product 'C' in the following reaction of but-1-ene.

$$CH_3 - CH_2 - C \equiv \underset{(A)}{CH} + HC < oB \xrightarrow{HI} C$$

A. $CH_3CH_2CH_2 - \overset{\overset{I}{|}}{\underset{\underset{Cl}{|}}{C}} - H$

B. $CH_3 - CH_2 - \overset{\overset{I}{|}}{CH} - CH_2Cl$

C. $CH_3CH_2 - \overset{\overset{I}{|}}{\underset{\underset{Cl}{|}}{C}} - CH_3$

D. $CH_3 - \underset{\underset{Cl}{|}}{CH} - CH_2CH_2I$

Answer: C

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8. The additio of HBr to but-1-ene gives a mixture of products (I),(II) and (III).

(III). $CH_3 - CH_2 - CH_2 - CH_2 - Br.$

Mixture consists of

A. (I) and (II) as major and (III) as minor products

B. (II) as major, (I) and (III) as minor products.

C. (II) as minor, (I) and (III) as major products.

D. (I) and (II) as minor and (III) as major products.

Answer: A

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9. The correct order of increasing reactivity of $C - X$ bond towards nucleophile in the following compounds is:

A. (II)lt(III)lt(I)lt(IV)

B. (IV)lt(III)lt(I)lt(II)

C. (III)lt(II)lt(Ilt(IV)

D. (I)lt(II)lt(IV)lt(III)

Answer: D

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10. Which one is the most reactive towards S_{N^1} reaction?

A. $C_6H_5CH(C_6H_5)Br$

B. $C_6H_5CH(Br)CH_3$

C. $C_6H_5C(CH_3)(C_6H_5)Br$

D. $C_6H_5CH_2Br.$

Answer: C

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11. Which is a nucleophilic substitution reaction among the following?

A. $CH_3 - CH = CH_2 + H_2O \xrightarrow{H^+} CH_3 - \underset{\underset{OH}{|}}{C}H - CH_3$

B. $RCHO + R''MgX \xrightarrow{H_2O/H^+} R - \underset{\underset{OH}{|}}{C}H - R''$

C.

$$CH_3 - CH_2 - \overset{\overset{CH_3}{|}}{C}H - CH_2 - Br + NH_3 \rightarrow CH_3 - CH_2 - \overset{\overset{CH_3}{|}}{C}H -$$

.

D. $CH_3CHO + HCN \rightarrow CH_3CH(OH)CN.$

Answer: C

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12. The compound which does not undergo hydrolysis by S_{N^1} mechanism is:

A. $CH_2 = CHCH_2Cl$

B. C_6H_5Cl

C. $C_6H_5CH_2Cl$

D. $C_6H_5CH(CH_3)Cl$

Answer: B

View Text Solution

13. Consider the reaction:

(i).

$$(CH_3)_2CH - CH_2Br \xrightarrow{C_2H_5OH} (CH_3)_2CH - CH_2 - O - C_2H_5 + HBr$$

(ii).

$$(CH_3)_2CH - CH_2Br \xrightarrow{C_2H_5O^-} (CH_3)_2CH - CH_2 - OC_2H_5 + Br^-$$

The mechanisms of reaction (i) and (ii) are respectively.

A. S_{N^1} and S_{N^2}

B. S_{N^1} and S_{N^1}

C. S_{N^2} and S_{N^2}

D. S_{N^2} and S_{N^1}

Answer: C

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14. In the following sequences of reaction

$CH_3Br \xrightarrow{KCN} A \xrightarrow{H_3O^+} B \xrightarrow[ether]{LiAlH_4} C$ The end product (C) is.

A. acetone

B. methane

C. acetaldehyde

D. ethyl alcohol.

Answer: D

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15. In the replacement reaction

$$> \underset{|}{C} - I + Mf \rightarrow \ > \underset{|}{C} - F + MI$$

the reaction will be most favourable if M happens to be

A. Na

B. K

C. Rb

D. Li.

Answer: C

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16. Which of the following alkyl halides has the lowest boiling point?

A. n-Butyl chloride.

B. Iso-butyl chloride.

C. Sec.Butyl chloride.

D. Tert-butyl chloride.

Answer: D

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17. 2,4,6-trinitrochlorobenzene on warming with water produces:

A. chlorobenzene

B. picric acid

C. pehnol

D. no reaction since $C-Cl$ bond is stable.

Answer: B

View Text Solution

18. Wurtz reaction of methyl iodide yields an organic compound X. Which of the following reaction also yields X?

A. $C_2H_5Cl + LiAlH_4 \rightarrow$

B. $C_2H_5Cl + Mg \xrightarrow{\text{dery ether}}$

C. $C_2H_5Cl + C_2H_5ONa \rightarrow$

D. $CH_3Cl + Ag(\text{Powder}) \rightarrow$

Answer: A

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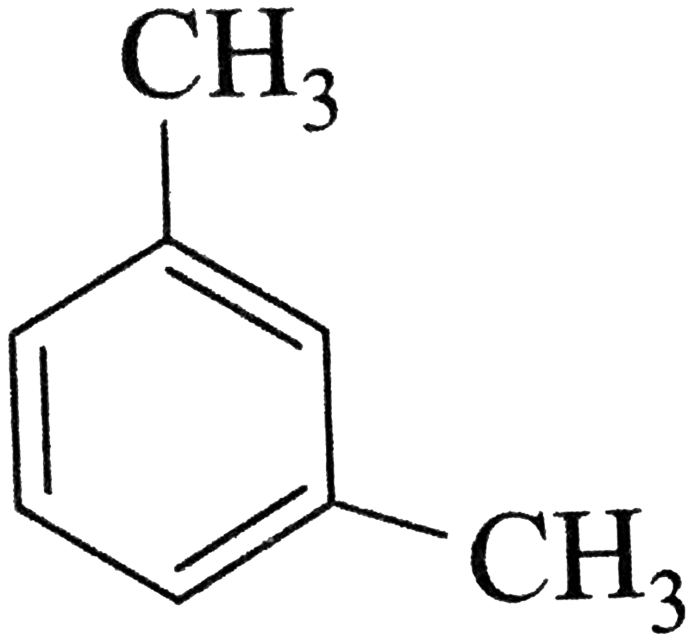
19. What products are formed when the following compounds are treated with Br_2 in the presence of $FeBr_3$?



A.

B.

C.

D.

Answer: B

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20. $RCl + NaI \xrightarrow{\text{Acetone}} R - I + NaCl$

This reaction is known as

A. Wurtz reaction

B. Fittig reaction

C. Finkelstein reaction

D. Frankland reaction.

Answer: C

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21. Two possible stereo-structures of $CH_3CHOHCOOH$, which are optically active are called

A. atropisomers

B. enantiomers

C. mesomers

D. diastereomers.

Answer: B

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22. In the reaction with HCl, an alkene reacts in accordance with the markovnikov's rule to give a product 1-chloro-1-methylcyclohexane. The possibel alkene is

A. 

B. 

C. A and B

D. 

Answer: C

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23. In an S_{N^1} reaction on chiral centres, there is

A. inversion is more than retention leading to partial racemisation

B. 100% retention

C. 100% inversion

D. 100% racemisation.

Answer: A

View Text Solution

24. The reaction ltBrgt

$$CH_3 - \overset{CH_3}{\underset{CH_3}{\overset{|}{\underset{|}{C}}}} - ONa + CH_3CH_2Cl \xrightarrow{-NaCl} CH_3 - \overset{CH_3}{\underset{CH_3}{\overset{|}{\underset{|}{C}}}} - O - CH_2 - CH_3$$

is called.

A. Etard reaction

B. Gattermann-kock reaction

C. Williamson synthesis

D. Williamson continuous etherification process.

Answer: C

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25. The reaction of $C_6H_5CH = CHCH_3$ with HBr produces

A. $C_6H_5CH_2CH_2CH_2Br$

B. 

C. $C_6H_5\underset{\underset{Br}{|}}{C}HCH_2CH_3$

D. $C_6H_5CH_2\underset{\underset{Br}{|}}{C}HCH_3$.

Answer: C

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26. In which of the following compounds, the $C-Cl$ bond ionisation shall give most stable carbocation ion?

A. 

B. 

C. 

D. 

Answer: D

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27. Which one of the following organohalogen compounds when heated with alcoholic potassium hydroxide does not undergo dehydrohalogenation reaction?

A. Secondary butyl chloride.

B. Isopropyl chloride.

C. Neopentyl chloride.

D. Isobutyl chloride

Answer: C

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28. Which of the following biphenyls is opticaly active?

A. 

B. 

C. 

D. 

Answer: D

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29. For the following reactions: (A). $CH_3CH_2CH_2Br + KOH \xrightarrow{(alc)} CH_3CH = CH_2 + KBr + H_2O$

(B). 

Which of the following statements is correct?

A. (A) is elimination, (B) and (C) are substitution reactions.

B. (A) is substitution, (B) and (C) are addition reactions.

C. (A) and (B) are elimination reaction. (C) is addition reaction.

D. (A) is elimination, (B) is substitution and (C) is addition reaction.

Answer: D

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30. The correct order of the reactivity of the following compounds towards nucleophilic substitution in the following compounds is

A. (iv)gt(Iii)gt(v)gt(ii)gt(i)

B. (iii)gt(iv)gt(v)gt(ii)gt(i)

C. (iv)gt(Ii)gt(iii)gt(i)gt(v)

D. (ii)gt(iii)gt(v)gt(iv)gt(i)

Answer: A

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31. consider the reaction

$CH_3CH_2CH_2Br + NaCN \rightarrow CH_3CH_2CH_2CN + NaBr.$

the reaction will be fastest in.

A. Water

B. Ethanol

C. Methanol

D. N,N'-dimethyl formamide (DMF).

Answer: D

View Text Solution

32. Which of the following can be used as halide component for Friedel-Crafts reaction?

A. Isopropyl chloride

B. Chlorobenzene

C. Bromobenzene

D. Chloroethane

Answer: A

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33. Bromination of trans but-2-ene leads to the formation of

A. d-form

B. l-form

C. meso compound

D. both d and l forms.

Answer: D

View Text Solution

34. The compound C_7H_8 undergoes the following reaction.

$$C_7H_8 \xrightarrow{3Cl_2/\Delta} A \xrightarrow{Br_2/Fe} B \xrightarrow{Zn/HCl} C$$

The product C is

A. m-bromotoluene

B. o-bromotoluene

C. 3-bromo-2,4,6-trichlorotuene

D. p-bromotoluene.

Answer: A

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35. The decreasing order of S_{N^2} reaction for the given compounds is  .

A. IgtIIgtIIIgtIV

B. IIgtIgtIIIgtIV

C. IVgtIIIgtIIgtI

D. IVgtIIIgtIgtII

Answer: B

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36. The correct order of reactivity in S_{N^1} reaction for the following compounds is

(i). $CH_3 - \underset{\underset{Cl}{|}}{CH} - CH_2 - CH_3$

(ii). $Ph - \underset{\underset{Cl}{|}}{CH} - CH_2 - CH_3$

(iii). $CH_3 - \underset{\underset{OCH_3}{|}}{\overset{\overset{Cl}{|}}{C}} - CH_3$

(iv). $CH_3 - CH_2 - CH_2 - Cl$

A. $(i) > (ii) > (iii) > (iv)$

B. $(ii) > (i) > (iii) > (iv)$

C. $(iii) > (ii) > (i) > (iv)$

D. $(iv) > (iii) > (ii) > (i)$

Answer: C

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37. An alkyl bromide produces a single alkene when it reacts with sodium ethoxide and ethanol. The alkene undergoes hydrogenation and produces 2-methylbutane. What is the identity of the alkyl bromide?

A. 1-bromo-2,2-dimethylpropane

B. 1-bromo-2-methylpentane

C. 1-bromo-2-methylbutane

D. 2-bromo-2-methylbutane.

Answer: C

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38. $CH_3 - \underset{\underset{CH_3}{|}}{CH} - CH = CH_2 + HBr \rightarrow \text{'}A\text{'}$

'A' (predominantly) is:

A. $CH_3 - \underset{\underset{Br}{|}}{CH} - \underset{\underset{CH_3}{|}}{C}\ H - CH_3$

B. $CH_3 - \underset{\underset{CH_3}{|}}{C}\ H - \underset{\underset{Br}{|}}{CH} - CH_3$

C. $CH_3 - \underset{\underset{CH_3}{|}}{\overset{\overset{Br}{|}}{C}}\ H - CH_2 - CH_2 - Br$

D. $CH_3 - \underset{\underset{CH_3}{|}}{C}\ - CH_2 - CH_3.$

Answer: D

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39. In a set of reaction, ethyl benzene yielded a product D.

The product D would be

A. 

B. 

C. 

D. 

Answer: D

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40. In alkaline hydrolysis of a tertiary halide by aqueous alkali, if concentration of alkali is doubled, then the reaction rate

A. will be doubled.

B. will be halved

C. will become four times greater

D. will remain constant.

Answer: D

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41. An alkyl halide with molcular formula $C_6H_{13}Br$ on dehydrohalogenation gave two isomeric alkenes X and Y with molecular formula C_6H_{12}. O reductive ozonolysis, X and Y gave four compounds $CH_3COCH_3, CH_3CHO, CH_3CH_2CHO$ and $(CH_3)_2CHCHO$. the alkyl halide is.

A. 2-Bromohexane.

B. 2,2-Dimethyl-1-bromobutane

C. 2-Bromo-2,3-dimethylbutane

D. 3-Bromo-Bromo-2-methylpentane.

Answer: D

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42. Which one of the following is most reactive towards nucleophilic substitution reaction ?

A. 

B. 

C. 

D. 

Answer: C

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43. 

The major product (A) of the following reactions is:

A. 

B. 

C. 

D. 

Answer: C

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44. The products expected to be formed in the wurtz reaction of a mixture of neopentyl bromide and isobutyl bromide are

(i). 2,2,4-trimethylpentane

(ii). 2,2,5,5-tetramethylhexane.

(iii). 2,2,4,4-tetramethylhexane

(iv). 2,5-dimethylhexane

(v). 2,2,5-trimethylhexane.

A. (ii),(iii) and (iv)

B. (ii),(iv) and (v)

C. (i),(iv) and (v)

D. (i),(iii) and (v)

Answer: B

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45. The major organic products in the given reaction.

 .

A. 

B. 

C. 

D. 

Answer: A

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46. Which one of the following does not show optical activity ?

A. 

B. 

C. 

D. 

Answer: C

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47. Identify A and predict the type of reaction.

A. 

B. 

C. 

D. 

Answer: A::B

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Jee Main Other Enginnering Entrance Examination

1. The compound formed on heating chlorobenzene with chloral in the presence of concentrated sulphuric acid is:

A. freon

B. DDT

C. gammexene

D. hexachloroethane.

Answer: B

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2. Tertiary alkyl halides are practically inert to substitution by S_{N^2} mechanism because of

A. insolubility

B. instability

C. inductive effect

D. steric hindrance.

Answer: D

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3. 2-Methylbutane on reacting with bromine in the presence of sunlight gives mainly

A. 1-Bromo-2-methylbutane

B. 2-bromo-2-methylbutane

C. 2-bromo-3-methylbutane

D. 1-bromo-3-methylbutane

Answer: B

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4. Fluorobenzene can be synthesised in the laboratory

A. by heating phenol with HF and KF

B. from aniline by diazotisation followed by heating diazonium salt with HF

C. by direct fluorination of benzene with fluorine gas

D. by reacting bromobenzene with NaF solution.

Answer: B

View Text Solution

5. Which one of the following is expected to rotate the plane of plane polarised light.

A. 

B. 

C. 

D. 

Answer: A

View Text Solution

6. Which of the following reactions with yield 2,2-dibromopropane?

A. $CH_3 - C \equiv CH + 2HBr \rightarrow$

B. $CH_3C \equiv CH + HBr \rightarrow$

C. $CH \equiv CH + 2HBr \rightarrow$

D. $CH_3C \equiv CBr + HBr \rightarrow .$

Answer: A

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7. Which of the following is the correct order of decreasing S_{N^2} reactivity?

A. $RCH_2X > R_3CX > R_2CHX$

B. $RCH_2X > R_2CHX > R_3RX$

C. $R_3CX > R_2CHX > R_2CHX > RCH_2X$

D. $R_2CHX > R_2CX > RCH_2X.$

Answer: B

View Text Solution

8. The organochlorocompound which shows complete steriochemical inversion during the S_{N^2} reaction is:

A. CH_3Cl

B. C_2H_5Cl

C. $(CH_3)_3CCl$

D. $(CH_3)_2CHCl$

Answer: A

View Text Solution

9. Which of the following on heating with aqeous KOH produces acetaldehyde?

A. CH_3COCl

B. CH_3CH_2Cl

C. CH_2ClCH_2Cl

D. CH_3CHCl_2.

Answer: D

View Text Solution

10. Consider the following bromides:

The correct order towards S_{N^1} reactivity is

A. BgtCgtA

B. BgtAgtC

C. CgtBgtA

D. AgtBgtC

Answer: A

View Text Solution

11. Out of the following the alken that exhibits optical isomerism is:

A. 2-Methylpent-2-ene

B. 3-Methylpent-2-ene

C. 4-Methylpent-1-ene

D. 3-Methylpent-1-ene.

Answer: D

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12. Aryl halides do not undergo nucleophilic substitution reactions under ordinary conditions because:

(1). Approach of nucleophile is retarded

(2). Carbon carrying halogen atom is sp^3 hybridised.

(3). The substrate molecule is destabilised due to resonance

(4). of partial double bond character between carbon and halogen.

A. 2 and 3 only

B. 1 and 4 only

C. 2 and 3 only

D. 2,3 and 4 only.

Answer: B

View Text Solution

13. A dibromoderivative of an alkane reacts with sodium metal to form an alicylic hydrocarbon. The derivative is:

A. 1,1-dibromopropane

B. 2,2-dibromopropane

C. 1,2-dibromoethane

D. 1,4-dibromobutane.

Answer: D

View Text Solution

14. Arrange the following in order of decreasing reactivity towards S_{N^2} reactions:

$CH_3CH_2CH_2Cl(I), CH_3CH_2 - CHCl - CH_3(II)(CH_3)_2CHCH_2Cl(III$

A. IgtIIIgtIIgtIV

B. IIIgtIVgtIIgtI

C. IIgtIgtIIIgtIV

D. IVgtIIIgtIIgtI

Answer: A

View Text Solution

15. When 3-Phenylpropene reacts with HBr in the presence of an organic peroxide, the major product formed is:

A. 2-Bromo-1-phenylpropane

B. 1,2-Dibromo-3-phenylpropane

C. 3-(o-bromophenyl)propane

D. 1-Bromo-3-phenylpropane

Answer: D

View Text Solution

16. An alkane with molecular formula C_6H_{14} reacts with chlorine in the presence of light and heat to give two constitutionally isomeric monochlorides of molecular formula $C_6H_{13}Cl$. Which is the most reasonable starting alkane?

A. n-Hexane

B. 2,2-Dimethylbutane

C. 2,3-Dimethylbutane

D. 3-Methylpentane

Answer: C

View Text Solution

17. How may chiral compounds are possible on monochlorination of 2-methylbutane?

A. 8

B. 2

C. 4

D. 6

Answer: C

View Text Solution

18. Which branched chain isomer of the hydrocarbon with molecular mass 72 gives only one isomer of monosubstituted alkyl halide?

A. Isopentane

B. Neopentane

C. Isohexane

D. Neohexane.

Answer: B

View Text Solution

19. (+)-1-chloro-1-phenylethane is toluene racemises slowly in the presence of small amount of $SbCl_5$ due to the formation of:

A. carbocation

B. carbene

C. free radical

D. carbonion

Answer: A

View Text Solution

20. Which of the following is ot an allyl halide?

A. 4-Bromopent-2-ene

B. 3-Bromobut-2-methylbut-1-ene

C. 1-Bromo-2-ene

D. 4-Bromobut-1-ene

Answer: D

View Text Solution

21. The correct IUPAC name of the following is:

$$H_3C - CH = \underset{\underset{CH_3Br}{|}}{C} - \underset{\underset{Br}{|}}{CH} - CH_3$$

A. 4-Bromo-3-methylpent-2-ene

B. 2-Bromo-3-methylpent-4-ene

C. 3-Methyl-2-bromopent-4-ene

D. 2-Bromo-2-methylpent-2-ene

Answer: A

View Text Solution

22. Which of the following will give yellow precipitate on shaking with an aqueous $NaOH$ followed by adification with dilute HNO_3 and addition of $AgNO_3$ solution.?

A. 

B. 

C. 

D. None of these

Answer: B

View Text Solution

23. Compound (A) C_8H_9Br gives light yellow precipitate when warmed with alcoholic $AgNO_3$ solution. Oxidation of (A) gives (B). $C_8H_6O_4$. The compound (B) easily forms an anhydride on heating. The compound (A) is:

A. 

B. 

C. 

D. 

Answer: A

View Text Solution

24. An alkyl bromide (X) reacts with Na metal dissolved in anhydrous ether to form 4,5-diethyloctane.t he compound (X).

A. $CH_3(CH_2)_3Br$

B. $CH_3(CH_2)_5Br$

C. $CH_3(CH_2)_3CH(Br)CH_3$

D. $CH_3(CH_2)_2CH(Br)CH_2CH_3$

Answer: D

View Text Solution

25. In S_{N^2} reactions, the correct order of reactivity for the compounds $CH_3Cl, CH_3CH_2Cl, (CH_3)_2CHCl$ and $(CH_3)_3CCl$ is:

A. $CH_3Cl > (CH_3)_2CHCl > CH_3CH_2Cl > (CH_3)_3CCl$

B. $CH_3Cl > CH_3CH_2Cl > (CH_3)_2CHCl > (CH_3)_3CCl$

C. $CH_3CH_2Cl > CH_3Cl > (CH_3)_2CHCl > (CH_3)_3CCl$

D. $(CH_3)_2CHCl > CH_3CH_2Cl > CH_3Cl > (CH_3)_3CCl$

Answer: B

View Text Solution

26. The major organic compound formed by the reaction of 1,1,1-trichloroethane with silver powder is:

A. acetylene

B. ethene

C. but-2-yne

D. but-2-ene

Answer: C

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27. The compound that will have a permanent dipole moment among the following

A. I

B. II

C. III

D. IV

Answer: A

View Text Solution

28. The arrangement of following compounds:

(I) bromomethane

(II). Bromoform

(III). Chloromethane

(IV). Dibromomethane. In increasing order of boiling points is

A. $(IV) < (III) < (I) < (II)$

B. $(I) < (II) < (III) < (IV)$

C. $(III) < (I) < (IV) < (II)$

D. $(II) < (I) < (IV) < (II)$

Answer: C

View Text Solution

29. The hydrolysis of optically active 2-bromobutane with aqueous NaOH results in the formation of:

A. (-)butane-2-ol

B. $(\pm)$butane-2-ol

C. (+)butane-2-ol

D. $(\pm)$butane-1-ol

Answer: B

View Text Solution

30. The major product of the given reaction is:

 .

A. 

B. 

C. 

D. 

Answer: B

View Text Solution

31. The product of the given reaction:

 .

A. 

B. 

C. 

D. 

Answer: C

View Text Solution

32. The synthesis of alkyl fluoride is best accomplished by:

A. Finkelstein reaction

B. Swart's reaction

C. Free radical mechanism

D. Sandmeyer's reaction.

Answer: B

View Text Solution

33. Identify A and B respectively in the following reaction:

$$Br - CH_2 - CH_2 - Br \xrightarrow{\text{Excess ACOAg}} [A] \xrightarrow{\text{Hydrolysis}} [B] + 2ACOH$$

A. 1,2-diacetoxyethane and 1,2-dibromoethane

B. 1,2-diacetoxyethane and ethylene glycol

C. Ethylene glycol and Glycerol

D. Ethylene glycol and 1,2-diacetoxyethane

Answer: B

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34. 

The absolute configuration of:

A. (2R,3S)

B. (2S,3R)

C. (2S,3S)

D. (2R,3R)

Answer: B

View Text Solution

35. 2-Chloro-2-methylpentane on reaction with sodium methoxide in methanol yields

(I). $C_2H_5CH_2\underset{CH_3}{\overset{CH_3}{\underset{|}{\overset{|}{C}}}} - OCH_3.$

(II). $C_2H_5CH_2\underset{CH_3}{\underset{|}{C}} = CH_2$

(III). $C_2H_5CH = \underset{CH_3}{\underset{|}{C}} - CH_3.$

A. all these

B. I and III

C. III only

D. I and II

Answer: A

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36. Replacement of Cl of chlorobenzene to give phenol requires drastic conditions, but Cl of 2,4-dinitrochlorobenzene is readily replaced. This is because

A. $-NO_2$ group makes the ring electron rich at ortho and para position

B. $-NO_2$ group withdraws electrons from position

C. $-NO_2$ donates electrons at meta position

D. $-NO_2$ withdraws electrons from ortho and para position.

Answer: D

View Text Solution

37. The increasing order of the reactivity of the following halides for the S_{N^1} reaction is:

$$\underset{I}{CH_3\underset{Cl}{\underset{|}{C}}HCH_2CH_3} \quad \underset{II}{CH_3CH_2CH_2Cl} \quad \underset{III}{p-H_3COC_6H_4CH_2Cl.}$$

A. $(I) < (III) < (II)$

B. $(II) < (III) < (I)$

C. $(III) < (II) < (I)$

D. $(II) < (I) < (III)$

Answer: D

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38. The major product obtained in the following reactions is

A. $(+)-C_6H_5CH(Ot-Bu)CH_2C_6H_5$

B. $(-)-C_6H_5CH(Ot-Bu)CH_2C_6H_5$

C. $(\pm)-C_6H_5CH(Ot-Bu)CH_2C_6H_5$

D. $C_6H_5CH=CHC_6H_5$

Answer: D

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39. Which of the following upon treatment with tert-BuONa the colour of bromine?

A. 

B. 

C. 

D. 

Answer: C

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40. 3-Methylpent-2-ene on reaction with HBr in presence of peroxide forms an addition product. The number of possible stereoisomers for the product is

A. two

B. four

C. six

D. zero.

Answer: B

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41. 

The major product of the following reaction is

A. 

B. 

C. 

D. 

Answer: A

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42. The major product (s) obtained in the following reaction is/are

 .

A. 

B. 

C. 

D. 

Answer: A::D

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Comprehension

1. Alkyl halides can participate in both S_{N^1} and S_{N^2} reactions depending upon their anture and conditions. The reactivity order in the three types of alkyl halides is the reverse in S_{N^1} reactions than what we observe in S_{N^2} reactions. Apart from that, there is inversion of configuration in case of alkyl halides when they participate in S_{N^2} reactions. on the other hand, partial or complete racemisation occurs in S_{N^1} reactions.

Q. S_{N^1} reactions take place much more rapidly in polar solvents than in non-polar solvents. this is because of hydration of nucleophile.

A. by the electron rich oxygen atoms of solvent (H_2O) molecules.

B. stabilisation of carbocation y the electorn rich oxygen atoms leading to solvation.

C. both are correct.

D. none is correct.

Answer: B

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2. Alkyl halides can participate in both S_{N^1} and S_{N^2} reactions depending upon their anture and conditions. The reactivity order in the three types of alkyl halides is the reverse in S_{N^1} reactions than what we observe in S_{N^2} reactions. Apart from that, there is inversion of configuration in case of alkyl halides when they participate in S_{N^2} reactions. on the other hand, partial or complete racemisation occurs in S_{N^1} reactions.

Q. An optically active halide when allowed to react with CN^-, gives a racemic mixture. the halide is most likely to be: primary

A. secondary

B. tertiary

C. none of these

D.

Answer: C

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3. In both alkyl halides and aryl halides, the halogen (X) atom is attached directly to the carbon atom. They are expected to exhibit similar reactivity. However, aryl halides are comparatively very little reactive, particularly towards nucleophilic substitution reaction. for example, hydrolysis of ethyl chloride occurs by simply boiling with aqueous KOH. ON the other hand, the alkaline hydrolysis of chlorobenzene requires a very high temperature (623K) as well as a very high pressure.

Q. Among the following which has weakest C-X bond?

A. Benzyl bromide

B. Bromobenzene

C. Vinyl bromide

D. Benzyl chloride.

Answer: A

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4. In both alkyl halides and aryl halides, the halogen (X) atom is attached directly to the carbon atom. They are expected to exhibit similar reactivity. However, aryl halides are comparatively very little reactive, particularly towards nucleophilic substitution reaction. for example, hydrolysis of ethyl chloride occurs by simply boiling with aqueous KOH. ON the other hand, the alkaline hydrolysis of chlorobenzene requires a very high temperature (623K) as well as a very high pressure.

Q. The halide which does not give any precipitate when warmed with alcoholic $AgNO_3$ solution is:

A. chlorobenzene

B. Benzyl chloride

C. Allyl chloride

D. Tert-butyl chloride.

Answer: A

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5. In both alkyl halides and aryl halides, the halogen (X) atom is attached directly to the carbon atom. They are expected to exhibit similar reactivity. However, aryl halides are comparatively very little reactive, particularly towards nucleophilic substitution reaction. for example, hydrolysis of ethyl chloride occurs by simply boiling with aqueous KOH. ON the other hand, the alkaline hydrolysis of chlorobenzene requires a very high temperature (623K) as well as a very high pressure.

Q. Benzene reacts with Cl_2 in the presence of $FeCl_3$ (and absence of sun light) to form:

A. Benzyl chloride

B. Benzyl chloride

C. Chlorobezene

D. Benzene hexachloride.

Answer: C

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6. In both alkyl halides and aryl halides, the halogen (X) atom is attached directly to the carbon atom. They are expected to exhibit similar reactivity. However, aryl halides are comparatively very little reactive, particularly towards nucleophilic substitution reaction. for example, hydrolysis of ethyl chloride occurs by simply boiling with aqueous KOH. ON the other hand, the alkaline hydrolysis of chlorobenzene requires a very high temperature (623K) as well as a very high pressure.

Q. Friedel Craft's reaction of bromobenzene with methyl iodide gives,

A. o-Bromotoluene

B. p-Bromotoluene

C. o-and p-Bromotoluene

D. m-Bromotoluene.

Answer: C

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7. The high reactivity of alkyl halides can be explained in terms of nature of $C-X$ bond which is a highly polarised covalent bond. This polarity is responsible for the nucleophilic substitution reaction of alkyl halides which jmostly occur by S_{N^1} and S_{N^2} mechanisms. S_{N^1} reaction is a two step process and in the first step $R-X$ ionises to give carbocation (slow process). IN the second step, the nucleophile attacks the carbocation from either side to form the product (fast process). IN S_{N^1} reaction, there can be racemization and inversion. S_{N^1} reaction is favoured by heavy (bulky) group on the carbon atom attached to halogens. IN S_{N^2} reaction, the strong nucleophile OH^- attacks fromt he opposite side

Of the halogen atom to give an intermediate (transition state), which breaks to yields to product (alcohol) and leaving group $\left(X^-\right)$. The alcohol has a configuratio opposite to that of the halide and is said to proceed with inversion of configuration. S_{N^2} reaction is favoured by small

groups on the carbon atom attached to halogen.

Q. Which among the following will not give S_{N^1} reaction?

A. $CH_3 - \underset{\underset{C_6H_5}{|}}{C}\ H - Br$

B. $(CH_3)_3C - Br$

C. $CH_3CH_2 - I$

D. $(C_6H_5)_2\ \underset{\underset{CH_3}{|}}{C}\ - Cl.$

Answer: C

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Q. Which one of the following compounds is most readily hydrolysed by S_{N^1} mechanism.?

A. $CH_3CH = CHCl$

B. $(C_6H_5)_3CCl$

C. $ClCH_2CH = CH_2$.

D.  .

Answer: B

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Q. The main product formed in the following reaction is :

$$CH_3-\underset{\underset{CH_3}{|}}{C}H-CH_2Br+CH_3CH_2O^- \xrightarrow{S_{N^1}}$$

A. $CH_3-\underset{\underset{CH_3}{|}}{C}H-CH_2OCH_2CH_3$

B. $CH_3-\underset{\underset{CH_3}{|}}{\overset{\overset{CH_3}{|}}{C}}-OCH_2CH_3$

C. $CH_3-\underset{\underset{CH_3}{|}}{C}H-CH_3OH$

D. $CH_3-\underset{\underset{CH_3}{|}}{\overset{\overset{CH_3}{|}}{C}}-OH$

Answer: A

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10. The high reactivity of alkyl halides can be explained in terms of nature of $C-X$ bond which is a highly polarised covalent bond. This polarity is responsible for the nucleophilic substitution reaction of alkyl halides which jmostly occur by S_{N^1} and S_{N^2} mechanisms. S_{N^1} reaction is a two step process and in the first step $R-X$ ionises to give carbocation

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Q. Which of the following is an example of S_{N^2} reaction?

A. $CH_3Br + OH^- \rightarrow CH_3OH + Br^-$

B. $CH_3CH_2OH \rightarrow CH_2 = CH_2$

C. $(CH_3)_2CHBr + OH^- \rightarrow (CH_3)_2CHOH + Br^-$

D. $(CH_3)_3CBr + OH^- \rightarrow (CH_3)_3COH + Br^-$.

Answer: A

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Straight Objective Type

1. In the addition of HBr to propene in the absence of peroxides, the first step involves the addition of:

A. H^+

B. Br^-

C. H^*

D. Br^*

Answer: A

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2. A compound which does not give iodoform test on treatment with alkale and iodine is

A. Ethanol

B. Acetone

C. Diethylketone

D. Isopropyl alcohol.

Answer: C

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3. The main product when n-butane reacts with Br_2 at $130^\circ C$ is:

A. $CH_3CH(Br) - CH_2CH_3$

B. $CH_3CH_2CH_2CH_2Br$

C. $(CH_3)_3CBr$

D. None of these

Answer: A

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4. The correct order of increasing dipole moment of the following compounds is :

A. $I < IV < II < III$

B. $IV < I < II < III$

C. $IV < I < III < II$

D. $IV < IILtI < III$

Answer: C

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5. The intermediate during the addition of HCl to propene in the presence of peroxide is:

A. $CH_3\overset{*}{C}HCH_2Cl$

B. $CH_3\overset{+}{C}HCH_3$

C. $CH_3CH_2\overset{*}{C}H_2$

D. $CH_3CH_2\overset{+}{C}H_2$.

Answer: C

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6. The number of possible enantiomeric pairs that can be produced during monochlorination of 2-methylbutane is:

A. 2

B. 3

C. 4

D. 1

Answer: A

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7. An equimolar mixture of toluene and chlorobenzene is treated with a mixture of conc. H_2SO_4 and conc. HNO_3. Indicate the correct statement from the following:

A. p-nitrotoluene is formed is excess

B. Equimolar amount of p-nitrotoluene and p-chloronitro benzene are formed.

C. p-chloronitrobenzene is formed in excess

D. m-chloronitrobenzene is formed in excess.

Answer: A

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8. Which among the following has the maximum nucleophilicity?

A. F^-

B. OH^-

C. CH_3^-

D. NH_2^-.

Answer: C

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9. The number of geometrical isomers for the compound with molecular formula $C_2BrClFI$ is

A. 3

B. 4

C. 5

D. 6

Answer: D

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10. In the presence of peroxide, hydrogen chloride and hydrogen iodide do not give Anti Markownikov's addition to alkenes because

A. both are highly ionic

B. one is oxidising and the other reducing

C. one of the steps is endothermic in both the cases

D. all the steps are exothermic in both the cases.

Answer: C

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11. Consider the following reaction

$$CH_3 - \underset{\underset{D}{|}}{CH} - \underset{\underset{CH_3}{|}}{C}\ H - CH_3 - \overset{*}{B}r \rightarrow \overset{*}{X} + HBr$$

The structure of $\overset{*}{X}$ is

A. $CH_3 - \underset{\underset{D}{|}}{CH} - \underset{\underset{CH_3}{|}}{C}\ H - \overset{*}{C}H_2$

B. $CH_3 - \underset{\underset{D}{|}}{CH} - \overset{*}{C} - \underset{\underset{CH_3}{|}}{CH_3}$

C. $CH_3 - \overset{*}{C} - \underset{\underset{D}{|}}{\underset{\underset{CH_3}{|}}{C}}\ H - CH_3$

D. $CH_3 - \overset{*}{C}H - \underset{\underset{CH_3}{|}}{C}\ H - CH_3.$

Answer: B

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12. Among the following molecules the one with highest dipole moment is:

A. CH_3Cl

B. CH_2Cl_2

C. $CHCl_3$

D. CCl_4

Answer: A

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13. 

The reagent for the above conversion is:

A. Alcoholic KOH

B. alcoholic KOH followed by $NaNH_2$

C. aqueous KOH followed by $NaNH_2$

D. $Zn/CH_3COOH.$

Answer: B

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14. The major product of the following reaction is:

A. 

B. 

C. 

D. 

Answer: A

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15. The synthesis of compound 3-octyne is achieved by adding a bromoalkane into a mixture of sodium amide and the alkyne. The bromoalkane and the alkyne are respectively.

A. $BrCH_2CH_2CH_2CH_2CH_3$ and $CH_3CH_2C \equiv CH$

B. $BrCH_2CH_2CH_3$ and $CH_3CH_2CH_2C \equiv CH$

C. $BrCH_2CH_2CH_2CH_2CH_3$ and $CH_3C \equiv CH$

D. $BrCH_2CH_2CH_2CH_3$ and $CH_3CH_2C \equiv CH$

Answer: D

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16. KI dissolved in acetone undergoes S_{N^2} reaction with each of P,Q,R and S. the reaction rates vary as:

A. $P > Q > R > S$

B. $S > P > R > Q$

C. $P > R > Q > S$

D. $R > P > S > Q$

Answer: B

View Text Solution

17. Aryl halids are less reactive rtowards nucleophilic substitution reactions than alkyl halides due to :

A. formation of less stable carbocation

B. resonance stabilisation

C. longer carbon-halogen bond

D. sp^2 hybridised carbon attached to halogen.

Answer: B::D

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18. The compound used as refrigerant are:

A. NH_3

B. CCl_4

C. CF_4

D. CF_2Cl_2

Answer: A::D

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19. Reagent which cannot be used to distinguish allyl bromide from n-propyl bromide are:

A. Br_2 / CCl_4

B. Shaking with an aqueous solution of $AgNO_3$

C. Boiling with alcoholic KOH solution followed by acidification wiith dilute HNO_3 and addition of $AgNO_3$ solution.

D. Fusion with sodium metal followed by acidification with dilute HNO_3 and addition of $AgNO_3$ solution.

Answer: C::D

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20. Benzyl chloride $(C_6H_5CH_2Cl)$ can be prepared from toluene by chlorination with:

A. SO_2Cl_2

B. $SOCl_2$

C. Cl_2

D. $NaOCl$

Answer: A::C

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21.

The correct statement(s) about the compound given below is (are):

A. the compound is optically active

B. the compound possesses centre of symmetry

C. the compoud possesses plane of symmetry

D. The compound possesses axis of symmetry.

Answer: A::D

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22.

Which of the given statement(s) about N,O,P and Q with respect to M is (are) correct?

A. M and N are non-mirror image stereoisomers

B. M and O are identical

C. M and P are enantiomers.

D. M and Q are identical.

Answer: A::B::C

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23. Compound(s) that on hydrogenation produce(s) optically inactive compound(s) is (are)

A. 

B. 

C. 

D. 

Answer: B::D

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24. Choose the correct statement(s) among the following:

A. 

are enantiomers

B. CH_3CHO on reaction with HCN gives racemic mixture.

C. $CH_3-\underset{\underset{OH}{|}}{\overset{\overset{C_2H_5}{|}}{C}}-H$ and $H-\underset{\underset{CH_3}{|}}{\overset{\overset{C_2H_5}{|}}{C}}-OH$ are enantiomers

D. $CH_3-CH=NOH$ shows geometrical isomerism.

Answer: B::D

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25. Among the following reaction(s) which gives (give) tert-butyl benzene as the major product(s)-

A. 

B. 

C. 

D. 

Answer: B::C::D

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26. The IUPAC naem(s) of the following compound is (are): 

A. 4-methylchlorobenzene

B. 4-chlorotoluene

C. 1-chloro-4-methylbenzene

D. 1-methyl-4-chlorobenzene.

Answer: B::C

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27. The correct statement(s) for the following addition reactions is (are):

A. (M and O) and (N and P) ar two pairs of enantiomers

B. Bromination proceeds through trans-addition in both the reaction

C. O and P are identical molecules.

D. (M and O) and (N and P) are two pairs of diastereomers.

Answer: B::D

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28. For the following compounds, the correct statement(s) with respect to nucleophilic substitution reaction is(are)

A. Compound IV undergoes inversion of configuration

B. The order of reactivity for I, III and IV is:

IVgtIgtIII

C. I and III follows S_{N1} mechanism

D. I and II follows S_{N2} mechanism

Answer: A::C::D

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Integer

1. What is the number of fluorine atoms in Freon-12?

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2. What is the number of lone pairs in chlorine atom in vinyl chloride?

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3. The number of chlorine atoms in C_2Cl_X is

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4. The number of structural isomers for the compound C_4H_9I are:

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5. How many stereoisomers are possible for 2-bromo-3-chlorobutane?

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6. A compound is formed by the substitution of two chlorine atoms by two hydrogen atoms in propane. What is the number of possible structure isomers.?

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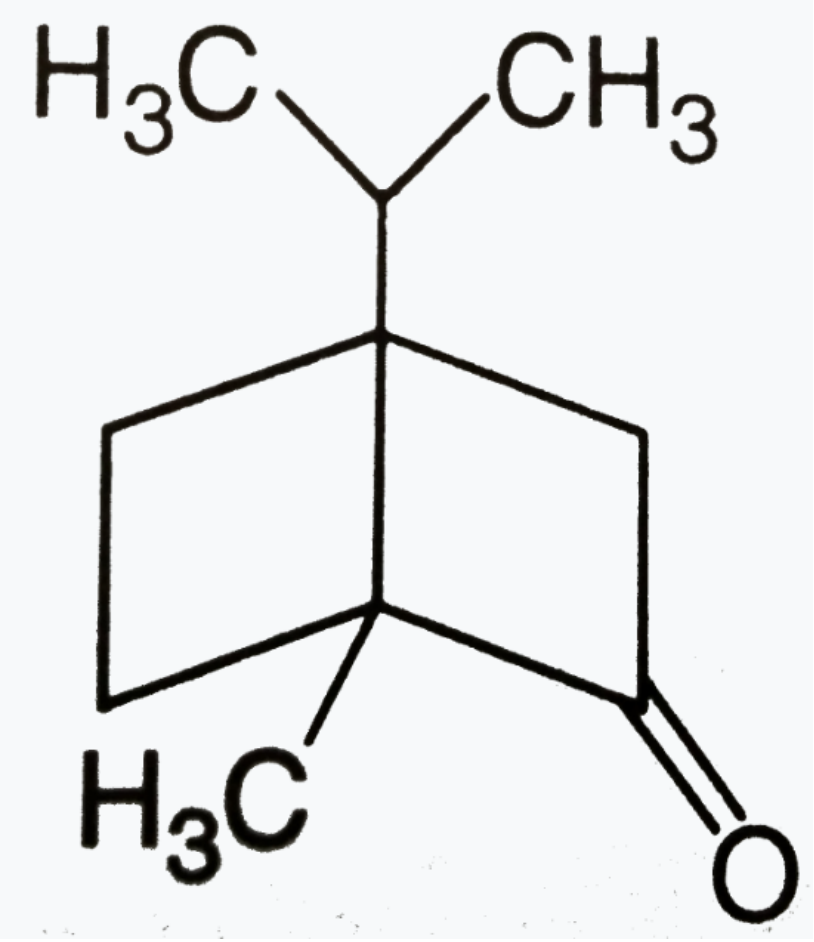
7. The total number of stereoisomers that can exist for M is:



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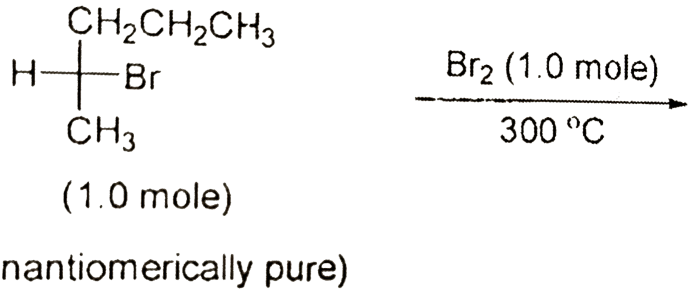
8. In the following monobromination reaction, the number of possible chiral products is



(1.0 mole)

(enantiomerically pure)

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9. In the following reaction, the number of substituted alcohols is:

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10. How many of the following alkyl halides would react by S_{N^1} mechanism?

$CH_3Br, CH_3CH_2Br, CH_3CH_2CH_2I, (CH_3)_3CBr, BrCH_3CH = CH_2, C$

.

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Matrix

1. List-I contians reaction and List-II contains major product.

 Match each reaction in List-I with one or more products in ListII and choose the correct option.

A. $P \to 1, 5, Q \to 2, R \to 3, S \to 4$

B. $P \to 1, 4, Q \to 2, R \to 4, S \to 3$

C. $P \to 1, 4, Q \to 1, 2, R \to 3, 4, S \to 4$

D. $P \to 4, 5, Q \to 4, R \to 4, S \to 3, 4$

Answer: B

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Brain Storming Multiple Choice Questions

1. 

is subjected to E_1 reaction, the expeceted product is:

A. 

B. 

C. 

D. 

Answer: C

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2. 

Main product of the following reactions is:

A. 

B. 

C. 

D. None of these

Answer: B

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3. In the given transformation

the reactant (A) is

A. 2,2-dichloropropane

B. 1,2-dichloropropane

C. 1,1-dichloropropane

D. 1,3-dichloropropane.

Answer: C

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4. An alkene with molecular formula C_6H_{14} reacts with chlorine in the presence of light and heat to give four isomeric mono chlorides of molecular formula $C_6H_{13}Cl$. The most probable structure for the starting alkane is:

A. $CH_3(CH_2)_4CH_3$

B. $(CH_3)_2CHCH_2CH_2CH_3$

C. $CH_3CH(CH_2CH_3)_2$

D. $(CH_3)_3CCH_2CH_3$.

Answer: A

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5. Which of the following phreases are not correvlty associated with S_{N^1} reaction ?

(I) Rearrangement is possible

(II) Rate si affected by polarity of solvent

(III) the strength of the nuclephile is important in determining rate

(IV) the reacityity series is tertiary gt secondary gt promany

(V) proceeds with complete inversion of configguation

A. 5 only

B. 3 only

C. 2,3,5

D. 3,5 only

Answer: C

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6. Rank the following species in order of decreasing nucleophilicity in a polar protic solvent $(\text{most} \rightarrow \quad \text{least nucleophilic})$:

$(I) CH_3CH_2CH_2O^-$ " " $(II) CH_3CH_2CH_2S^-$

$(III) \quad CH_3CH_2\overset{O}{\overset{||}{C}} - O^-$

A. $2 > 1 > 3$

B. $2 > 3 > 1$

C. $1 > 2 > 3$

D. $3 > 1 > 2$

Answer: D

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7. In the reaction

$$CH_3CH_2\underset{\underset{Br}{|}}{C}HCH_2CH = CH_2 \xrightarrow{\text{KOH(alc.)}} A$$

The product A is predominantly.

A. $CH_3CH_2CH = CHCH = CH_2$

B. $CH_3CH = CHCH_2CH = CH_2$

C. $CH_2 = CHCH_2CH_2CH = CH_2$

D. $CH_3CH_2CH_2CH_2C = CH.$

Answer: A

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8. In the reaction:

$(CH_3)_3CCH_2Cl \xrightarrow[\text{heat}]{AlCl_3} X$ X is mainly.

A. $CH_3CH_2\underset{\underset{Cl}{|}}{C}HCH_2CH_3$

B. $(CH_3)_2\underset{\underset{Cl}{|}}{C}HCH_2CH_3$

C. Both a and b

D. None of these

Answer: A

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9. Which one of the following compounds undergoes predominantly S_{N^2} reaction with aqueous NaOH in polar aerotic solvent?

A. 

B. 

C. 

D. 

Answer: B

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10. The reagents which help in introducing I atom in the benzene ring of aniline is

A. (i) $NaNO_2 / HCl$ (ii) Cu / HI

B. (i). $NaNO_2 / HCl$,(ii). CuI / Heat

C. (i) $NaNO_2 / HCl$, $(ii) KI / heat$

D. (i) KI, (Iii) H_3O^+

Answer: D

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11. 

(N is number of isomeric products) $\xrightarrow[\text{distillation}]{\text{Fractional}}$ (M is the number of isomeric products).

N and M are respectively.

A. 6,6

B. 6,4

C. 4,4

D. 7,3

Answer: C

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