10.HALOALKANES AND HALOARENES

Single Correct Answer Type

1. Among the following the one that gives positive iodoform test upon reaction with I_2 and NaOH is
   a) $CH_3CH_2CH(OH)CH_2CH_3$
   b) $C_6H_5\ CH_2\ CH_2OH$
   c) $H_3C-\underset{\displaystyle CH_3}{\underset{|}{CH}}-CH_2OH$
   d) $PhCHOHCH_3$
2. Vicinal and geminal dihalides can be distinguished by:
   a) $KOH(aq.)$ b) KOH(alc.) c) Zn dust d) None of these
3. An alkyl halide may be converted into an alcohol by:
   a) Addition b) Substitution c) Dehydrohalogenation d) Elimination
4. Dehydrohalogenation in haloalkanes produces:
   a) A single bond b) A double bond c) A triple bond d) Fragmentation
5. Chlorination of CS_2 gives:
   a) CCl_4 b) CS_2Cl_2 c) CH_4 d) $CHCl_3$
6. Methylene chloride on hydrolysis yields:
   a) HCHO b) CH_3CHO c) $CHCl_3$ d) CH_3COCl
7. The greater the ionic character of the carbon metal bond:
   a) The more reactive is the organometallic compound
   b) The less reactive is the organometallic compound
   c) Both are correct
   d) None of the above is correct
8. For the reaction,
   $C_2H_5OH + HX \xrightarrow{ZnX_2} C_2H_5X$, the order of reactivity is:
   a) $HI > HCl > HBr$ b) $HI > HBr > HCl$ c) $HCl > HBr > HI$ d) $HBr > HI > HCl$
9. The order of reactivities of methyl halides in the formation of Grignard reagent is
   a) $CH_3I > CH_3Br > CH_3Cl$ b) $CH_3Cl > CH_3Br > CH_3I$
   c) $CH_3Br > CH_3Cl > CH_3I$ d) $CH_3Br > CH_3I > CH_3Cl$
10. The antiseptic character of iodoform is due to:
    a) Its poisonous nature
    b) Unpleasant smell
    c) Liberation of free iodine
    d) None of the above
11. On treating a mixture of two alkyl halides with sodium metal in dry ether, 2-methyl propane was obtained. The alkyl halides are
    a) 2-chloropropane and chloromethane b) 2-chloropropane and chloroethane
    c) Chloromethane and chloroethane d) Chloromethane and 1-chloropropane
12. The IUPAC name of the compound, $(CH_3)_2CHCH_2CH_2Br$ is:
    a) 2-methyl-3-bromopropane
    b) 1-bromopentane
    c) 2-methyl-4-bromobutane
    d) 1-bromo-3-methylbutane
13. The given reaction is an example of,
    $C_2H_5Br + KCN(aq.) \longrightarrow C_2H_5CN + KBr$:
    a) Elimination
    b) Nucleophilic substitution

c) Electrophilic substitution
d) Redox change

14. Which one of the following compound reacts with chlorobenzene to produce DDT?
a) Acetaldehyde b) Nitrobenzene
c) *m*-chloroacetaldehyde d) Trichloroacetaldehyde

15. Preparation of alkyl halides in laboratory is least preferred by:
a) Halide exchange
b) Direct halogenation of alkanes
c) Treatment of alcohols
d) Addition of hydrogen halides to alkenes

16. Which one of the following pairs is the strongest pesticide?
a) Chloroform and benzene hexachloride b) DDT and 666
c) 666 and ether d) isocyanides and alcohol

17. Iodoform gives a precipitate with $AgNO_3$ on heating but chloroform does not because:
a) Iodoform is ionic
b) Chloroform is covalent
c) C—I bond in iodoform is weak and C—Cl bond in chloroform is strong
d) None of the above

18. Which reagent is useful in increasing the carbon chain of an alkyl halide?
a) HCN b) KCN c) NH_4CN d) AgCN

19. Chloroform on reaction with conc. HNO_3 gives an insecticide and war gas known as:
a) Chloropicrin b) Nitromethane c) Picric acid d) Acetylene

20. Aryl halides are less reactive towards electrophiles than alkyl halides due to:
a) Resonance
b) Stability of carbonium ions
c) High boiling point
d) None of the above

21. Carbon tetrachloride reacts with steam at 500°C to give:
a) $COCl_2$ b) $CHCl_3$ c) Both (a) and (b) d) None of these

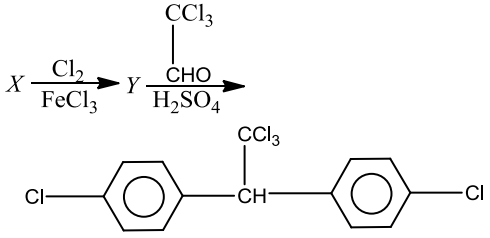
22. Chloroform on reaction with acetone yields:
a) Insecticide b) Hypnotic agent c) Analgesic d) Isocyanide

23. In Wurtz reaction alkyl halide reacts with
a) Sodium in ether b) Sodium in dry ether c) Sodium only d) Alkyl halide in ether

24. When iodoform is heated with silver powder it forms:
a) Acetylene b) Ethylene c) Methane d) Ethane

25. 1,3-dibromopropane reacts with metallic zinc to form:
a) Propene b) Cyclopropane c) Propane d) Hexane

26. In the reaction sequence



Compound 'X' is
a) Chlorobenzene b) Benzene c) Toluene d) Biphenyl methane

27. Which is used as a general anaesthetic in place of diethyl ether?
a) CF_3—$CHClBr$ b) CF_3—$CHCl_2$ c) CF_3—$CHBr_2$ d) None of these

28. Which of the following ketones will not respond to iodoform test?
a) Methyl isopropyl ketone b) Ethyl isopropyl ketone

c) Dimethyl ketone d) 2-hexanone

29. Propyl iodide and isopropyl iodide are:
a) Functional isomers b) Chain isomers c) Metamers d) Position isomers

30. $X + \text{KCN} \longrightarrow \text{CH}_3\text{CN} \xrightarrow{2\text{H}_2/\text{Ni}} \text{CH}_3\text{CH}_2\text{NH}_2$,
What is (X)?
a) $\text{CH}_3\text{CH}_2\text{Cl}$ b) CH_3Cl c) $\text{CH}_3\text{CH}_2\text{CH}_2\text{Cl}$ d) $(\text{CH}_3)_2\ \text{CHCl}$

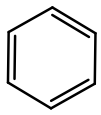
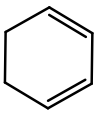
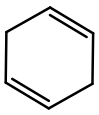
31. 2-chlorobutane obtained by chlorination of butane, will be:
a) *meso*-form b) Racemic form c) d-form d) l-form

32. Reaction of alkyl halides with aromatic compounds in presence of anhy. AlCl_3 is known as
a) Friedel-Craft's reaction b) Hofmann degradation
c) Kolbe's synthesis d) Beckmann rearrangement

33. Which of the following statements is incorrect regarding benzyl chloride?
a) It gives white precipitate with alcoholic AgNO_3
b) It is an aromatic compound with substitution in the side chain
c) It undergoes nucleophilic substitution reaction
d) It is less reactive than vinyl chloride

34. Which of the following compounds is not formed in iodoform reaction of acetone?
a) $\text{CH}_3\text{COCH}_2\text{I}$ b) $\text{ICH}_2\text{COCH}_2\text{I}$ c) $\text{CH}_3\text{COCHI}_2$ d) CH_3COCI_3

35. Of the isomeric hexanes, the isomers that give the minimum and maximum number of monochloro derivatives are respectively
a) 3-methylpentane and 2, 3-dimethylbutane b) 2, 3-dimethylbutane and n-hexane
c) 2, 2-dimethylbutane and 2-methylpentane d) 2, 3-dimethylbutane and 2-methypentane

36. 1, 2-dibromo cyclohexane on dehydrogenation gives
a)  b)  c)  d) None of these

37. Ethyl ortho formate is formed by heating ..... with sodium ethoxide.
a) CHCl_3 b) $\text{C}_2\text{H}_5\text{OH}$ c) HCOOH d) CH_3CHO

38. Chloroform is kept in dark coloured bottles because:
a) It is inflammable
b) It gives a peroxide
c) It undergoes rapid chlorination
d) It is oxidized to poisonous phosgene

39. Which of the following will not respond to iodoform test?
a) Ethyl alcohol b) Propanol-2 c) Propanol-1 d) Ethanal

40. At higher temperature, iodoform reaction is given by:
a) $\text{CH}_3\text{COOCH}_3$ b) $\text{CH}_3\text{COOC}_2\text{H}_5$ c) $\text{C}_6\text{H}_5\text{COOCH}_3$ d) $\text{CH}_3\text{COOC}_6\text{H}_5$

41. Molecular formula of chloropicrin is
a) CHCl_3NO_2 b) CCl_3NO_3 c) CCl_2NO_2 d) CCl_3NO_2

42. Which one of the following is not true for the hydrolysis of t-butyl bromide with aqueous NaOH?
a) Reaction occurs through the S_N1 mechanism.
b) The intermediate formed is a carbocation.
c) Rate of the reaction doubles when the concentration of alkali is doubled.
d) Rate of the reaction doubles when the concentration of t-butyl bromide is doubled.

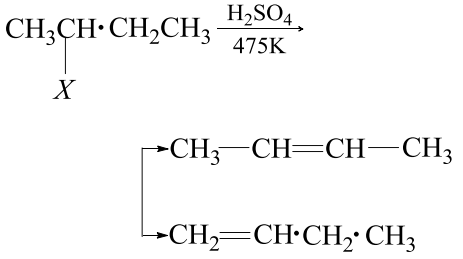
43. CHCl_3 reacts with conc. HNO_3 to give
a) CCl_3NO_2 b) CH_3NO_2 c) CH_3CN d) $\text{CH}_3\text{CH}_2\text{NO}_2$

44. The correct order of melting and boiling points of the primary (1°), secondary(2°) and tertiary (3°) alkyl halides is:
a) $P > S > T$ b) $T > S > P$ c) $S > T > P$ d) $T > P > S$

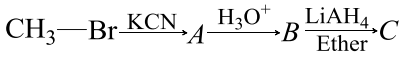
45. Ethyl alcohol gives ethyl chloride on treatment with:

a) NaCl b) $SOCl_2$ c) Cl_2 d) KCl

46. 20% aqueous solution of sodium chloride containing ethyl alcohol on electrolysis gives:
    a) Ethyl chloride b) Chloral c) Acetaldehyde d) Chloroform
47. Which of the following statements about benzyl chloride is incorrect?
    a) It is less reactive than alkyl halides
    b) It can be oxidised to benzaldehyde by boiling with copper nitrate solution
    c) It is a lachrymatory liquid and answers Beilstein's test
    d) It gives a white precipitate with alcoholic silver nitrate
48. The S_N1 reactivity of ethyl chloride is:
    a) More or less equal to that of benzyl chloride
    b) Less than that of benzyl chloride
    c) More or less equal to that of chlorobenzene
    d) Less than that of chlorobenzene
49. Which of the following will not give iodoform test?
    a) Isopropyl alcohol
    b) Ethanol
    c) Ethanal
    d) Benzyl alcohol
50. Elimination of HBr from 2-bromobutane results in the formation of:
    a) Equimolar mixture of 1- and 2- butene
    b) Predominantly 2-butene
    c) Predominantly 1- butene
    d) Predominantly 2-butyne
51. 1,2-dibromoethane is added to prevent deposition of lead metal in :
    a) Water pipes
    b) Petrol engines
    c) Electric heaters
    d) Metal working lathe machines
52. For the reaction,



    a) CH_3 —CH=CH— CH_3 predominates
    b) CH_2=CH—CH_2—CH_3 predominates
    c) Both are formed in equal amounts
    d) The product ratio is dependent on the halogen X
53. Grignard reagent is prepared by the reaction between:
    a) Zinc and alkyl halide
    b) Magnesium and alkyl halide
    c) Magnesium and alkane
    d) Magnesium and aromatic hydrocarbon
54. In the following swquence of reactions

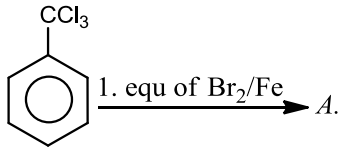


    the end product (C) is:
    a) Acetaldehyde b) Ethyl alcohol c) Acetone d) Methane
55. The IUPAC name of the compound,

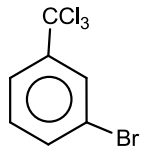
$CH_3COCH(Cl)—CH(Br)COOH$ is:

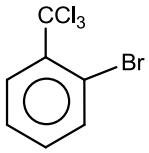
a) 2-bromo-3-chloro-4-oxopentanoic acid
b) 3-chloro-2-bromo-4-oxopentanoic acid
c) 4-carboxybromo-3-chloro-2-butanone
d) None of the above

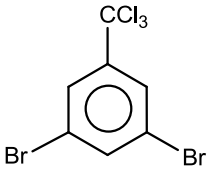
56. Which of the following is primary halide?
a) Isopropyl halide b) Sec-butyl halide c) Tert-butyl halide d) Neo-hexyl chloride

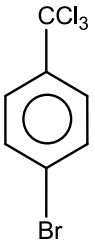
57. 

Compound *A* is

a) 

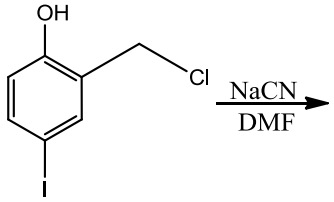
b) 

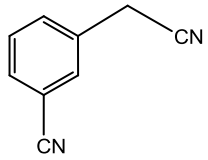
c) 

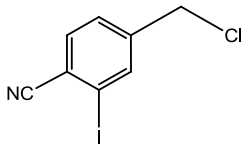
d) 

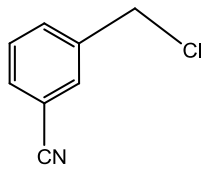
58. Which of the following do not form Grignard reagent?
a) CH_3F b) CH_3Cl c) CH_3Br d) CH_3I

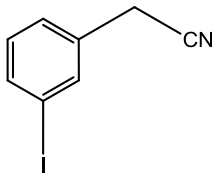
59. The structure of the major product formed in the following reaction is



a) 

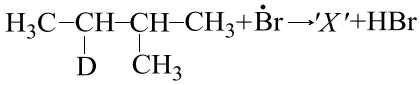
b) 

c) 

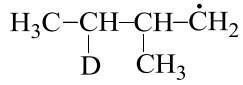
d) 

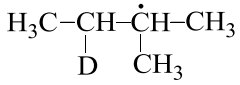
60. Butane nitrile may be prepared by heating:
a) Propyl alcohol with KCN
b) Butyl alcohol with KCN
c) Butyl chloride with KCN
d) Propyl chloride with KCN

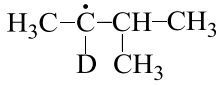
61. Consider the following reaction,

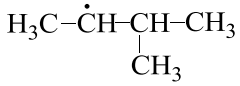


Identify the structure of the major product '*X*':

a) 

b) 

c) 

d) 

62. A mixture of 1-chloropropane and 2-chloropropane when treated with alcoholic KOH, it gives:
    a) 1-propene
    b) 2-propene
    c) Isopropylene
    d) A mixture of 1-propene and 2-propene
63. In Wurtz reaction of alkyl halides with sodium, the reactivity order of these halides is:
    a) $RI > RBr > RCl$ b) $RCl > RBr > RI$ c) $RBr > RI > RCl$ d) None of these
64. A mixture of sodium acetate and sodalime is heated and the product treated with excess of chlorine in presence of bright sunlight. The product is:
    a) CH_3COOH b) $CH_2BrCOOH$ c) CCl_4 d) CH_3Cl
65. 1-chlorobutane on reaction with alcoholic KOH gives:
    a) 1-butene b) 1-butanol c) 2-butene d) 2-butanol
66. Which halide does not get hydrolysed by sodium hydroxide?
    a) Vinyl chloride b) Methyl Chloride c) Ethyl chloride d) Isopropyl chloride
67. Iodoform test is not given by
    a) 2-pentanone b) Ethanol c) Ethanal d) 3-pentanone
68. The alkyl halides that can be made by free radical halogenation of alkanes are
    a) RCl and RBr but not RF *or* RI b) RF, RCl and RBr but not RI
    c) RF, RCl, RBr, RI d) RF, RCI *and* RI but not RBr
69. Non-sticking frying pans are coated with:
    a) Ethylene
    b) Styrene
    c) Tetrafluoroethylene (Teflon)
    d) Chlorofluoro methane
70. Ethyl chloride on heating with AgCN forms a compound *X*. The functional isomer of X is
    a) C_2H_5NC b) $C_2H_5NH_2$ c) C_2H_5CN d) None of these
71. Chlorine is most reactive towards NaOH in:
    a) CH_3Cl b) $CH_2{=}CHCl$ c) C_6H_5Cl d) $C_6H_5CH_2Cl$
72. The chemical formula of 'tear gas' is
    a) $COCl_2$ b) CO_2 c) Cl_2 d) CCl_3NO_2
73. The order of polarity of CH_3I, CH_3Br and CH_3Cl molecules follows the order:
    a) $CH_3Br > CH_3Cl > CH_3I$
    b) $CH_3I > CH_3Br > CH_3Cl$
    c) $CH_3Cl > CH_3Br > CH_3I$
    d) $CH_3Cl > CH_3I > CH_3Br$
74. Chloroform gives a trichloro derivative of an alcohol on reaction with
    a) conc. nitric acid b) aq. alkali
    c) acetone and alkali d) a primary amine and an alkali
75. In order to convert aniline into chlorobenzene the reagent used is
    a) $NaNO_2/HCl, CuCl$ b) Cl_2/CCl_4 c) $Cl_2/AlCl_3$ d) $CuCl_2$
76. Number of monochloro derivatives obtained when *neo* $-$pentane is chlorinated, is
    a) One b) Two c) Three d) Four
77. Which of the following will not form a yellow precipitate on heating with an alkaline solution of iodine?

a) $CH_3\ CH(OH)CH_3$ b) $CH_3\ CH_2CH(OH)CH_3$ c) CH_3OH d) $CH_3\ CH_2OH$

78. $CaOCl_2 + H_2O \rightarrow Ca(OH)_2 + X$
$X + CH_3CHO \rightarrow Y$
$Y + Ca(OH)_2 \rightarrow CHCl_3$.
What is 'Y'?
a) $CH_3CH(OH)_2$ b) CH_2Cl_2 c) CCl_3CHO d) CCl_3COCH_3

79. Reaction of *trans*-2-phenyl-1-bromocyclopentane on reaction with alcoholic KOH produces
a) 4-phenylcyclopentene b) 2-phenylcyclopentene
c) 1-phenylcyclopentene d) 3-phenylcyclopentene

80. In order to get ethanethiol from C_2H_5Br, the reagent used is:
a) Na_2S b) NaHS c) KCNS d) K_2S

81. Solvent used in dry-cleaning of clothes is:
a) Alcohol b) Acetone c) Carbon tetrachloride d) freon

82. Correct order of reactivity for halides is:
a) Vinyl chloride > allyl chloride > propyl chloride
b) Propyl chloride > vinyl chloride > allyl chloride
c) Allyl chloride > propyl chloride > vinyl chloride
d) None of the above

83. The substance employed as tear gas is:
a) Westron b) Chloropicrin c) Chloretone d) None of these

84. One of the following that cannot undergo dehydrohalogenation is
a) *iso*-propyl bromide b) ethanol c) Ethyl bromide d) None of the above

85. The starting material for the preparation of CHI_3 is:
a) C_2H_5OH b) CH_3OH c) C_2H_5CHO d) HCHO

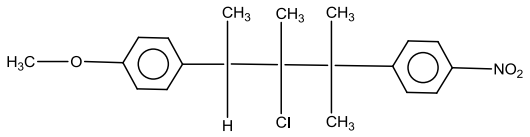
86. Optically active compound is:
a) 2-chloropropane b) 2-chlorobutane c) 3-chloropentane d) None of these

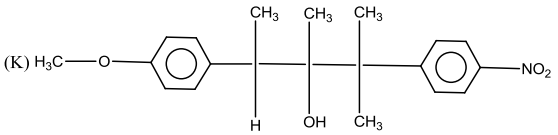
87. CCl_4 is insoluble in water because:
a) Water is non-polar
b) CCl_4 is non-polar
c) Water and CCl_4 are polar
d) None of the above

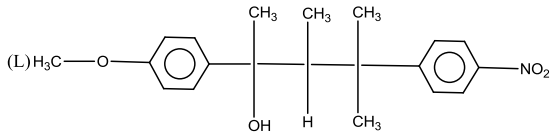
88. Which one is most reactive towards S_N1 reactions?
a) $C_6H_5CH(C_6H_5)Br$ b) $C_6H_5CH(CH_3)Br$ c) $C_6H_5C(CH_3)(C_6H_5)Br$ d) $C_6H_5CH_2Br$

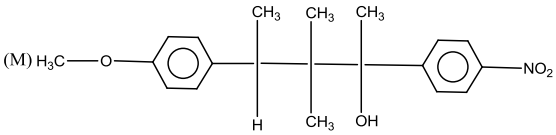
89. Which of the following applies in the reaction,
$CH_3CHBrCH_2CH_3 \xrightarrow{\text{Alc.KOH}}$
(i)$CH_3CH = CHCH_3$ (major product)
(ii) $CH_2 = CHCH_2CH_3$ (minor product)
a) Markownikoff's rule b) Saytzeff's rule c) Kharasch effect d) Hofmann's rule

90. The following compound on hydrolysis in aqueous acetone will give









a) Mixture of (K) and (L)
b) Mixture of (K) and (M)
c) Only (M)
d) Only (K)

91. The metal used for the de-bromination reaction of 1, 2-dibromoethane.
a) Na
b) Zn
c) Mg
d) Li

92. Reaction of *t*-butyl bromide with sodium methoxide produces
a) Isobutane
b) Isobutylene
c) Sodium *t*-butoxide
d) *t*-butylmethyl ether

93. $CH_3Br + KCN(alc.) \rightarrow X \xrightarrow[Na+C_2H_5OH]{Reduction} Y$

What is Y in the series?
a) CH_3CN
b) C_2H_5CN
c) $C_2H_5NH_2$
d) CH_3NH_2

94. If methyl iodide and ethyl iodide are mixed in equal proportions, and the mixture is treated with metallic sodium in presence of dry ether, the number of possible products formed is:
a) 2
b) 3
c) 1
d) 4

95. An alkyl iodide on standing darkens, due to:
a) Hydrolysis
b) Conversion into ether
c) Liberation of iodine
d) Formation of alkanes

96. Xcompound reacts with Na to give $CH_3\ CH_2\ CH_2\ CH_3$, then compound $X$is
a) $CH_3\ CH_2OH$
b) $CH_3\ CH_2 - Cl$
c) $CH_3 - CH_3$
d) $CH_3CH_2CH_2CH_2\ OH$

97. Maximum number of molecules of CH_3I that can react with a molecule of CH_3NH_2 are
a) 3
b) 4
c) 2
d) 1

98. The CCl_4 and $CHCl_3$ can be distinguished by the action of:
a) RNH_2 + KOH alc.
b) RCN + KOH alc.
c) Hydrolysis
d) Burning in air

99. Alkyl halides reacts with dialkyl lithium cuprate to give:
    a) Alkenes b) Alkyl Cu halide c) Alkanes d) Alkenyl halide
100. Which responds to the iodoform test?
    a) Butanol b) Butan-1-al c) Butanone-2 d) 3-pentanone
101. In the reaction sequence,
    $C_2H_5Cl + KCN \xrightarrow{C_2H_5OH} X \xrightarrow[\Delta]{H_3O^{\oplus}} Y$
    What is the molecular formula of Y?
    a) $C_3H_6O_2$ b) C_3H_5N c) $C_2H_4O_2$ d) C_2H_6O
102. Which one of the following forms propane nitrile as the major product?
    a) Ethyl bromide + alcoholic KCN b) Propyl bromide + alcoholic KCN
    c) Propyl bromide + alcoholic AgCN d) Ethyl bromide + alcoholic AgCN
103. The compound A forms B with sodium metal and again A forms C with PCl_5, but B and C form diethyl ether. Therefore A, B and C are:
    a) $C_2H_5OH, C_2H_5ONa, C_2H_5$ b) $C_2H_5OH, C_2H_5Cl, C_2H_5O$ c) $C_2H_5OH, C_2H_5Cl, C_2H_4Cl$ d) $C_2H_5OH, C_2H_5Cl, C_2H_5O$
104. For the carbylamine reaction we need hot alcoholic KOH and:
    a) Any amine and chloroform
    b) Chloroform and silver powder
    c) A primary amine and an alkyl halide
    d) Any monoalkyl amine and trichloro methane
105. Ethyl bromide reacts with lead-sodium alloy to form:
    a) Tetraethyl lead b) Tetraethyl bromide c) Both (a) and (b) d) None of these
106. The number of possible enantiomeric pairs that can be produced during mono-chlorination of 2-methyl butane is
    a) 3 b) 4 c) 1 d) 2
107. Alkyl halides on treatment with a suspension of Ag_2O moist in ether gives:
    a) Alkanol b) Alkanal c) Alkanes d) Alkoxy alkane
108. The conversion of ethyl chloride into diethyl ether takes place by
    a) Williamson's synthesis b) Perkin's reaction
    c) Wurtz reaction d) Grignard reaction
109. Which process does not occur during formation of $CHCl_3$ from C_2H_5OH and bleaching powder?
    a) Hydrolysis b) Oxidation c) Elimination d) Chlorination
110. Which of the following does not answer iodoform test?
    a) n-butyl alcohol b) Acetophenone c) Acetaldehyde d) Ethylmethyl ketone
111. Methyl bromide is not used:
    a) As an insecticide
    b) As disinfectant
    c) For dyeing clothes
    d) As disinfectant for young fruit trees
112. Which compound on reaction with ethyl magnesium bromide and water will form 2-methyl-2-butanol?
    a) CH_3COCH_3 b) CH_3COOCH_3 c) CH_3CH_2CHO d) $C_2H_5COCH_3$
113. Alkyl halides are less soluble in water because
    a) they ionise in water b) they do not form H-bonds with water
    c) they are highly viscous d) they have very strong $C-X$ bond
114. Hexachloroethane is also called
    a) Artificial sweetner b) Artificial camphor c) Artificial polymer d) None of these
115. Isobutyl magnesium bromide with dry ether and absolute alcohol gives:
    a) $CH_3 \cdot \underset{\displaystyle CH_3}{\underset{|}{CH}} \cdot CH_2OH \cdot$ and $CH_3 \cdot CH_2MgBr$

b) $CH_3{\cdot}CH{\cdot}CH_2{\cdot}CH_2{\cdot}CH_3$ and $Mg(OH)Br$ (with CH_3 branch)

c) $CH_3-CH(CH_3)-CH_3$, $CH_2=CH_2$ and $Mg(OH)Br$

d) $CH_3-CH(CH_3)-CH_3$ and CH_3CH_2OMgBr

116. Strong reducing agent converts $CHCl_3$ into:
a) C_2H_2 b) C_2H_6 c) C_2H_4 d) CH_4

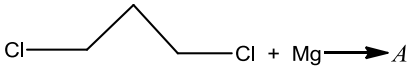
117. Which of the following are arranged in decreasing order of dipole moment:
a) CH_3Cl, CH_3Br, CH_3F b) CH_3Cl, CH_3F, CH_3Br c) CH_3Br, CH_3Cl, CH_3F d) CH_3Br, CH_3F, CH_3Cl

118. Fluorobenzene (C_6H_5F) can be synthesised in the laboratory
a) By heating phenol with HF and KF
b) From aniline by diazotisation followed by heating the diazonium salt with HBF_4
c) By direct fluorination of benzene with F_2 gas
d) By reacting bromobenzene with NaF solution

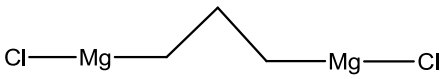
119. 1-chlorobutane on reaction with alcoholic potash gives
a) but-1-ene b) butan-1-ol c) but-2-ene d) butan-2-ol

120. On warming with silver powder, chloroform is converted into
a) Acetylene b) Hexachloroethane
c) 1, 1, 2, 2-tetrachloroethane d) Ethylene

121. What is the product *A* in the following?



a) 

b) 

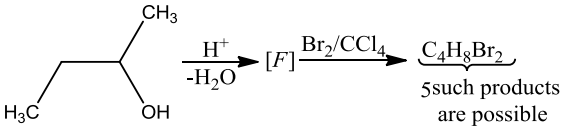
c) Both (a) and (b) d) None of the above

122. Identify (Z) in the following reaction series,

$C_2H_5I \xrightarrow[KOH]{\text{Alcoholic}} (X) \xrightarrow{Br_2} (Y) \xrightarrow{KCN} (Z)$:

a) $CH_3—CH_2—CN$ b) $CH_2(CN)-CH_2(CN)$ c) $CH_2(Br)-CH_2(CN)$ d) $CH(Br)=CH(CN)$

123. How many structures of *F* is possible?



a) 2 b) 5 c) 6 d) 3

124. PVC plastics are produced by the polymerization of:
a) Vinyl acetate b) Allyl chloride c) Vinyl chloride d) Ethene

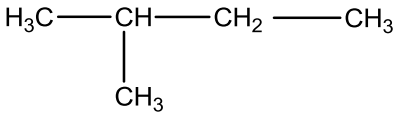
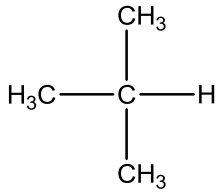
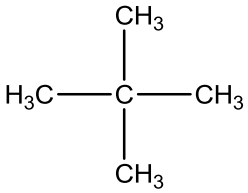
125. Ethylene dichloride can be prepared by the reaction of HCl and :
a) Ethane b) Ethylene c) Acetylene d) Ethylene glycol

126. Polymer of chloroethylene is:
a) PVC b) Teflon c) Nylon d) Terylene

127. Most readily hydrolysed halides is:
a) C_6H_5Cl b) $(C_6H_5)_2CHCl$ c) $C_6H_5CH_2Cl$ d) $(C_6H_5)_3CCl$

128. What is the product of the reaction of 1, 3-butadiene with Br_2?
a) 1, 4-dibromo butene b) 1, 2- dibromo butene
c) 3, 4- dibromo butene d) 2, 3- dibromo-2-butene

129. Chlorobenzene gives aniline with
a) NH_3/Cu_20 b) NH_3/H_2SO_4 c) $NaNH_2$ d) None of the above

130. In the following compound, least number of monochlorination is possible
a) $CH_3CH_2CH_2CH_2CH_3$ b) 
c)  d) 

131. 2, 2-dichloro propane on hydrolysis yields
a) Acetone b) 2, 2-propane diol
c) Isopropyl alcohol d) Acetaldehyde

132. The product of vinyl chloride and HCl is a
a) *gem* chloride b) Ethylidene chloride
c) 1, 1 dichloroethane d) All of the above are correct

133. Among the following, the molecule with the highest dipole moment is:
a) CH_3Cl b) CH_2Cl_2 c) $CHCl_3$ d) CCl_4

134. CO_2 on reaction with C_2H_5MgBr and H_2O gives:
a) Ethane b) Propionic acid c) Acetic acid d) None of these

135. Methyl chloride reacts with silver acetate to yield:
a) Acetic acid b) Methyl acetate c) Acetyl chloride d) Acetaldehyde

136. A compound *A* of formula $C_3H_6Cl_2$ on reaction with alkali can give *B* of formula C_3H_6O or *C* of formula C_3H_4. *B* on oxidation gave a compound of the formula $C_3H_6O_2$. *C* with dilute H_2SO_4 containing H_g^{2+} ion gave *D* of formula C_3H_6O, which with bromine and NaOH gave the sodium salt of $C_2H_4O_2$. Then *A* is:
a) $CH_3CH_2CHCl_2$
b) $CH_3CCl_2CH_3$
c) $CH_2ClCH_2CH_2Cl$
d) $CH_3CHClCH_2Cl$

137. Compounds formed, when methyl amine is heated with chloroform in the presence of KOH is:
a) CH_3—C≡N b) $CH_3N^+{\equiv}C^-$ c) CH_3— $N^-{\equiv}C^+$ d) CH_3NHCH_3

138. Tertiary butyl alcohol gives tertiary butyl chloride on treatment with
a) Conc. HCl/anhy. $ZnCl_2$ b) KCN c) NaOCl d) Cl_2

139. The reaction of toluene with Cl_2 in presence of $FeCl_3$ gives predominantly
a) Benzoyl chloride b) Benzyl chloride
c) *o*-and *p*-chlorotoluene d) *m*-chlorotoluene

140. Which one of the following compounds when heated with KOH and a primary amine gives carbylamine test?
a) $CHCl_3$ b) CH_3Cl c) CH_3OH d) CH_3CN

141. In the following reaction:
$C_6H_5CH_2Br \xrightarrow[2.H_3O^+]{1.\ Mg/ether} X$; the product '*X*' is :
a) $C_6H_5CH_2OCH_2C_6H_5$ b) $C_6H_5CH_2OH$ c) $C_6H_5CH_3$ d) $C_6H_5CH_2CH_2C_6H_5$

142. For a given alkyl group, the densities/b. p./m. p. are in the order:
a) $RI < RBr < RCl$ b) $RI < RCl < RBr$ c) $RBr < RI < RCl$ d) $RCl < RBr < RI$

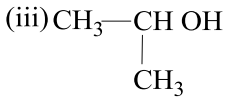
143. Carbylamine test is performed by heating alc. KOH with:
a) $CHCl_3$ and Ag
b) Trihalogenated methane and primary amine

c) CH_3Cl and $C_2H_5NH_2$
d) RCN and RNH_2

144. Which of these compounds is synthesised by chloral?
a) DDT b) BHC c) Chloroform d) Michlers ketones

145. Iodoform can be prepared from all except:
a) Isopropyl alcohol b) 3-methyl -2-butanone c) Isobutyl alcohol d) Ethyl methyl ketone

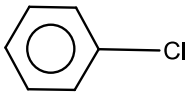
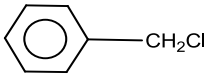
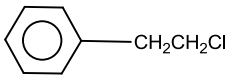
146. When vinyl chloride is passed through alcoholic KOH solution:
a) It dissolves b) It forms vinyl alcohol c) It forms acetylene d) It has no action

147. Following compounds are given:
(i) CH_3CH_2OH (ii) CH_3COCH_3
(iii)  (iv) CH_3OH
Which of the above compound(s), on being warmed with iodine solution and NaOH, will give iodoform?
a) (i),(iii) and (iv) b) Only (ii) c) (i), (ii) and (iii) d) (i) and (ii)

148. DDT is obtained by the reaction of chlorobenzene with
a) Chloral b) Chloroform c) Dichloromethane d) Acetaldehyde

149. The reaction products of the reaction between $C_6H_5NH_2$, $CHCl_3$ and KOH are:
a) $C_6H_5NC + KCl$
b) $C_6H_5OH + NH_4Cl + H_2O$
c) $C_6H_5Cl + NH_4Cl + KCl$
d) $C_6H_5CN + KCl$

150. In the reaction,
$CH_3C \equiv \bar{C}\ Na^+ + (CH_3)_2CHCl \longrightarrow$
the product formed is:
a) 4-methyl-2-pentyne b) Propyne c) Propyne and propene d) None of these

151. Which one of the following chlorohydrocarbons readily undergoes solvolysis?
a) $CH_2 = CHCl$ b) 
c)  d) 

152. Grignard reagent with hydrogen cyanide gives:
a) Aldehyde b) Ketone c) Both (a) and (b) d) None of these

153. What happens if CCl_4 is treated with $AgNO_3$?
a) A white ppt. of AgCl will form b) NO_2 will be evolved
c) CCl_4 will dissolve in $AgNO_3$ d) Nothing will happen

154. Among the following which one has weakest carbon-halogen bond?
a) Benzyl bromide b) Bromobenzene c) Vinyl bromide d) Benzyl chloride

155. Of the five isomeric hexanes, the isomer which can give two monochlorinated compounds is
a) 2-methylpentane b) 2,2-dimethylbutane c) 2, 3-dimethylbutane d) *n*-hexane

156. Which of the following compounds gives trichloromethane on distilling with bleaching powder?
a) Methanal b) Phenol c) Ethanol d) Methanol

157. Sodium ethoxide reacts with ethyl iodide to yield:
a) CH_3CH_3 b) $C_2H_5OCH_3$ c) $C_2H_5OC_2H_5$ d) None of these

158. $CH_3Br + KCN\ (alc.) \rightarrow X \xrightarrow[Na/C_2H_5OH]{Reduction} Y$, what is Y in the series?
a) CH_3CN b) C_2H_5CN c) $C_2H_5NH_2$ d) CH_3NH_2

159. Identify A and B in the following reactions
$A \xrightarrow[\Delta]{Aq.NaOH} C_2H_5OH \xleftarrow{AgOH} B$
a) $A = C_2H_2, B = C_2H_6$ b) $A = C_2H_5Cl, B = C_2H_4$

c) $A = C_2H_4, B = C_2H_5Cl$ d) $A = C_2H_5Cl, B = C_2H_5Cl$

160. The reagent used in the conversion of 1-butanol to 1-bromobutane is:
a) $CHBr_3$ b) Br_2 c) CH_3Br d) $P + Br_2$

161. *t*-butyl chloride preferably undergo hydrolysis by
a) S_N1 mechanism
b) S_N2 mechanism
c) Any of (a) and (b)
d) None of the above

162. Which statement is wrong about chloroform?
a) Chloroform is used as anaesthetic
b) Chloroform has distorted tetrahedral shape
c) Chloroform is used as a solvent
d) Chloroform has sp^2-hybridised carbon atom

163. When CCl_4 is boiled with KOH, the product formed is:
a) Formic acid b) Methyl alcohol c) Formaldehyde d) Carbon dioxide

164. Which set of reagents will produce freon(CCl_2F_2) ?
a) $C + F_2 + Cl_2 \longrightarrow$ b) $CH_3Cl + F_2 \longrightarrow$ c) $CCl_4 + HF \xrightarrow{SbCl_5}$ d) $CCl_4 + F_2 \longrightarrow$

165. Which of the following will not give positive iodoform test?
a) $CH_3CH_2CHOHCH_3$ b) $CH_3CH_2CH_2COCH_3$ c) $CH_3CH_2COCH_2CH_3$ d) $CH_3COC_6H_5$

166. Which of the following does not react with benzene in presence of anhydrous $AlCl_3$?
a) C_6H_5Cl b) $C_6H_5CH_2Cl$ c) CH_3Cl d) $C_6H_5CH_2CH_2CH_2Cl$

167. Iodoform is obtained when ethanol is heatd with
a) KI and aq. KOH b) I_2 and aq. KOH c) I_2/aq. KI d) HI and HIO_3

168. *n*-propyl bromide reacts with ethanolic KOH to form:
a) Propane b) Propene c) Propyne d) Propyl alcohol

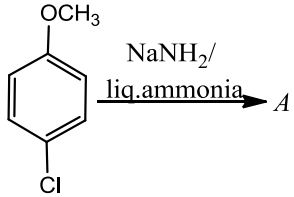
169. Which of the following statements regarding the S_N1 reaction shown by alkyl halide is not correct?
a) The added nucleophile plays no kinetic role in S_N1 reaction.
b) The S_N1 reaction involves the inversion of configuration of the optically active substrate.
c) The S_N1 reaction on the chiral starting material ends up with racemization of the product.
d) The more stable the carbocation intermediate the faster the S_N1 reaction.

170. Pick up the correct statement about alkyl halides:
a) They show H-bonding.
b) They are soluble in water.
c) They are soluble in organic solvents.
d) They do not contain any polar bond.

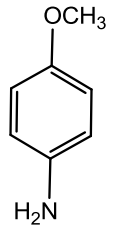
171. The product of reaction between alcoholic silver nitrite with ethyl bromide is
a) Ethene b) Ethane c) Ethyl nitrile d) Nitro ethane

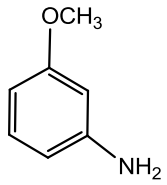
172. 1-phenyl, 2-chloropropane on treating with alc. KOH gives mainly:
a) 1-phenylpropene
b) 2-phenylpropene
c) 1-phenylpropan-2-ol
d) 1-phenylpropan-1-ol

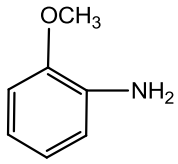
173. In the reaction,

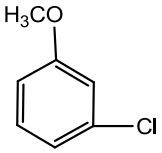


The major product *A* is

a) 

b) 

c) 

d) 

174. $(CH_3)_3CMgCl$ on reaction with D_2O gives:
a) $(CH_3)_3CD$ b) $(CH_3)_3OD$ c) $(CD_3)_3CD$ d) $(CD_3)_3OD$

175. Grignard reagent shows addition on:
a) $>C=O$ b) $-C\equiv N$ c) $>C=S$ d) All of these

176. When tetrahydrafuran is treated with excess HI, the product formed is
a) 1, 4-diiodobutane b) 1, 4-butanediol
c) 2-iodotetrahydrofuran d) 4-iodo-1-butanol

177. Lodoform can be used in medicine as:
a) Anaesthetic b) Antiseptic c) Analgesic d) Antifebrin

178. A mixture of two organic compounds was treated with sodium metal in ether solution. Isobutane was obtained as a product. The two chlorine compounds are:
a) Methyl chloride and propyl chloride
b) Methyl chloride and ethyl chloride
c) Isopropyl chloride and methyl chloride
d) Isopropyl chloride and ethyl chloride

179. Wurtz's reaction involves the reduction of alkyl halide with
a) Zn/HCl b) HI c) Zn/Cu couple d) Na in ether

180. In the following sequences of reactions;
$CH_3CH_2CH_2Br \xrightarrow{KOH(alc.)} (A) \xrightarrow{HBr}$
$(B) \xrightarrow{KOH(aq.)} (C)$ the end product (C) is :
a) Propene
b) Propyne
c) Propan-l-ol
d) Propan-2-ol

181. When $CHCl_3$ is boiled with NaOH, it gives
a) Formic acid b) Trihydroxy methane
c) Acetylene d) Sodium formate

182. Which of the following compounds has the highest boiling point ?
a) $CH_3\ CH_2CH_2Cl$ b) $CH_3CH_2CH_2CH_2Cl$
c) $CH_3CH(CH_3)CH_2Cl$ d) $(CH_3)_3\ CCl$

183. Which one is liquid at room temperature?
a) CH_3Cl b) C_2H_5Cl c) CH_3Br d) C_2H_5Br

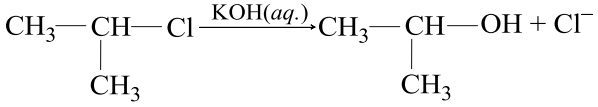
184. The organic chloro compound, which shows complete stereochemical inversion during an S_N2 reaction is
a) $(C_2H_5)_2\ CHCl$ b) $(CH_3)_3CCl$ c) $(CH_3)_2\ CHCl$ d) CH_3Cl

185. The best method for the conversion of an alcohol into an alkyl chloride is by treating the alcohol with
a) PCl_3 b) PCl_5
c) $SOCl_2$ in presence of pyridine d) dry HCl in the presence of anhydrous $ZnCl_2$

186. Which compound is used in cooling?
a) $CHCl_3$ b) CCl_4 c) CF_4 d) CCl_2F_2

187. Which is finally produced when acetylene reacts with HCl?
a) $CH_2=CHCl$ b) CH_3CHCl_2 c) $ClCH=CHCl$ d) None of these

188. The reaction,



shows:

a) Reduction
b) Oxidation
c) Neutralisation
d) Nucleophilic substitution

189. Which of the following alkyl halide is used as methylating agent?
a) C_2H_5Cl b) C_2H_5Br c) C_2H_5I d) CH_3I

190. The products of reaction of alcoholic silver nitrite with ethyl bromide are:
a) Ethane b) Ethene c) Ethyl alcohol d) Nitroethane

191. Which is most reactive for S_N2 reactions?
a) CH_3I b) C_2H_5I c) C_3H_7I d) C_4H_9I

192. The product obtained on treatment of ethyl chloride with potassium cyanide is reduced by sodium and alcohol to give:
a) Propyl amine b) Ethyl amine c) Diethyl amine d) Acetic acid

193. The molecular formula of the chlorinated acetone formed in the distillation of acetone with bleaching powder is:
a) CH_3COCl b) CCl_2OCl_3 c) $CH_2ClCOOH$ d) CCl_3COCH_3

194. Compound 'A' reacts with alcoholic KOH to yield compound 'B' which on ozonolysis followed by reaction with Zn/H_2O gives methanal and propanal. Compound 'A' is
a) 1-propanol b) 1-butanol c) 1-chlorobutane d) 1-chloropentane

195. Phenol is heated with $CHCl_3$ and alcoholic KOH when salicylaldehyde is produced. The reaction is known as:
a) Rosenmund's reaction
b) Reimer-Tiemann reaction
c) Friedel-Craft's reaction
d) Sommelet reaction

196. Which of the following can be used as local anaesthetic?
a) $CHCl_3$ b) C_2H_4 with O_2 c) C_2H_5Cl d) C_2H_5OH

197. Which of the following is not inflammable?
a) $CHCl_3$ b) Benzene
c) Toluene d) Carbon tetrachloride

198. Which of the following does not answer iodoform test?
a) *N*-butyl alcohol b) *Sec*-butyl alcohol c) Acetophenone d) Acetaldehyde

199. Grignard reagent is not prepared in aqueous medium but prepared in either medium, because
a) the reagent is highly reactive in ether b) the reagent does not react with water
c) the reagent becomes inactive in water d) the reagent reacts with water

200. The reaction in which phenol differs from alcohol is
a) It undergoes esterification with carboxylic acid b) It reacts with ammonia
c) It forms yellow crystals of iodoform d) It liberates H_2 with Na metal

201. Which compound is used as helminthicide for elimination of hook worms?
a) CH_4 b) $CHCl_3$ c) $C_2H_2Cl_4$ d) CCl_4

202. In the preparation of chlorobenzene from aniline, the most suitable reagent is
a) Chlorine in the presence of ultraviolet light b) Chlorine in the presence of $AlCl_3$
c) Nitrous acid followed by heating with Cu_2Cl_2 d) HCl and Cu_2Cl_2

203. Methyl magnesium iodide on treatment with D_2O furnishes a hydrocarbon, alongwith Mg(OD)I. The hydrocarbon is:
a) CH_3D b) CH_3CH_2D c) CH_4 d) None of these

204. A Grignard reagent is prepared by reacting magnesium with:

a) Methyl amine b) Diethyl ether c) Ethyl iodide d) Ethyl alcohol

205. Identify *A* and *B* in the following reaction

$C_2H_5Cl \xrightarrow{A} C_2H_5OH \xleftarrow{B} C_2H_5Cl$

a) *A*= aqueous KOH; *B*= AgOH b) *A*= alcoholic KOH/ Δ; *B*=aqueous NaOH

c) *A*= aqueous NaOH; *B*= $AgNO_2$ d) $A = AgNO_2$; $B = KNO_2$

206. A yellow precipitate is obtained when aqueous $AgNO_3$ is added to a solution of the compound:

a) CCl_3CHO b) CHI_3 c) $CHCl_3$ d) $C_6H_5CH_2Cl$

207. Which statement is correct?

a) C_2H_5Br reacts with alcoholic KOH to form C_2H_5OH

b) C_2H_5Br when treated with metallic sodium gives ethane

c) C_2H_5Br when treated with sodium ethoxide forms diethyl ether

d) C_2H_5Br with AgCN forms ethyl cyanide

208. Phosgene is a common name for:

a) CO_2 and PH_3 b) Phosphoryl chloride c) Carbonyl chloride d) Carbon tetrachloride

209. The alkyl halide which does not give white precipitate with alcoholic $AgNO_3$ solution is:

a) Ethyl chloride b) Allyl chloride c) Isopropyl chloride d) Vinyl chloride

210. An alkyl halide reacts with equivalent amount of NH_3 to give:

a) Amide b) Cyanide c) Amine d) None of these

211. The combination which produces *t*-butyl alcohol when treated with Grignard reagent:

a) $CH_3MgBr + CH_3COCH_3$

b) $C_2H_5MgBr + CH_3COCH_3$

c) $CH_3MgBr + (CH_3)_2CHOH$

d) $CH_3MgBr + (CH_3)_3COH$

212. Methyl chloride on treatment with potassium cyanide followed by hydrolysis yields:

a) HCOOH b) CH_3COOH c) CH_3CN d) CH_3COOK

213. 9.65 C of electric current is passed through fused anhydrous magnesium chloride. The magnesium metal thus, obtained is completely converted into a Grignard reagent. The number of moles of the Grignard reagent obtained is

a) 5×10^{-4} b) 1×10^{-4} c) 5×10^{-5} d) 1×10^{-5}

214. A bromoalkane 'X' reacts with magnesium in dry ether to form compound 'Y'. The reaction of 'Y' with methanal followed by hydrolysis yield an alcohol having molecular formula $C_4H_{10}O$. The compound 'X' is

a) Bromoethane b) Bromomethane c) 1-bromopropane d) 2-bromopropane

215. $C_2H_5Br \xrightarrow{KCN} (A) \xrightarrow{\text{Hydrolysis}} (B)$

The compound (B) in above reaction is:

a) Ethylene chloride b) Acetic acid c) Propionic acid d) Ethyl cyanide

216. A salt solution is treated with chloroform drops and is shaken with chlorine water. Chloroform layer becomes violet, solution contains:

a) NO_2^- b) NO_3^- c) Br^- d) I^-

217. Which of the following is least reactive in a nucleophilic substitution reaction?

a) $(CH_3)_3CCl$ b) $CH_2{=}CHCl$ c) CH_3CH_2Cl d) $CH_2{=}CHCH_2Cl$

218. Ethylidine dichloride (CH_3CHCl_2) can be prepared by the addition of hydrogen chloride on:

a) C_2H_6 b) C_2H_4 c) C_2H_2 d) All of these

219. Which of the following statements is true?

a) Allyl chloride is more reactive than vinyl chloride

b) Vinyl chloride is as reactive as allyl chloride

c) Vinyl chloride is more reactive than allyl chloride

d) Both of them are more reactive than chlorobenzene

220. An alkyl halide (RX) reacts with Na to from 4, 5-diethyloctane. Compound RX is

a) $CH_3\ (CH_2)_3\ Br$ b) $CH_3\ (CH_2)_2\ CH(Br)CH_2CH_3$

c) $CH_3\ (CH_2)_3\ CH(Br)CH_3$ d) $CH_3(CH_2)_5\ Br$

221. PCl_5 reacts with propanone, to give:
a) Gem dichloride b) Vic dichloride c) Propanal d) Propane chloride

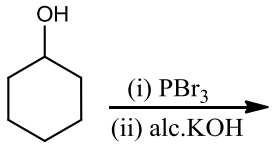
222. Which is not present in Grignard reagent?
a) Carboxylic radical represented by COOH
b) Magnesium represented by Mg
c) Alkyl radical represented by R
d) Halide radical represented by X

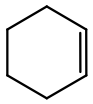
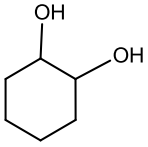
223. Alkyl iodide reacts with NaCN to give alkyl cyanide and small amount of alkyl isocyanide. Formation of these two products is due to the
a) ionic character of NaCN b) nucleophilic character of CN^-
c) ambidentate character of CN^- d) Electrophilic character of CN^-

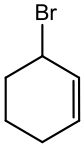
224. Which of the following gives iodoform test?
a) $CH_3 - CH_2\ (OH)$
b) C_2H_5CHO
c) $(CH_2OH)_2$
d) None of the above

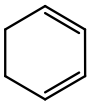
225. C_2H_5 Br can be obtained in the laboratory by the action of ethyl alcohol with:
a) KBr b) NH_4Br c) Br_2 d) KBr and conc. H_2SO_4

226. Predict the product,



a) 
b) 

c) 

d) 

227. Trichloro acetone reacts with lime water to form:
a) CH_3CHO b) $CHCl_3$ c) CH_3Cl d) CH_3OH

228. When 32.25 g of ethyl chloride is subjected to dehydrohalogenation reaction the yield of the alkene formed is 50%. The mass of the product formed is (atomic mass of chlorine is 35.5)
a) 14 g b) 28 g c) 64.5 g d) 7 g

229. Which one of the following possess highest m.pt. ?
a) Chlorobenzene b) *o*-dichlorobenzene c) *m*- dichlorobenzene d) *p*- dichlorobenzene

230. Which of the compounds when brominated turns to *meso* 2, 3-dibromobutane?
a) *Cis*-2-butene b) *Iso*-butane c) Butane d) *Trans*-2-butene

231. Iodoform can be obtained on warming NaOH and iodine with
a) $CH_3 - CH_2 - CH(OH)CH_3$
b) $(CH_3)_2CH - \overset{\overset{O}{\|}}{C} - C_2H_5$
c) $CH_3 - \overset{\overset{O}{\|}}{C} - OCH_3$
d) $(CH_3)_3\ CCH_2OH$

232. 1-chlorobutane on reaction with alcoholic potash gives
a) 1-butene b) 1-butanol c) 2-butene d) 2-butanol

233. S_N1 reaction is favoured by:
a) Non-polar solvents
b) More no. of alkyl group on the carbon atom attached to the halogen atom
c) Small groups on the carbon attached to the halogen atom
d) None of the above

234. What mass of isobutylene is obtained from 37 g of tertiary butyl alcohol by heating with 20% H_2SO_4 at

363 K, if the yield is 65%?

a) 16 g b) 18.2 g c) 20 g d) 22 g

235. Tertiary alkyl halides are practically inert to substitution by S_N2 mechanism because of

a) Steric hindrance b) Inductive effect c) Instability d) Insolubility

236. Identify the set of reagents/reaction conditions 'X' and 'Y' in the following set of transformations:

$CH_3CH_2CH_2Br \xrightarrow{'X'} \text{Product} \xrightarrow{'Y'} (CH_3)_2\ CHBr$

a) $X=$ dilute NaOH $aq.$; 20°C
$Y=$ HBr/acetic acid; 20°C

b) $X=$conc., alc. NaOH; 80°C
$Y=$ HBr/acetic acid; 20°C

c) $X=$ dilute aqueous NaOH; 20°C
$Y=$ $Br_2/CHCl_3$; 0°C

d) $X=$ conc., alc. NaOH; 80°C
$Y=$$Br_2/CHCl_3$; 0°C

237. In the dichlorination reaction of propane, mixture of products are obtained. How many isomers the mixture contains?

a) 2 b) 3 c) 4 d) 5

238. The number of stereoisomers of compound

$CH_3—CH=CH—CHBr—CH_3$ would be:

a) 3 b) 6 c) 2 d) 4

239. The industrial preparation of chloroform employs acetone and:

a) Sodium chloride b) Chlorine gas c) Calcium hypochlorite d) Phosgene

240. $RX + A \rightarrow RNC$

A is

a) AgCN b) KCN c) NaCN d) HCN

241. On mixing a certain alkane with chlorine and irradiating it with ultraviolet light, it forms only one monochloroalkane.

a) Propane b) Pentane c) Iso-pentane d) Neo-pentane

242. Formation of alkane by the action of Zn on alkyl halide is called:

a) Wurtz reaction b) Kolbe's reaction c) Cannizzaro's reaction d) Frankland's reaction

243. Chloretone used as a drug is prepared by the reaction of acetone with:

a) Chlorine b) Ethyl chloride c) Chloroform d) Ethylene dichloride

244. Which is gem dihalide?

a) $CH_3 \cdot CHBr_2$ b) $CH_2Br \cdot CH_2Br$ c) $CH_3 \cdot CHBr \cdot CH_2Br$ d) None of these

245. Which of the following is a Grignard reagent?

a) Ammoniacal solution of $AgNO_3$

b) Ethereal solution of C_2H_5MgCl

c) Alcoholic solution of KOH

d) Aqueous solution of caustic soda

246. The product formed on reaction of ethyl alcohol with bleaching powder is

a) $CHCl_3$ b) CCl_3CHO c) CH_3COCH_3 d) CH_3CHO

247. Chloral is:

a) CCl_3CHO b) $CCl_3 \cdot CO \cdot CH_3$ c) $CCl_3 \cdot CO \cdot CCl_3$ d) $CCl_3 \cdot CH_2OH$

248. Which of the following compounds undergo E_2 reactions more easily?

a) $(CH_3)_2\ C \cdot CH_2CH_3$
|
Br

b) $CH_3(CH_2)_2CH_2Cl$

c) $CH_3(CH_2)_2CH_2I$

d) I

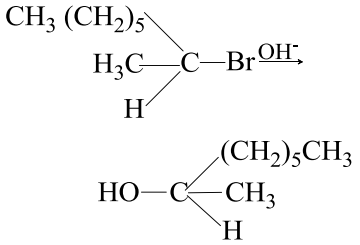
$(CH_3)_2$— C— CH_2CH_3

249. Decomposition of benzene diazonium chloride by using Cu_2Cl_2/HCl to form chlorobenzene is
a) Raschig's reaction b) Sandmeyer's reaction
c) Kolbe's reaction d) Cannizaro's reaction

250. Isobutyl chloride and butyl chloride are:
a) Position isomers b) Chain isomers c) Functional isomers d) Metamers

251. $CH_3Br + Nu^- \rightarrow CH_3 - Nu + Br^-$
The decreasing order of the rate of the above reaction with nucleophiles (Nu^-) A to D is [$Nu^- =$ $(A)PhO^-, (B)AcO^-, (C)HO^-, (D)CH_3O^-$]
a) $D > C > A < B$ b) $D > C > B > A$ c) $A > B > C > D$ d) $B > D > C > A$

252. The reaction described below is:



a) S_E1 b) S_N2 c) S_N1 d) S_E2

253. Identify 'Z' in the following reaction series,

$CH_3{\cdot}CH_2CH_3Br \xrightarrow{aq.NaOH} (X) \xrightarrow[Heat]{Al_2O_3} (Y) \xrightarrow{HOCl} (Z)$:

Mixture of

a) $CH_3-\underset{Cl}{\underset{|}{CH}}-\underset{Cl}{\underset{|}{CH_2}}$ and $CH_3-\underset{OH}{\underset{|}{CH}}-\underset{Cl}{\underset{|}{CH_2}}$

b) $CH_3-\underset{OH}{\underset{|}{CH}}-\underset{Cl}{\underset{|}{CH_2}}$

c) $CH_3-\underset{Cl}{\underset{|}{CH}}-\underset{OH}{\underset{|}{CH_2}}$

d) $CH_3-\underset{Cl}{\underset{|}{CH}}-\underset{Cl}{\underset{|}{CH_2}}$

254. Which of the following when heated with KOH and primary amine gives carbylamine test?
a) $CHCl_3$ b) CH_2Cl_2 c) CH_3OH d) CCl_4

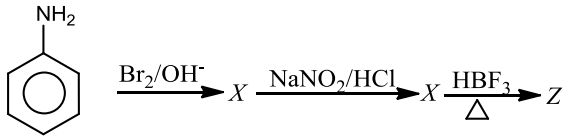
255. The reagent used for dehalogenation of 1,2-dichloropropane is:
a) Zn dust b) Zn—Hg c) Na d) Zn—Cu couple

256. CH_3NH_2 reacts with CH_3MgX to give:
a) Acetone b) Alcohol c) Methane d) Ethane

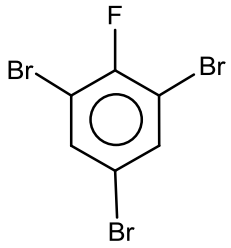
257. Which of the following haloalkanes is most reactive?
a) 1-chloropropane b) 1-bromopropane c) 2-chloropropane d) 2-bromopropane

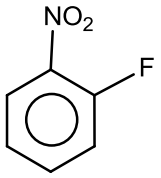
258. Iodoform is formed when ethanol is heated with:
a) Potassium iodide and sodium hydroxide
b) Iodine and aqueous potassium hydroxide
c) Chloroform and iodine
d) Iodine and potassium iodide

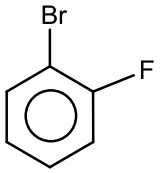
259. Tertiary alkyl halides are practically inert to S_N2 mechanism because of:
a) Insolubility b) Instability c) Inductive effect d) Steric hinderance

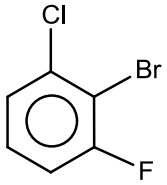
260. 

The final product, is

a) 

b) 

c) 

d) 

261. Carbon tetrachloride on treatment with Fe/H_2O gives:
a) Chloromethane b) Methane c) Chloroform d) Methylene chloride

262. Which group is displaced by a halogen group?
a) Hydroxyl (OH) group
b) Aldehyde (—CHO) group
c) Nitro ($—NO_2$) group
d) Keto (C=O) group

263. A small amount of alcohol is usually added to $CHCl_3$ bottles because:
a) It retards the anaesthetic property of $CHCl_3$
b) It retards the oxidation of $CHCl_3$ to phosgene
c) It converts any phosgene formed to harmless ethyl carbonate
d) Both (b) and (c)

264. Which one is correct?
a) Freon-14 is CF_4; Freon-13 is CF_3Cl;Freon-12 is $CF_2Cl_2$and Freon-11 is $CFCl_3$
b) Freons are chlorofluorocarbons
c) Freons are used as refrigerants
d) All of the above

265. The reactivity order of alkyl halides depends upon:
a) Nature of alkyl group only
b) Nature of halogen atom only
c) Nature of both alkyl group and halogen atom
d) None of the above

266. *p*-nitrobromobenzene can be converted to *p*-nitroaniline by using $NaNH_2$. The reaction proceeds through the intermediate named
a) Carbocation b) Carbanion c) Benzyne d) Dianion

267. Reagent not used to prepare an alkyl halide from an alcohol is:
a) $HCl + ZnCl_2$ b) NaCl c) PCl_5 d) $SOCl_2$

268. The catalyst used in the preparation of an alkyl chloride by the action of dry HCl on an alcohol is
a) anhy. $AlCl_3$ b) $FeCl_3$ c) anhy. $ZnCl_2$ d) Cu

269. Following is the substitution reaction in which –CN replaces –Cl.

$$R - Cl + KCN \xrightarrow[\text{alcoholic}]{\Delta} R - CN + KCl$$

To obtain propanenitrile, R – Cl should be
a) Chloroethane b) 1-chloropropane c) Chloromethane d) 2-chloropropane

270. $CH_3Br + O\overline{H} \rightarrow CH_3OH + Br^-$ reaction proceeds by S_N2 mechanism. Its rate is dependent on the concentration of
a) $CH_3Br, O\overline{H}$ b) CH_3Br only c) $O\overline{H}$ only d) CH_3Br, CH_3OH

271. If chloroform is left open in air in presence of sun-rays:
a) Explosion takes place

b) Poisonous phosgene gas is formed
c) Polymerization takes place
d) No reaction takes place

272. Westrosol is:
a) Acetylene tetrachloride
b) Acetylene dichloride
c) Trichloroethyne
d) 1,1,2-trichloroethene

273. The compound formed on heating chlorobenzene with chloral in the presence of concentrated sulphuric acid is
a) Gammexane b) DDT c) Freon d) Hexachloroethane

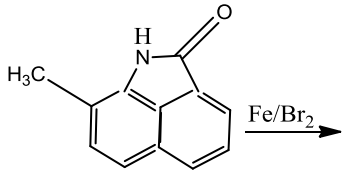
274. The C—Mg bond in CH_3CH_2MgBr is:
a) Ionic b) Non-polar covalent c) Polar covalent d) Hydrogen

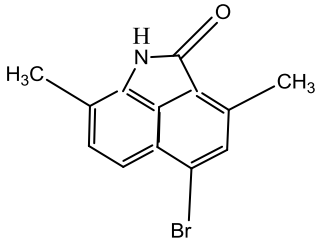
275. In S_N1 reaction, the first step involves the formation of:
a) Free radical b) Carbanion c) Carbocation d) Final product

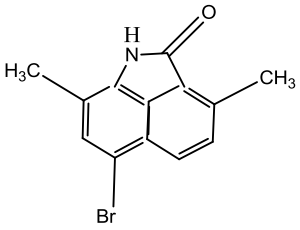
276. The alkyl group of Grignard reagent acts as:
a) Free radical b) Carbonium ion c) Carbanion d) None of these

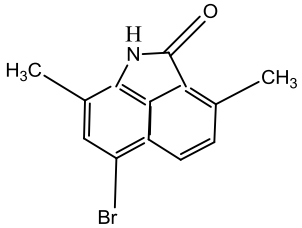
277. Methyl ketone is identified by
a) Iodoform test b) Fehling solution c) Tollen's reagent d) Schiff's reagent

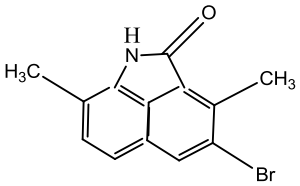
278. Product on monobromination of this compound is



a) 

b) 

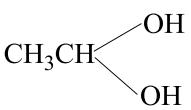
c) 

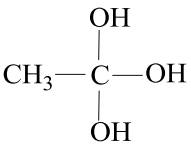
d) 

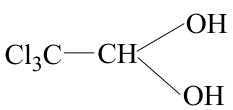
279. Which of the following is added to chloroform to slow down its aerial oxidation in presence of light?
a) Carbonyl chloride b) Ethyl alcohol c) Sodium hydroxide d) Nitric acid

280. When a solution of $AgNO_3$ is added to pure CCl_4:
a) A pale yellow precipitate is formed
b) Curdy white precipitate is formed
c) No precipitate is formed
d) None of the above

281. A compound containing two —OH groups attached with one carbon atom is unstable but which one of the following is stable?

a) 

b) 

c) 

d) None of these

282. Westron is:

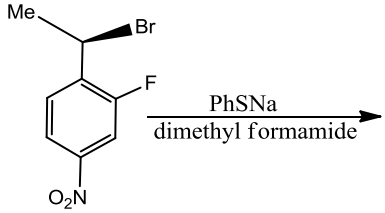
a) $CHCl{=}CHCl$ b) $CHCl_2 \cdot CHCl_2$ c) $CH_2Cl{-}CH_2Cl$ d) None of these

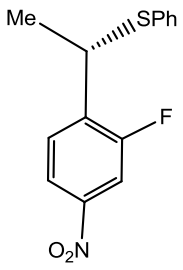
283. Monohalogen derivative of alkanes with alcoholic KOH gives:
   a) Alkane
   b) Alkene
   c) Alkyne
   d) Alicyclic hydrocarbon

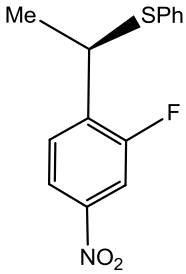
284. The reaction $R\text{Cl} + \text{NaI} \xrightarrow{\text{Acetone}} R - \text{I} + \text{NaCl}$ is known as:
   a) Wurtz reaction b) Fittig reaction c) Frankland's reaction d) Finkelstein's reaction

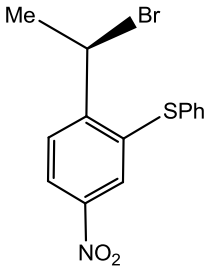
285. The hydrogen atom in chloroform is:
   a) Acidic b) Basic c) Neutral d) None of these

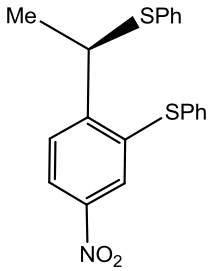
286. The major product of the following reaction is



a) 

b) 

c) 

d) 

287. Ethyl bromide and isopropyl chloride can be distinguished by:
   a) Alcoholic $AgNO_3$
   b) Comparing their colours
   c) Burning the compound on spatula
   d) Aqueous KOH solution

288. In the following sequence of reactions
   $C_2H_5Br \xrightarrow{AgCN} X \xrightarrow{\text{Reduction}} Y$; Y is
   a) *n*-propyl amine b) Isopropylamine c) Ethylamine d) ethylmethyl amine

289. Which alkyl halide is preferentially hydrolysed by S_N1 mechanism?
   a) CH_3Cl b) CH_3CH_2Cl c) $CH_3CH_2CH_2Cl$ d) $(CH_3)_2C \cdot Cl$

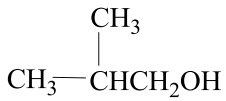
290. Treatment of ammonia with excess of ethyl chloride will yield:
   a) Diethyl amine
   b) Ethane
   c) Tetraethyl ammonium chloride
   d) Methyl amine

291. In a group of isomeric alkyl halides, the order of boiling points is
   a) primary < secondary < tertiary b) primary > secondary < tertiary
   c) primary < secondary > tertiary d) primary > secondary > tertiary

292. Ethylene dichloride and ethylidene chloride are isomeric compounds. Identify the statement which is not applicable to both of them?
   a) React with alcoholic potash
   b) React with aqueous potash and give the same products
   c) Are dihalides
   d) Answer Beilstein's test

293. The Mg—Br bond in CH_3CH_2MgBr is:
   a) Ionic b) Non-polar c) Covalent d) None of these

294. Chloroform is slowly oxidised by air in the presence of light and air to form
a) Formyl chloride b) Trichloro methanol c) Phosgene d) Formaldehyde

295. Among the following the one that gives positive iodoform test upon reaction with I_2 and NaOH is:
a) $CH_3CH_2CH(OH)CH_2CH_3$
b) $C_6H_5CH_2CH_2OH$
c) 
d) $PhCHOHCH_3$

296. 2-bromopentane is heated with potassium ethoxide in ethanol. The major product is:
a) *trans*-pent-2-ene b) 2-ethoxy pentane c) pent-1-ene d) *cis*-pent-2-ene

297. Bottles containing C_6H_5I and $C_6H_5CH_2I$ lost their original labels. They were labelled *A* and *B* for testing. *A* and *B* were separately taken in a test tube and boiled with NaOH solution. The end solution in each tube was made acidic with dilute HNO_3 and then some $AgNO_3$ solution was added. Substance *B* gave a yellow precipitate. Which one of the following statements is true for this experiment?
a) *A* was C_6H_5I b) *A* was $C_6H_5CH_2I$
c) *B* was C_6H_5I d) Addition of HNO_3 was unnecessary

298. $2CHCl_3 + O_2 \xrightarrow{X} 2COCl_2 + 2HCl$
In the above reaction *X* stands for:
a) An oxidant b) A reductant c) Light and air d) None of these

299. Identify the product (A) in following reaction series,
$CH_3CN \xrightarrow{Na/C_2H_5OH} (X) \xrightarrow{HNO_2} (Y) \xrightarrow{[O]}$
$(Z) \xrightarrow[\text{reagent}]{\text{Tollen's}} (A)$:
a) CH_3CHO b) CH_3CONH_2 c) CH_3COOH d) $CH_3—CH_2—NHOH$

300. Isocyanide test is used to detect:
a) Primary alcohols b) Primary amines c) Secondary amines d) Secondary alcohols

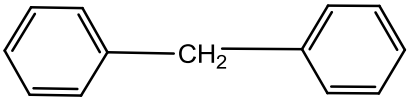
301. Which would be obtained by boiling $CHCl_3$ with caustic soda?
a) CH_3COONa b) $HCOONa$ c) $Na_2C_2O_4$ d) CH_3OH

302. In the following sequences of reactions:
$CH_3CH_2CH_2I \xrightarrow{KOH(alc.)} (A) \xrightarrow{Br_2} (B) \xrightarrow{NaNH_2/NH_3} (C)$
the end product (C) is:
a) Alkene b) Alkanol c) Alkyne d) Alkyl amine

303. Which of the following compound give yellow precipitate with I_2 and NaOH?
a) CH_3OH b) $CH_3CH_2CH_2OH$ c) $C_2H_5OC_2H_5$ d) CH_3CH_2OH

304. In the reaction of phenol with $CHCl_3$ and aqueous NaOH at 70°C, the electrophile attacking the ring is:
a) $CHCl_3$ b) $CHCl_2$ c) CCl_2 d) $COCl_2$

305. The product formed in the reaction of H*X* with $(CH_3)_2C{=}CH_2$ is:
a) $(CH_3)_2CXCH_3$ b) $(CH_3)_2CH \cdot CH_2X$ c) $(CH_3)_2CHCH_3$ d) $(CH_3)_2CXCH_2X$

306. The molecular formula of diphenyl methane is

is $C_{13}H_{12}$
How many structural isomers are possible when one of the hydrogen is replaced by a chlorine atom?
a) 6 b) 4 c) 8 d) 7

307. For the preparation of *p*-nitroiodobenzene from *p*-nitroaniline, the best method is
a) $NaNO_2/HCl$ followed by KI b) $NaNO_2/HCl$ followed by CuCN
c) $LiAlH_4$ followed by I_2 d) $NaBH_4$ followed by I_2

308. Iodoform test is not given by
a) HCHO b) CH_3CHO c) CH_3COCH_3 d) C_2H_5OH

309. Fires result from the combustion of alkali metals can be extinguished by:
a) CCl_4 b) Sand c) Water d) Kerosene

310. The reactivities of methyl chloride (A) propyl chloride (B) and chlorobenzene (C) are in the order :
a) $A > B > C$ b) $C > B > A$ c) $A > C > B$ d) $B > A > C$

311. A sample of chloroform before being used as an anaesthetic is tested by:
a) $AgNO_3$ solution
b) $AgNO_3$ solution after boiling with alc. KOH
c) Fehling's solution
d) Ammoniacal Cu_2Cl_2

312. Ethylene dichloride can be prepared by adding HCl to:
a) Ethane b) Ethylene c) Acetylene d) Ethylene glycol

313. Which of the following can be obtained by halide exchange method?
a) CH_3Cl b) C_2H_5Cl c) CH_3I d) CH_3Br

314. Grignard reagent undergoes:
a) Nucleophilic substitution
b) Nucleophilic addition
c) Both (a) and (b)
d) None of the above

315. Ethylene on treatment with chlorine gives:
a) Ethylene dichloride
b) Ethylene chlorohydrin
c) CH_4
d) C_2H_6

316. Ethylidene dichloride on treatment with aq. KOH gives:
a) CH_3CHO b) $\begin{matrix} CH_2OH \\ | \\ CH_2OH \end{matrix}$ c) HCHO d) $\begin{matrix} CHO \\ | \\ CHO \end{matrix}$

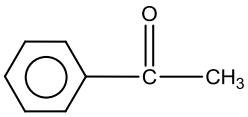
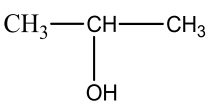
317. The bad smelling substance formed by the action of alcoholic caustic potash on chloroform and aniline is:
a) Phenyl isocyanide b) Nitrobenzene c) Acetylene d) Chlorobenzene

318. In the reaction,
$2A + \text{dry oxide} \xrightarrow{\Delta} \text{ether} + 2AgX$
A is a/an
a) Primary alcohol b) Acid c) Alkyl halide d) Alcohol

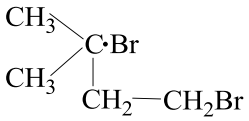
319. Ethyl alcohol is used as a preservative for chloroform because it
a) Prevents aerial oxidation of chloroform
b) Prevents decomposition of chloroform
c) Decomposes phosgene to CO and Cl_2
d) Removes phosgene by converting it to ethyl carbonate

320. Anhydrous HCl gas, on passing through ethyl alcohol, in presence of anhy. $ZnCl_2$ gives:
a) Ethane b) Ethyl chloride c) Ethene d) CCl_4

321. Which one of the isomers of cyclohexane hexachloride is strong pesticide?
a) α b) β c) γ d) δ

322. Which one of the following does not give iodoform?
a) 
b) CH_3OH
c) $CH_3\ CH_2OH$
d) 

323. The IUPAC name of the compound ,


is :

a) 1,3-dibromo-3-methylbutane
b) 3-methyl-1,2-bromobutane
c) 3-methyl-1,3-bromopropane
d) None of the above

324. Ethyl iodide on treatment with alcoholic potash gives:
a) Ethyl alcohol b) Ethane c) Acetylene d) Ethylene

325. Chloroform is used as an:
a) Antiseptic b) Anaesthetic c) Insecticide d) Antipyretic

326. Chlorination of toluene in presence of light and heat followed by treatment with aqueous NaOH gives
a) *o*-cresol b) *p*-cresol
c) mixture of *o*-cresol and *p*-cresol d) 1, 3, 5-trihydroxy toluene

327. 1, 2-dibromoethane reacts with alcoholic KOH to yield a product *X.* The hybridisation state of the carbons present in *X* respectively, are
a) sp, sp b) sp^3, sp^3 c) sp^3, sp^2 d) sp^3, sp^2

328. The phosphorus pentachloride reacts with ethanol to give:
a) Ethyl chloride b) Ethylene chloride c) Ethylidene chloride d) None of these

329. Elimination of bromine from 2-bromobutane results in the formation of
a) Predominantly 2-butyne b) Predominantly 1-butene
c) Predominantly 2-butene d) Equimolar mixture of 1 and 2-butene

330. The compound formed in carbylamine test is:
a) $C_6H_5—C\equiv N$ b) $C_6H_5—N\rightrightarrows C$ c) $CH_3—O—C\equiv N$ d) $CH_3—N=C=O$

331. Best method of preparing alkyl chloride is
a) $ROH + SOCl_2 \longrightarrow$ b) $ROH + PCl_5 \longrightarrow$
c) $ROH + PCl_3 \longrightarrow$ d) $ROH + HCl \xrightarrow{\text{Anhy.}ZnCl_2}$

332. $CH_2=CHCl$ reacts with HCl to form:
a) $CH_2Cl—CH_2Cl$ b) $CH_3—CHCl_2$ c) $CH_2=CHCl \cdot HCl$ d) None of these

333. In dihalogen derivatives if two halogen atoms are attached to the same carbon atom, the compound is called:
a) Gem dihalide b) Vicinal dihalide c) Both (a) and (b) d) None of these

334. Vapour density of an organic compound is 23.0. It contains 52.17% of carbon and 13% of hydrogen. The compound gives iodoform test. The compound is:
a) Ethanol b) Dimethyl ether c) Acetone d) Methanal

335. An alkyl halide reacts with alcoholic ammonia in a sealed tube, the product formed will be
a) A primary amine b) A secondary amine
c) A tertiary amine d) A mixture of all the three

336. Chloropicrin is obtained by the reaction of
a) Steam on carbon tetrachloride b) Nitric acid on chlorobenzene
c) Chlorine on picric acid d) Nitric acid on chloroform

337. Which of the following solvent may be used instead of ether in the preparation of Grignard reagent?
a) THF b) $C_6H_5OCH_3$ c) $C_6H_5N(CH_3)_2$ d) All are correct

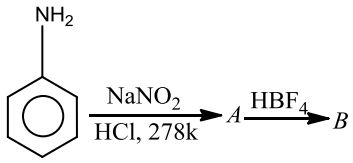
338. Chloroform on reduction with Zn and HCl (alc.) gives:
a) Formic acid b) Chloretone c) Chloropicrin d) Methylene dichloride

339. Identify *X* and *Y* in the following sequence
$C_2H_5Br \xrightarrow{X}$ product $\xrightarrow{Y} C_3H_7NH_2$
a) $X = KCN, \quad Y = LiAlH_4$ b) $X = KCN, \quad Y = H_3O^+$
c) $X = CH_3Cl, \quad Y = AlCl_3/HCl$ d) $X = CH_3NH_2, \quad Y = HNO_2$

340. In alkyl nitrites the oxygen of —O—N=O group is linked with carbon. An alkyl nitrite is:

a) An ester b) A nitro compound c) An amide d) A nitrile

341. In the chemical reactions,



The compounds '*A*' and '*B*' respectively are

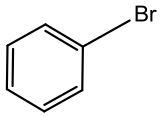
a) Nitrobenzene and fluorobenzene
b) Phenol and benzene
c) Benzene diazonium chloride and fluorobenzene
d) Nitrobenzene and chlorobenzene

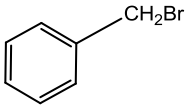
342. Chloroform, when kept open, is oxidised to

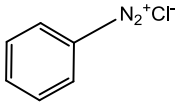
a) CO_2 b) $COCl_2$ c) CO_2 , Cl_2 d) None of these

343. $X \xrightarrow[HNO_3]{AgNO_3}$ Y Yellow or white ppt.

Which of the following cannot be *X*?

a) 

b) $(CH_3)_2CHCl$ c) 

d) 

: ANSWER KEY :

1) d	2) a	3) b	4) b	189) d	190) d	191) a	192) a
5) a	6) a	7) a	8) b	193) d	194) c	195) b	196) c
9) a	10) c	11) a	12) d	197) d	198) a	199) d	200) c
13) b	14) d	15) b	16) b	201) d	202) c	203) a	204) c
17) c	18) b	19) a	20) a	205) a	206) b	207) c	208) c
21) a	22) b	23) b	24) a	209) d	210) c	211) a	212) b
25) b	26) b	27) a	28) b	213) c	214) c	215) c	216) d
29) d	30) b	31) b	32) a	217) b	218) c	219) a	220) b
33) d	34) b	35) d	36) b	221) a	222) a	223) c	224) a
37) a	38) d	39) c	40) b	225) d	226) a	227) b	228) d
41) d	42) c	43) a	44) a	229) d	230) d	231) a	232) a
45) b	46) d	47) a	48) b	233) b	234) b	235) a	236) b
49) d	50) b	51) b	52) a	237) c	238) d	239) c	240) a
53) b	54) b	55) a	56) d	241) d	242) d	243) c	244) a
57) a	58) a	59) d	60) d	245) b	246) a	247) a	248) d
61) b	62) a	63) a	64) c	249) b	250) b	251) a	252) b
65) a	66) a	67) d	68) a	253) b	254) a	255) a	256) c
69) c	70) c	71) d	72) d	257) d	258) b	259) d	260) a
73) c	74) c	75) a	76) a	261) c	262) a	263) d	264) d
77) c	78) c	79) d	80) b	265) c	266) c	267) b	268) c
81) c	82) c	83) b	84) b	269) a	270) a	271) b	272) d
85) a	86) b	87) b	88) c	273) b	274) c	275) c	276) c
89) b	90) a	91) b	92) b	277) a	278) b	279) b	280) c
93) c	94) b	95) c	96) b	281) c	282) b	283) b	284) d
97) a	98) a	99) c	100) c	285) a	286) a	287) a	288) d
101) a	102) a	103) a	104) d	289) d	290) c	291) d	292) b
105) a	106) d	107) d	108) a	293) a	294) c	295) d	296) a
109) c	110) a	111) c	112) a	297) a	298) c	299) c	300) b
113) b	114) b	115) d	116) d	301) b	302) c	303) d	304) c
117) b	118) b	119) a	120) a	305) a	306) b	307) a	308) a
121) a	122) b	123) d	124) c	309) a	310) a	311) b	312) d
125) d	126) a	127) d	128) a	313) c	314) c	315) a	316) a
129) a	130) d	131) a	132) d	317) a	318) c	319) d	320) b
133) a	134) b	135) b	136) a	321) c	322) b	323) a	324) d
137) b	138) a	139) c	140) a	325) b	326) c	327) a	328) a
141) c	142) d	143) b	144) a	329) c	330) b	331) a	332) b
145) c	146) c	147) c	148) a	333) a	334) a	335) d	336) d
149) a	150) a	151) d	152) a	337) d	338) d	339) a	340) a
153) d	154) a	155) c	156) c	341) c	342) b	343) a	
157) c	158) c	159) d	160) d				
161) a	162) d	163) d	164) c				
165) c	166) a	167) b	168) b				
169) b	170) c	171) d	172) a				
173) a	174) a	175) d	176) a				
177) b	178) c	179) d	180) d				
181) d	182) b	183) d	184) d				
185) c	186) d	187) b	188) d				

: HINTS AND SOLUTIONS :

1 **(d)**

For positive iodoform test, alcohol molecule must have

$CH_3 - \underset{\underset{OH}{|}}{CH} -$ group.

$$Ph - \underset{\underset{OH}{|}}{CH} - CH_3 \xrightarrow{I_2+NaOH} CHI_3 + Ph - COO^-$$

2 **(a)**

$$CH_2ClCH_2Cl \xrightarrow{KOH(aq.)} \underset{Ethane-1,2-diol}{CH_2OHCH_2OH}$$

$$CH_3CHCl_2 \xrightarrow{KOH(aq.)} \underset{Ethanal}{CH_3CHO}$$

3 **(b)**

$$R - X \xrightarrow{KOH(aq.)} R - OH$$

4 **(b)**

$$CH_3CH_2Cl \xrightarrow{KOH(alc.)} CH_2 = CH_2 + HCl$$

5 **(a)**

$$CS_2 + 2Cl_2 \longrightarrow CCl_4 + 2S$$

6 **(a)**

$$CH_2Cl_2 \xrightarrow{HOH} CH_2(OH)_2 \xrightarrow[-H_2O]{} HCHO$$

8 **(b)**

HI reacts with C_2H_5OH even in absence of ZnX_2.

Larger is bond length, more is reactivity.

9 **(a)**

Among alkyl halides, iodides are least stable, hence these form Grignard reagent easily. Hence, the correct order of reactivity in formation of Grignard reagent is

$CH_3I > CH_3Br > CH_3Cl$

10 **(c)**

The I_2 has antiseptic nature.

11 **(a)**

This is Wurtz reaction. 2-chloropropane and chloromethane reacts in presence of dry ether t form 2-methyl propane.

$$CH_3\,Cl + 2Na + Cl - \underset{\underset{CH_3}{|}}{CH} - Ch_3 \xrightarrow{Ether}$$

$$CH_3 - \underset{\underset{CH_3}{|}}{CH} - CH_3 + 2NaCl$$

13 **(b)**

Br is replaced by a nucleophile CN^-.

15 **(b)**

A mixture of halides is formed.

16 **(b)**

DDT and 666 ($C_6H_6Cl_6$ or benzene hexachloride) is the pair of strongest pesticides.

17 **(c)**

Thus, decomposition of CHI_3 occurs.

18 **(b)**

$$CH_3X + KCN \longrightarrow CH_3CN$$

19 **(a)**

$$CHCl_3 + HNO_3 \longrightarrow CCl_3 \cdot NO_2 + H_2O \cdot CCl_3$$

$\cdot NO_2$ is called chloropicrin.

20 **(a)**

Aryl halides show resonance in their structure.

21 **(a)**

$$CCl_4 + H_2O(v) \longrightarrow COCl_2 + 2HCl$$

23 **(b)**

In Wurtz reaction alkyl halide react with sodium in dry ether to produce alkane having double number of carbon atoms as in alkyl halide.

$$2R - X + 2Na \xrightarrow{\text{Dry ether}} R - R + 2NaX$$

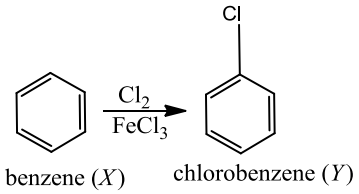
alkyl halide → alkane

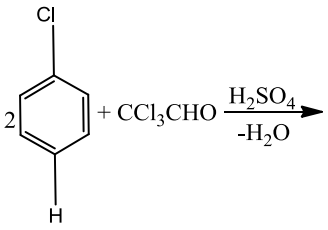
24 **(a)**

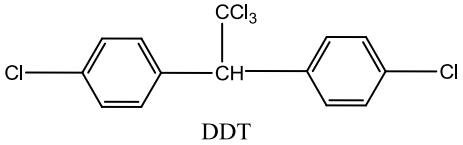
$$CH_3I + 6Ag + I_3HC \longrightarrow C_2H_2 + 6AgX$$

26 **(b)**

This is the preparation method of DDT (dichloro diphenyl trichloroethane).







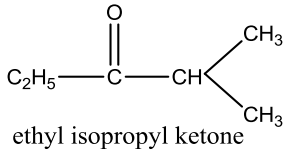
DDT

27 **(a)**

$CF_3CHClBr$, *i. e.*, haloethane is less hazardous and

28 **(b)**

All the except ethyl isopropyl ketone gives iodoform test in this question.



ethyl isopropyl ketone

29 **(d)**

30 **(b)**

$$\underset{\text{alkyl chloride}}{R\text{Cl}} + \text{KCN} \rightarrow \underset{\text{alkyl cyanide}}{R\text{CN}} + \text{KCl}$$

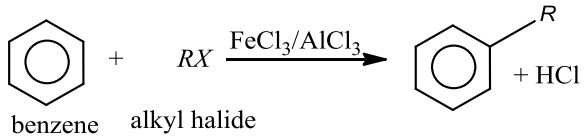
$$\underset{\text{methyl chloride}}{\text{CH}_3\text{Cl}} + \text{KCN} \rightarrow \underset{\text{methyl cyanide}}{\text{CH}_3\text{CN}} \xrightarrow{2\text{H}_2/\text{Ni}} \underset{\text{ethyl amine (Primary amine)}}{\text{CH}_3\text{CH}_2\text{NH}_2}$$

31 **(b)**

An optically inactive compound forming optically active compound during a reaction always gives racemic mixture.

32 **(a)**

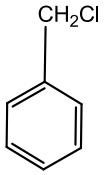
Friedel-Craft reaction : In this reaction alkyl halides react with aromatic compounds in presence of $AlCl_3$ or $FeCl_3$ to form alkyl substituted aromatic compounds.



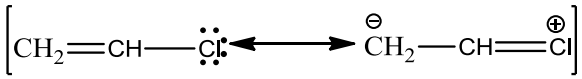
benzene alkyl halide

33 **(d)**

Benzyl chloride is very reactive. It readily gives white precipitate with alcoholic $AgNO_3$ at room temperature. It also readily undergoes nucleophilic substitution. Its structure is as follows



Vinyl chloride($CH_2 = CH.Cl$), on the other hand, is less reactive than benzyl chloride due to resonance.



34 **(b)**

$$CH_3-\overset{\overset{O}{\|}}{C}-CH_3 \xrightarrow{OI^-} CH_3-\overset{\overset{O}{\|}}{C}-CH_2I + OH^-$$

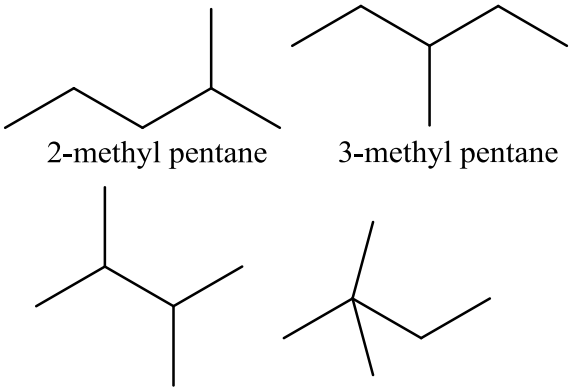
$$CH_3-\overset{\overset{O}{\|}}{C}-CH_3I \xrightarrow{OI^-} CH_3-\overset{\overset{O}{\|}}{C}-CHI_2 + OH^-$$

$$CH_3-\overset{\overset{O}{\|}}{C}-CHI_2 \xrightarrow{OI^-} CH_3-\overset{\overset{O}{\|}}{C}-CI_3 + OH^-$$

$$CH_3-C-Cl_3 \xrightarrow{OH^-} CH_3-\underset{\underset{O^-}{|}}{C}=O + CHI_3$$

35 **(d)**

The possible isomers of hexane are



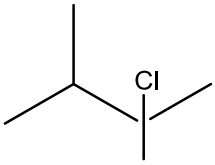
2-methyl pentane 3-methyl pentane

2,3-dimethyl butane 2,2-dimethyl butane

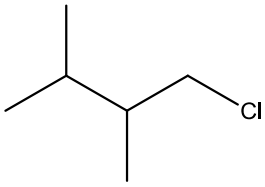
Out of these structure (iii) and (i) have respectively minimum and maximum number of monochloro derivatives

For structure(iii)

(a)



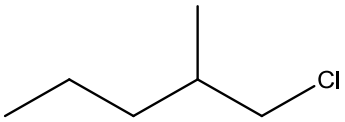
(b)



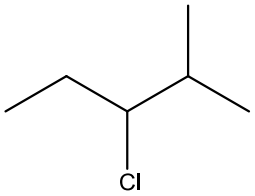
[Only 2 monochloro derivatives (minimum) are possible]

For structure (i).

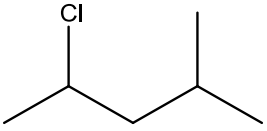
(a)



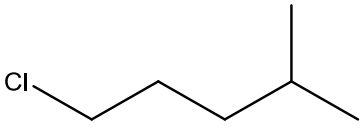
(b)



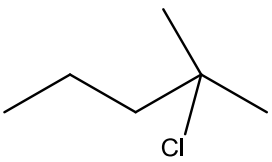
(c)



(d)



(e)



[5 monochloro derivatives (maximum) are possible]

37 **(a)**

$CHCl_3 + 3C_2H_5ONa \rightarrow CH(OC_2H_5)_3 + 3NaCl$

Ethy ortho formate

38 **(d)**

$2CHCl_3 + \frac{1}{2}O_2 \longrightarrow COCl_2 + H_2O$; $COCl_2$ *i. e.*, phosgene is poisonous gas.

39 **(c)**

Iodoform test is given by only those compounds which conatain either

$CH_3C=O$ or CH_3CH-OH group

(a) $CH_3CH(OH)H$ ethyl alcohol

(b) $CH_3CH(OH)CH_3$ propanol-2

(c) $CH_3CH_2CH_2OH$ Propanol-1

(c) $CH_3-C(=O)H$ ethanal

Hence, propanal-1 due to absence of above given groups, does not give positive iodoform test.

40 **(b)**

At higher temperature, esters undergoes hydrolysis to give alcohol and acid. In (b) ethyl alcohol is formed which respond for positive iodoform test.

$RCOOR' \xrightarrow{HOH} R'OH + RCOOH$

41 **(d)**

$CHCl_3 + HNO_3 \rightarrow CCl_3NO_2 + H_2O$

Chloroform nitric acid chloropicrin

Thus, the molecular formula of chloropicrin is CCl_3NO_2.

42 **(c)**

The reaction between *tert*-butyl bromide and hydroxide ion yields *tert*-butyl alcohol and follows the first order kinetics. The rate of reaction depends upon the concentration of only one reactant, which is tertiary butyl bromide.

$(CH_3)_3CBr \underset{\text{Slow}}{\overset{\text{Step II}}{\rightleftharpoons}} (CH_3)_3C^{\oplus} + Br^{\ominus}$

$(CH_3)_3C^{\oplus} + OH^- \xrightarrow[\text{fast}]{\text{Step II}} (CH_3)_3COH$

43 **(a)**

Chloroform reacts with conc. HNO_3 to give chloropicrin which is used as tear gas.

$$CHCl_3 + HNO_3 \xrightarrow{\Delta} \underset{\text{chloropicrin}}{CCl_3NO_2} + H_2O$$

44 **(a)**

More is the branching in molecule, lesser is surface area, lower is attraction, lower is b.p.

45 **(b)**

$C_2H_5OH + SOCl_2 \longrightarrow C_2H_5Cl + SO_2 + HCl$

46 **(d)**

Cl_2 formed at anode reacts with C_2H_5OH in presence of NaOH (formed in reaction) to give haloform reaction.

47 **(a)**

Benzyl chloride is more reactive than alkyl halides. Benzyl carbocation is stabilised by resonance hence, benzyl chloride easily gives nucleophilic substitution reaction.

48 **(b)**

S_N1 order.

Benzyl > Allyl > 3° > 2° > 1° > Phenyl halide.

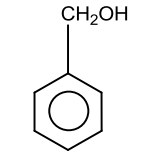
49 **(d)**

Iodoform test is given by compounds which have CH_3CO or CH_3CHOH group.

(a) $H_3C-\underset{\underset{OH}{|}}{\overset{\overset{H}{|}}{C}}-CH_3$ Iso-propyl alcohol

(b) CH_3CH_2OH ethyl alcohol

(c) $CH_3-\overset{\overset{O}{\|}}{C}-H$ ethanal

(d) 

benzyl alcohol

(i) *iso*-propyl alcohol, ethanol ad ethanal all have CH_3CO or CHOH group, therefore they give iodoform test.

(ii) Benzyl alcohol does not have CH_3CO- or CHOH group,

$$\underset{\underset{CH_3}{|}}{CHOH}$$

Therefore, it does not give iodoform test.

50 **(b)**

Follow Saytzeff's rule.

51 **(b)**

The lead deposited is exhaused out in the form of $PbBr_2$.

53 **(b)**

$$RX + Mg \xrightarrow{\text{Ether}} RMgX$$

54 **(b)**

$$CH_3Br + KCN \xrightarrow[-KBr]{} CH_3CN \xrightarrow{H_3^+O} CH_3COOH$$

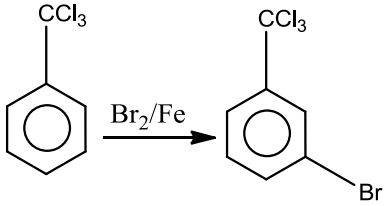
$$\xrightarrow{LiAlH_4} \underset{(A)}{CH_3CH_2OH} \qquad \underset{(B)}{}$$

(C)

56 **(d)**

$(CH_3)_3CCH_2CH_2Cl$; halogen is attached on 1° carbon.

57 **(a)**

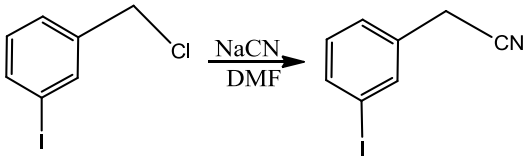


As-CCl_3 group is *meta* -directing.

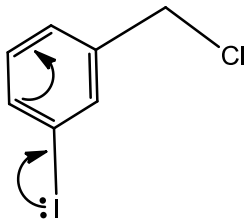
58 **(a)**

*R*MgF are unstable compounds.

59 **(d)**



Chloride is an 1° aliphatic carbon which is substituted easier in comparison to iodide which is arylic and more stable due to delocalisation hence, difficult to substitute.



60 **(d)**

$CH_3CH_2CH_2Cl + KCN \longrightarrow CH_3CH_2CH_2CN + KCl$

61 **(b)**

Br is less reactive and more selective and thus, formation of 3° free radical will be the major product.

62 **(a)**

$$CH_3CH_2CH_2Cl \xrightarrow{KOH(alc.)} CH_3CH{=}CH_2$$

$$CH_3CHClCH_3 \xrightarrow{KOH(alc.)} CH_3CH{=}CH_2$$

63 **(a)**

Larger is C—*X* bond length; more is reactivity.

64 **(c)**

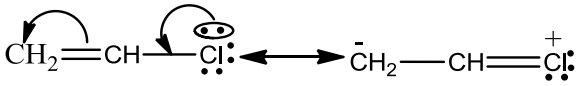
$CH_3COONa + NaOH \longrightarrow CH_4 + Na_2CO_3$

$\downarrow Cl_2$

CCl_4

66 **(a)**

In vinyl chloride, the C-Cl bond acquires some double bond character due to resonance.



Vinyl chloride

Thus, it is very difficult to break C-Cl bond. Hence, vinyl chloride not get hydrolysed by NaOH.

67 **(d)**

Iodoform test is given by compounds which have $(CH_3 - CO -)$ group or $CH_3 - CH -$ group.

|

OH

Hence, 2-pentanone, CH_3CHO and C_2H_5OH give the test. But 3-pentanone does not give iodoform test. Actually, iodoform test can be used to distinguish methyl ketones from ketones.

68 **(a)**

*R*Cl and *R*Br can be prepared by free radical halogenation of alkanes while *R*F and *R*I cannot be prepared. With F_2, the reaction is not only explosive but also brings cleavage of C-C bonds while with I_2 the reaction is too slow to be of any practical value.

70 **(c)**

$$C_2H_5Cl + AgCN \rightarrow \underset{(X)}{C_2H_5NC} + AgCl$$

Functional isomer of *X* is C_2H_5CN.

71 **(d)**

Benzyl carbonium ion is most stable and thus, its chloride is most reactive.

72 **(d)**

Tear gas is chloropicrin. It is obtained by the reaction of chloroform with nitric acid.

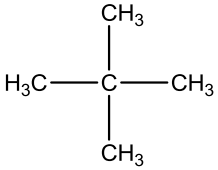
$$\underset{\text{chloropicric}}{CCl_3NO_2} + H_2O$$

73 **(c)**

C—Cl bond is more polar due to more electronegativity difference.

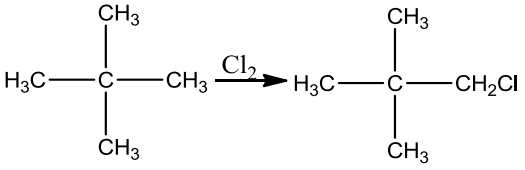
76 **(a)**

The number of monochloro derivatives of a compound depends upon the type of hydrogen present in the compound. The structure of *neo*-pentane is



∵It contains only one type of hydrogens.

∴ It will give only ony monochloro derivative



77 **(c)**

An organic compound forms yellow precipitate of iodoform with I_2 in presence of alkali, if it has $CH_3CO -$ group directly or it has

|

$CH_3 - CHOH$

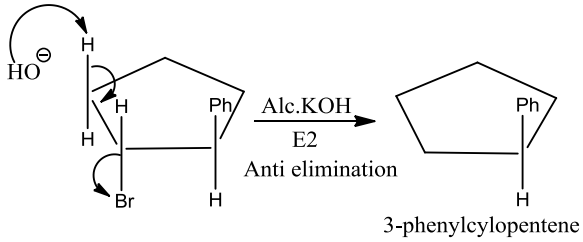
78 **(c)**

$$\underset{(X)}{CaOCl_2} + H_2O \rightarrow Ca(OH)_2 + Cl_2$$

$$\underset{(X)}{CH_3CHO} + Cl_2 \rightarrow \underset{(Y)}{CCl_3CHO}$$

$$2\underset{(Y)}{CCl_3CHO} + Ca(OH)_2 \rightarrow 2CHCl_3 + (HCOO)_2Ca$$

79 **(d)**



Anti-elimination, means –H and the –Br both departing group must be present at dihedral angle of 180° (anti).

80 **(b)**

$C_2H_5Br + NaHS \longrightarrow C_2H_5SH + NaBr$

82 **(c)**

Allyl carbonium shows resonance and thus, allyl chloride is more reactive. Vinyl chloride shows resonance and thus, less reactive.

83 **(b)**

CCl_3NO_2 is chloropicrin used as tear gas.

84 **(b)**

Ethanol cannot undergo dehydrohalogenation as it does not contain any halogen.

85 **(a)**

By haloform reaction.

86 **(b)**

CH_3- $CHCH_2CH_3$has one asymmetric carbon atom.

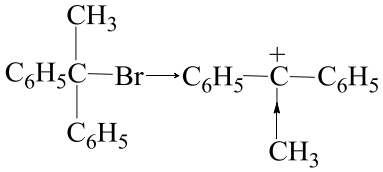
$$\begin{matrix} & | \\ & Cl \end{matrix}$$

87 **(b)**

CCl_4 is non-polar; H_2O is polar.

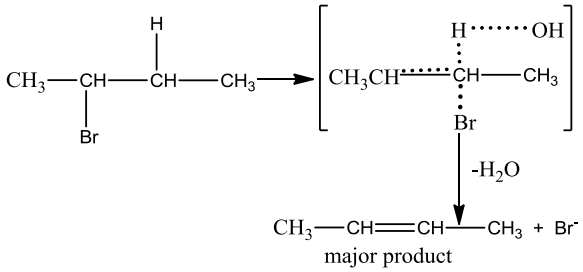
88 **(c)**

Most stable carbocation formation by halide shows more reactivity for S_{N^1} reactions.



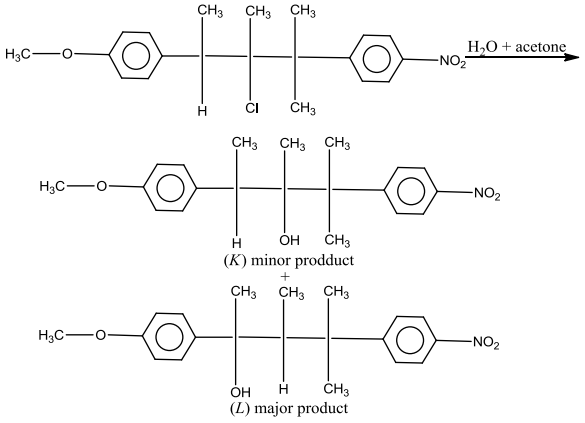
89 **(b)**

Alkyl halides on heating with alcoholic KOH give dehydrogenation reaction to yield alkene. If in reaction, more than one alkenes are formed, then according to Saytzeff, the most highly substituted alkene is the major product.



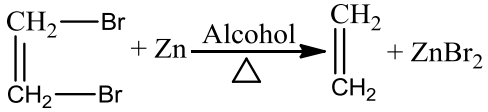
90 **(a)**

The product (K) is formed through simple substitution while major product (L) is formed through H^- shift *via* S_N1 reaction and methoxy group stabilizes the carbocation intermediate of product (L).



91 **(b)**

Zinc is used for debromination of dibromoalkane to give alkene.



92 **(b)**

$$CH_3-\underset{\underset{CH_3}{|}}{\overset{CH_3}{\overset{|}{C}}}-Br + CH_3ONa \longrightarrow$$

t-butyl bromide (sodium methanol)

$$CH_3-\underset{\underset{CH_3}{|}}{\overset{CH_3}{\overset{|}{C}}}= CH_2 + CH_3OH + NaBr$$

2-methyl propene (methanol) (isobutylene)

93 **(c)**

$$CH_3Br \xrightarrow{Alc.KCN} \underset{(X)}{CH_3CN} \xrightarrow[\text{reduction}]{Na/C_2H_5OH} \underset{(Y)}{CH_3CH_2\ NH_2}$$

95 **(c)**

Liberated iodine is absorbed by iodides to darken their colour.

96 **(b)**

This is Wurtz reaction. In this reaction two molecules of alkyl halide react with each other to form alkane having double the number of carbon atoms.

$$\underset{(X)}{2CH_3CH_2Cl} + 2Na \xrightarrow{\text{Dry ether}}$$

ethyl chloride

$$CH_3CH_2CH_2CH_3 + 2NaCl$$

butane

97 **(a)**

$$CH_3NH_2 \xrightarrow[-HI]{CH_3I} (CH_3)_2NH \xrightarrow[-HI]{CH_3I} (CH_3)_3N \xrightarrow{CH_3I} (CH_3)_4N^+I^-$$

Hence, three molecules of CH_3I is used.

98 **(a)**

$CHCl_3$ will give positive carbylamine reaction.

99 **(c)**

This is corey house synthesis:

$R_2CuLi + R'X \longrightarrow RR' + RCu + LiX$

100 **(c)**

When a carbonyl compound having the structure CH_3-CO-R is reacted with a halogen in the presence of NaOH, KOH, Na_2CO_3or K_2CO_3 solution, haloform is obtained. Thus, butanone-2 gives +ve iodoform test.

$$CH_3-CH_2-\underset{\underset{CH_3}{\|}}{\overset{O}{C}}-CH_3 \xrightarrow[\text{(Iodoform test)}]{I_2/NaOH}$$

$$\begin{array}{c} \| \\ O \end{array}$$

2-butanone

$$CHI_3 + CH_3 - CH_2 - \overset{O}{\overset{\|}{C}} - ONa$$

iodoform

101 **(a)**

$$C_2H_5Cl + KCN \xrightarrow{C_2H_5OH} \underset{(X)}{C_2H_5CN} + KCl$$

$$C_2H_5CN \xrightarrow[\Delta]{H_3O^+, 2H_2O} \underset{(Y) \text{or } (C_3H_6O_2)}{C_2H_5COOH} + NH_3$$

So, the molecular formula of the Y is $C_3H_6O_2$.

102 **(a)**

When ethyl bromide reacts with alcoholic KCN, propane nitrile is obtained as main product.

$$C_2H_5Br + \text{Alc. KCN} \rightarrow \underset{\text{propane nitrile}}{C_2H_5CN}$$

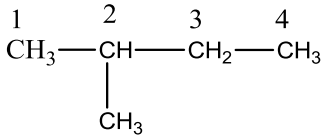
104 **(d)**

Carbylamine reaction is characteristic reaction for primary amine and chloroform.

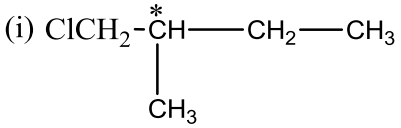
105 **(a)**

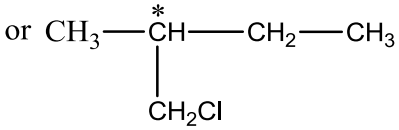
$$4C_2H_5Br + 4Na - Pb \longrightarrow (C_2H_5)_4Pb + 4NaBr$$

106 **(d)**

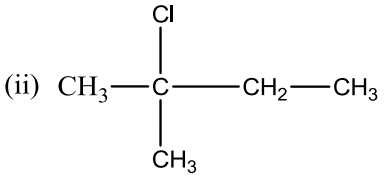
(1) 

Its monochloro derivatives are follows

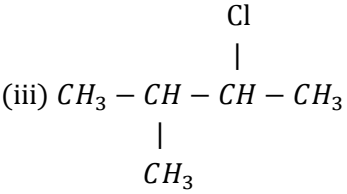
(i) 

or 

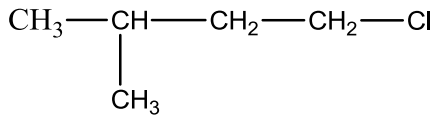
It will exist as enantiomers pair d and l-forms

(ii) 

no asymmetric C atom

(iii) 

It will exist as enantiomeric pair (d-and l- forms)

(iv) 

No asymmetric carbon atom

Hence, only two enantiomeric pairs will be obtained by the monochlorination of 2-methylbutane.

107 **(d)**

$$RX + Ag_2O_{(\text{Ether})} \longrightarrow R \cdot O \cdot R + 2AgX$$

108 **(a)**

Williamson's synthesis

$$C_2H_5ONa + ClC_2H_5 \rightarrow \underset{\text{diethyl ether}}{C_2H_5OC_2H_5} + NaCl$$

109 **(c)**

$CaOCl_2 + H_2O \longrightarrow Ca(OH)_2 + Cl_2$(Hydrolysis)

$Cl_2 + C_2H_5OH \longrightarrow CH_3CHO$ (Oxidation)

$CH_3CHO + Cl_2 \longrightarrow CCl_3CHO$ (Substitution)

$CCl_3CHO + Ca(OH)_2 \longrightarrow CHCl_3 +$ $(HCOO)_2Ca$ (Hydrolysis)

110 **(a)**

Iodoform test is given by the compounds containing either

$$\begin{array}{c} | \\ CH_3CO - \end{array}$$ roup or CH_3CHOH group.

The structures of the given compounds are as

1. $CH_3CH_2CH_2CH_2OH$
2. $CH_3COC_6H_5$
3. CH_3CHO
4. $CH_3COC_2H_5$

$\therefore$ n butyl alcohol does not give iodoform test because it does not possess the

$$\begin{array}{c} | \\ CH_3CO - \end{array}$$ or CH_3CHOH group.

111 **(c)**

It is not a colouring material.

113 **(b)**

Alkyl halides are less soluble in water. They are polar but fail to form H-bonds with water.

114 **(b)**

Hexachloroethane is also called artificial camphor. Its structure is

$$\begin{array}{l} \quad Cl \quad Cl \\ \quad | \quad | \\ Cl - C - C - Cl \\ \quad | \quad | \end{array}$$

Cl Cl

115 **(d)**

$(CH_3)_2CHCH_2MgBr + HOC_2H_5 \xrightarrow{\text{Ether}}$

$(CH_3)_2CHCH_3 + Mg\begin{matrix}OC_2H_5\\Br\end{matrix}$

117 **(b)**

Dipole moment of CH_3Cl is more than CH_3F due to larger C—*X* bond. Also electronegativity of Br being less than F and Cl and thus inspite of larger C—*X* bond dipole moment of CH_3Br is lowest.

119 **(a)**

$CH_3 - CH_2 - CH_2 - CH_2 - Cl \xrightarrow[\Delta]{\text{Alc.KOH}} CH_3 - CH_2 - CH = CH_2 + HCl$

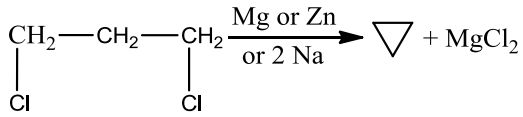
1-chlorobutane

butene-1

120 **(a)**

$2CHCl_3 + 6Ag \xrightarrow{\Delta} CH \equiv CH + 6AgCl$

121 **(a)**



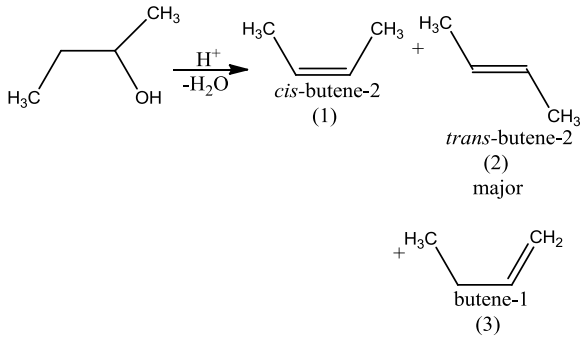
α and ω-dihalogen derivative of an alkane on treatment with Mg or Zn or Na gives cycloalkane.

122 **(b)**

$C_2H_5I \xrightarrow{\text{KOH(alc.)}} C_2H_4 \xrightarrow{Br_2} CH_2BrCH_2Br$

$CH_2BrCH_2Br \xrightarrow{KCN} CH_2CNCH_2CN$

123 **(d)**



In [F] order of quantity of alkene 2 > 1> 3

These on addition with Br_2/CCl_4 to give their addition products which have $C_4H_6\ Br_2$ as molecular formula.

$(1)CH_3 - \underset{\underset{Br}{|}}{CH} - \underset{\underset{Br}{|}}{CH} - CH_3$

$(2)CH_3 - \underset{\underset{Br}{|}}{\underset{\underset{Br}{|}}{CH}} - CH - CH_3$

$(3)BrH_2C - \underset{\underset{Br}{|}}{CH} - CH_2 - CH_3$

$(4)BrH_2C - CH_2 - \underset{\underset{Br}{|}}{CH} - CH_2$

$(5)CH_2Br - CH_2 - CH_2 - CH_2Br$

125 **(d)**

$CH_2OHCH_2OH \xrightarrow{HCl} CH_2ClCH_2Cl$

127 **(d)**

Tertiary carbonium is most stable.

128 **(a)**

$CH_2 = CH - CH = CH_2 + Br_2 \longrightarrow$

1,3-butadiene

$(i)CH_2 = CH - \underset{\underset{Br}{|}}{CH} - \underset{\underset{Br}{|}}{CH_2}$

3,4-dibromo butane

(ii) $CH_2 - CH = CH - CH_2$ (Br on 1st C, Br on 4th C)

1,4-dibromo-2-butene

1,4-adduct is more stable than the 1,2-adduct.

130 **(d)**

Write chlorination reaction for all of them to find which gives of the maximum number of monochlorination product.

(a) $CH_3CH_2CH_2CH_2CH_3 + Cl_2 \xrightarrow{UV}$

$ClCH_2 - (CH_2)_3CH_3 + CH_3 - \underset{\underset{Cl}{|}}{CH} - (CH_2)_2$

$CH_3 + CH_3 - CH_2 - \underset{\underset{Cl}{|}}{CH} - CH_2 - CH_3$

∴ Total 3 monochlorinated products are formed.

(b) $CH_3 - \underset{\underset{CH_3}{|}}{CH} - CH_2 - CH_3 + Cl_2 \xrightarrow{UV}$

$ClCH_2 - \underset{\underset{CH_3}{|}}{CH} - CH_2 - CH_3 + CH_3 - \underset{\underset{CH_3}{|}}{\overset{\overset{Cl}{|}}{C}} - CH_2$

$-CH_3 + CH_3 - \underset{\underset{CH_3}{|}}{CH} - CH_2 - CH_2Cl$

∴ Total 3 monochlorinated products are formed.

(c) $CH_3 - \overset{\overset{CH_3}{|}}{C} - H + Cl_2 \xrightarrow{UV}$

$$CH_3-\underset{\underset{CH_3}{|}}{\overset{\overset{CH_3}{|}}{C}}-Cl + CH_3-\underset{\underset{CH_3}{|}}{\overset{\overset{CH_2Cl}{|}}{C}}-H$$

∴ Total 3 monochlorinated products are formed.

(d) $CH_3-\underset{\underset{CH_3}{|}}{\overset{\overset{CH_3}{|}}{C}}-CH_3 + Cl_2 \xrightarrow{UV}$

$$CH_3-\underset{\underset{CH_2Cl}{|}}{\overset{\overset{CH_3}{|}}{C}}-CH_3$$

∴ Only one monochlorinated products formed.

131 **(a)**

$$CH_3-\underset{\underset{Cl}{|}}{\overset{\overset{Cl}{|}}{C}}-CH_3 \xrightarrow{\text{Hydrolysis}} CH_3-\underset{\underset{OH}{|}}{\overset{\overset{OH}{|}}{C}}-CH_3$$

2,2-dichloro propane — unstable

$$\xrightarrow[-H_2O]{} CH_3-\underset{\underset{O}{\|}}{C}-CH_3$$

acetone

132 **(d)**

$$CH_2=CHCl + HCl \rightarrow CH_3-CHCl_2$$

ethylidene chloride
sor
1, 1 dichloroethane

133 **(a)**

$\mu_{CCl_4} = 0$; $\mu_{CHCl_3} = 1.0$ D; $\mu_{CH_2Cl_2} = 1.6$ D, $\mu_{CH_3Cl} = 1.86$ D

134 **(b)**

$O=C=O + C_2H_5OMgBr \longrightarrow$

$$O=C\begin{matrix}OMgBr\\C_2H_5\end{matrix} \xrightarrow{HOH} O=C\begin{matrix}OH\\C_2H_5\end{matrix}$$

135 **(b)**

$CH_3COOAg + CH_3Cl \longrightarrow CH_3COOCH_3 + AgCl$

136 **(a)**

$$C_3H_6Cl_2\ (A) \xrightarrow{KOH} C_3H_6O\ (B)$$

$$C_3H_6Cl_2\ (A) \xrightarrow{KOH(alc.)} C_3H_4\ (C)\ \text{Or}$$

$$CH_3C\equiv CH \xrightarrow[H^+, Hg^{2+}]{H_2O} CH_3COCH_3\ (D) \xrightarrow[+NaOH]{Br2} CHBr_3 + CH_3COONa$$

Since, B and D are different thus, B is CH_3CH_2CHO and so A is $CH_3CH_2CHCl_2$.

138 **(a)**

Tertiary alcohols readily react with Lucas reagent ($ZnCl_2$/conc. HCl) to give white turbidity due to the formation of halide.

$$H_3C-\underset{\underset{CH_3}{|}}{\overset{\overset{CH_3}{|}}{C}}-OH \xrightarrow{ZnCl_2/HCl} H_3C-\underset{\underset{CH_3}{|}}{\overset{\overset{CH_3}{|}}{C}}-Cl$$

140 **(a)**

Carbylamine test is a characteristic test of aliphatic and aromatic primary amines. In this test, amine is heated with chloroform and alcoholic potash when a bad smelling isocyanide (carbylamine) is formed.

$$RNH_2 + CHCl_3 + 3KOH\ (alc.) \xrightarrow{\Delta} RN\rightrightarrows C + 3KCl + 3H_2O$$

alkyl isocyanide
(bad smelling)

142 **(d)**

The density order is:
Iodine > Bromide > Chloride > Fluoride.
Higher is the molecular weight, more is b.p, m.p.

143 **(b)**

$4C_2H_5Br + 4Na - Pb \longrightarrow (C_2H_5)_4Pb + 4NaBr$

147 **(c)**

Follow iodoform test.

148 **(a)**

Chloral + Chlorobenzene → DDT

150 **(a)**

$CH_3C\equiv CNa + (CH_3)_2CHCl \longrightarrow CH_3C\equiv CCH(CH_3)_2 + NaCl$

151 **(d)**

Solvolysis of haloalkanes follows first order kinetics. During this process an intermediate carbocation is formed. Therefore, the halohydrocarbon which gives more stable carbocation undergoes solvolysis readily.

153 **(d)**

CCl_4 is a covalent compound, therefore, it does not ionise to give Cl^- ions hence, it does not give white ppt. of AgCl when treated with

$AgNO_3$ soution. There is no reaction to evolve NO_2 . CCl_4 will form a separate layer as it is immiscible with water.

154 **(a)**

$C - X$ bond in benzyl bromide is much weaker than in vinyl bromide and bromobenzene since the benzyl cation left after the removal of the bromide ion is stabilized by resonance. Further, C-Br is weaker than C-Cl bond. Therefore, $C_6H_5CH_2Br$ has the weakest C-X bond.

155 **(c)**

5. 2-methylpentane $\xrightarrow{Cl_2}$ five types of monochlorinated compounds

6. 3-methylpentane $\xrightarrow{Cl_2}$ four types of monochlorinated compounds

7. 2, 2-dimethylbutane $\xrightarrow{Cl_2}$ three types ……

8. 2, 3-dimethylbutane $\xrightarrow{Cl_2}$ two types ….

9. n-hexane $\xrightarrow{Cl_2}$ three types ….

156 **(c)**

Ethanol on reaction with bleaching powder, gives chloroform (trichloromethane).

$$CaOCl_2 + H_2O \rightarrow Ca(OH)_2 + Cl_2$$
$$C_2H_5OH + Cl_2 \rightarrow CH_3CHO + 2HCl$$
$$CH_3CHO + 3Cl_2 \rightarrow CCl_3 . CHO + 3HCl$$
$$2CCl_3 . CHO + Ca(OH)_2 \xrightarrow{\text{Chloral}} 2CHCl_3 + (HCOO)_2Ca$$

chloroform

157 **(c)**

$$C_2H_5ONa + C_2H_5I \longrightarrow C_2H_5OC_2H_5 + NaI;$$ Williamson's synthesis.

158 **(c)**

$$CH_3Br + KCN(alc.) \longrightarrow CH_3CN \xrightarrow[NaC_2H_5OH]{\text{Reduction}} CH_3CH_2NH_2$$

ethylamine

159 **(d)**

Ethyl chloride can be converted into ethanol either by its alkaline hydrolysis or by its reaction with moist AgOH.

$$C_2H_5Cl \xrightarrow[\Delta]{\text{Aq.NaOH}} C_2H_5OH \xleftarrow{AgOH} C_2H_5Cl$$
$$(A) \qquad\qquad (B)$$

160 **(d)**

$$CH_3CH_2CH_2CH_2OH \xrightarrow{P+Br_2} CH_3CH_2CH_2CH_2Br$$

161 **(a)**

Tertiary halide preferentially undergo S_N1 substitution as they can give stable carbocation.

$$H_3C - \underset{\displaystyle CH_3}{\overset{\displaystyle CH_3}{\overset{|}{\underset{|}{C}}}} - Cl \xrightarrow[-Cl]{\text{Slow}} \underset{\text{carbocation}}{(H_3C)_3C^+} \xrightarrow[\text{fast}]{+OH^-} \underset{t\text{-butyl alcohol}}{(H_3C)_3COH}$$

t-butyl chloride

162 **(d)**

In $CHCl_3$, carbon is sp^3-hybridised.

163 **(d)**

$$CCl_4 + KOH(aq.) \longrightarrow C(OH)_4 \longrightarrow CO_2 + 2H_2O$$

164 **(c)**

$$CCl_4 + 2HF \xrightarrow{SbCl_5} CCl_2F_2 + 2HCl$$

165 **(c)**

Iodoform test is positive for compounds which have O

$$CH_3 - C$$

group or 2° alcohol group.

(a) $CH_3 - CH_2 - \underset{\displaystyle OH}{\overset{\displaystyle H}{\overset{|}{\underset{|}{C}}}} - CH_3$

has 2° alcoholic group

(b) $CH_3 - CH_2 - CH_2 - \overset{\displaystyle O}{\overset{\|}{C}} - CH_3$

has $CH_3CO -$ group

(d) $CH_3 - \overset{\displaystyle O}{\overset{\|}{C}} - C_6H_5$

has $CH_3CO -$ group

∴ Compounds in choice (a), (b) and (d) give positive iodoform test.

$$CH_3 - CH_2 - \overset{\displaystyle O}{\overset{\|}{C}} - CH_2 - CH_3$$

∵ This compound doesn't have $CH_3CO -$ or 2° alcoholic group.

∴ It does not give positive iodoform test.

166 **(a)**

In C_6H_5Cl, Cl is firmly attached to C_6H_6 nucleus.

167 **(b)**

For iodoform reaction, we need an oxidising agent which is provided by only $\frac{I_2}{KOH}$, *i. e.*, IO^- ion.

Hypoiodide ion first oxidises

$CH_3CH_2OH \rightarrow CH_3CHO$

and then brings about iodination of

CH_3CHO to $I_3C.CHO$. Alkaline hydrolysis of

Cl_3CHO then gives CHI_3. The other three reagents do not contain any oxidising species and hence, fail to give iodoform test.

169 **(b)**

Statement (b) is not correct regarding the S_N1 reaction for alkyl halide because in S_N1 reaction no inversion takes place. The removal of X and the attachment of OH^- will take place from the same side.

$R - X \xrightarrow{Slow} R^+ + X^-$

$R^+ + OH^- \xrightarrow{Fast} ROH$

170 **(c)**

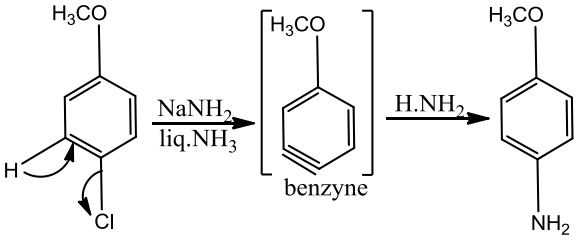
Alkyl halides are soluble in organic solvents.

171 **(d)**

$C_2H_5Br + AgNO_2(alc.) \rightarrow \underset{\text{nitro ethane}}{C_2H_5NO_2} + AgBr$

173 **(a)**

This reaction follows benzyne mechanism.

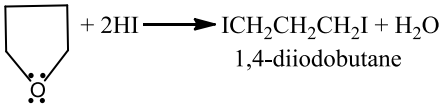


175 **(d)**

Grignard reagent give nucleophilic addition (of R^-) at +ve centre.

176 **(a)**

Tetrahydrofuran when treated with excess HI, give 1, 4-diiodobutane.



177 **(b)**

I_2 possesses antiseptic nature.

179 **(d)**

Wurtz's reaction involves the reduction of alkyl halide with Na in ether.

181 **(d)**

$\underset{(aq)}{CHCl_3} + 4NaOH \rightarrow \underset{\text{sodium formate}}{HCOONa} + 3NaCl + 2H_2O$

182 **(b)**

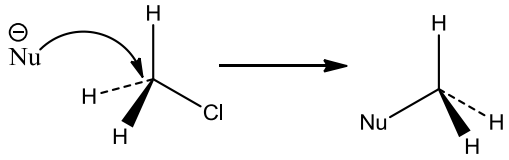
Straight chain alkyl halides have greater boiling point than their isomers. Therefore, $CH_3CH_2CH_2CH_2Cl$ has highest boiling point.

183 **(d)**

CH_3Cl, C_2H_5Cl and CH_3Br are gases at room temperature.

184 **(d)**

Nucleophilic substitution bimolecular (S_N2) prefers less sterically hindered site to attack. Lesser the steric hindrance better the S_N2 reaction. So, ease of reaction is $1^\circ > 2^\circ > 3^\circ$. S_N2 involves inversion of configuration stereochemically (Walden inversion)



185 **(c)**

The best method for the conversion of an alcohol into an alkyl chloride is by treating the alcohol with $SOCl_2$ in the presence of pyridine.

$$ROH + SOCl_2 \rightarrow RCl + HCl + SO_2$$

The other products being gases escape leaving behind pure alkyl halide.

186 **(d)**

Freon, CCl_2F_2 is used in cooling.

187 **(b)**

$CH{\equiv}CH + 2HCl \longrightarrow CH_3CHCl_2$

188 **(d)**

Cl^- is replaced by OH^-, *i.e.*, nucleophilic substitution.

189 **(d)**

RX are called alkylating agent. CH_3X is methylating agent; C_2H_5X is ethylating agent.

191 **(a)**

Methyl iodide is more reactive for nucleophilic substitution of II order.

192 **(a)**

$C_2H_5Cl \xrightarrow{KCN} C_2H_5CN \xrightarrow{Na/alcohol} C_2H_5CH_2NH_2$

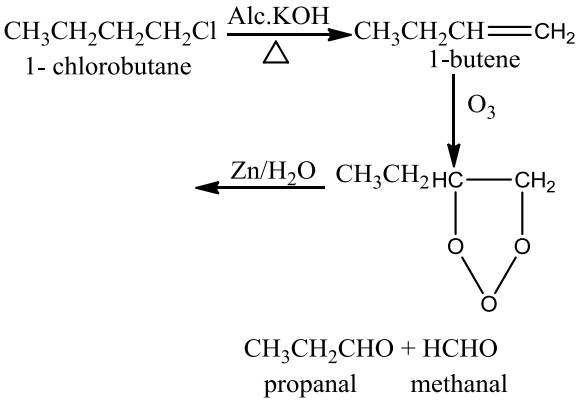
193 **(d)**

$CH_3COCH_3 \xrightarrow{Cl_2} CH_3COCCl_3$

194 **(c)**

1-chlorobutane gives butene-1 on reaction with alc. KOH (dehydrohalogenation) which on ozonolysis yields methanal and propanal. The

reaction is as follows



$CH_3CH_2CHO + HCHO$
propanal methanal

197 **(d)**
Carbon tetrachloride is not inflammable. It is used as fire-proof agent under the name 'pyrene'.

198 **(a)**
n-butyl alcohol ($CH_3CH_2CH_2CH_2OH$) does not give iodoform test because it does not possess the CH_3CO- or CH_3CHOH group.

199 **(d)**
Grignard reagents are highly reactive and react with any source of proton to give hydrocarbons. It is therefore necessary to avoid even traces of moisture from a grignard reagent.

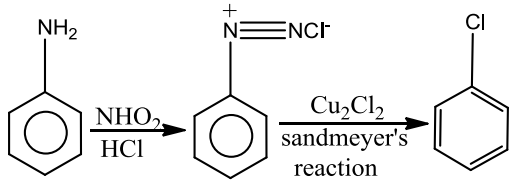
200 **(c)**
Iodoform test is given by those compounds which has

$CH_3-\underset{\underset{O}{\|}}{C}-C/H$ or $CH_3-\underset{\underset{OH}{|}}{CH}-$ units.

Hence, this test is not given by phenol (C_6H_5-OH).

201 **(d)**
CCl_4 is used as medicine in this form.

202 **(c)**



(Diazotization)

204 **(c)**
$C_2H_5I + Mg \longrightarrow C_2H_5MgI$

205 **(a)**
$C_2H_5Cl \xrightarrow{Aq.KOH} C_2H_5OH \xleftarrow{AgOH} C_2H_5\ Cl$

206 **(b)**
Due to less stable nature of CHI_3.

207 **(c)**
$C_2H_5Br + C_2H_5ONa \longrightarrow C_2H_5OC_2H_5$; also in (a) C_2H_4 is formed; in (b) C_4H_{10} is formed, in (d) C_2H_5NC is formed.

208 **(c)**
Phosgene is $COCl_2$.

210 **(c)**
$R-X + NH_3 \longrightarrow RNH_2$

212 **(b)**
$CH_3X + KCN \longrightarrow CH_3CN \xrightarrow{HOH} CH_3COOH$; —CN group hydrolyses to —COOH.

213 **(c)**
$MgCl_2 \rightarrow Mg^{2+} + 2Cl^-$
$Mg^{2+} + \underset{2F}{2e^-} \rightarrow \underset{1\ mol}{Mg}$ (at cathode)
$\because$ 2F(2 × 96500 C)deposits Mg = 1 mol

$\therefore$ 9.65 C charge will deposit Mg $= \dfrac{1 \times 9.65}{2 \times 96500}$
$= 5 \times 10^{-5}$ mol

$R\text{Br} + \text{Mg} \xrightarrow{\text{Dry ether}} \underset{\text{Grignard reagent}}{R\text{MgBr}}$

In order to prepare Grignard reagent, one mole of Mg is used per mole of reagent obtained. Thus, by 5×10^{-5} mol mg , 5×10^{-5} mole of Grignard reagent is obtained.

215 **(c)**
$C_2H_5CN(A)$ on hydrolysis gives C_2H_5COOH.

216 **(d)**
$2NaI + Cl_2 \longrightarrow NaCl_2 + I_2$
$I_2 + CHCl_3 \longrightarrow$ Violet

218 **(c)**
$CH{\equiv}CH \xrightarrow{2HCl} CH_3CHCl_2$

219 **(a)**
Allyl carbonium shows resonance and thus, allyl chloride is more reactive. Vinyl chloride shows resonance and thus, less reactive.

220 **(b)**
Since, the alkyl halide RX gives 4, 5-diethyloctane, when reacts with Na, it must be
$CH_3\ (CH_2)_2\ CH(Br)CH_2CH_3$.

$2CH_3CH_2CH_2\underset{\underset{CH_2CH_3}{|}}{CH}-Br \xrightarrow[\text{Dry ether}]{Na}$

$CH_3(CH_2)_2\underset{\underset{CH_2CH_3}{|}}{CH}-\underset{\underset{CH_2CH_3}{|}}{CH}-(CH_2)_2-CH_3$

The reaction is known as Wurtz reaction.

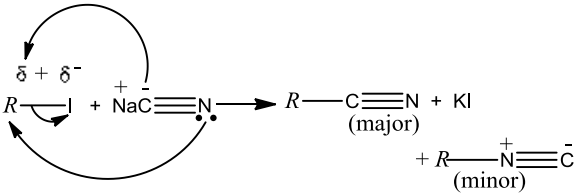
221 **(a)**
$CH_3COCH_3 + PCl_5 \longrightarrow CH_3CCl_2CH_3 + POCl_3$

222 **(a)**

Grignard reagent is RMgX.

223 **(c)**

CN^- (cyanide) is an ambidenate ligand, *i.e.*, it can donate electrons to the alkyl iodide either by using carbon or by using nitrogen.



In principle, the reaction can occur either through carbon or nitrogen. But in practice, the reaction mainly occurs through carbon as carbon behave like a strong nucleophile.

224 **(a)**

The iodoform test is given by compounds which have

$$CH_3-\overset{\overset{O}{\|}}{C}- \text{ or } CH_3-\overset{\overset{OH}{|}}{CH}- \text{ group.}$$

In this given compounds only CH_3CH_2OH gives positive iodoform test as it has

$$-\overset{\overset{OH}{|}}{CH}-CH_3 \text{ group.}$$

225 **(d)**

KBr and conc. H_2SO_4 gives HBr , which reacts with C_2H_5OH to give C_2H_5Br.

227 **(b)**

$$CCl_3COCH_3 + Ca(OH)_2 \longrightarrow CHCl_3 + (CH_3COO)_2Ca$$

228 **(d)**

$$\underset{(24+5+35.5)}{C_2H_5Cl} \xrightarrow{\text{Dehydrohalogenation}} \underset{(24+4)}{C_2H_4}$$

64.5 g of C_2H_5Cl forms=28 gC_2H_4

$\therefore$ 32.25 g of C_2H_5Cl will form= $\frac{28}{64.5} \times 32.25$

$= 14$ g C_2H_5

yield of alkene $=$ 50% of 14 g

$$= \frac{50}{100} \times 14 = 7\text{g}$$

229 **(d)**

p- dichlorobenzene molecule has symmetrical structure. It can fit well in its crystal lattice. The intermolecular forces of attraction are strong. Hence, it possesses highest melting point.

231 **(a)**

The compound containing

$$CH_3-\overset{\overset{O}{\|}}{C}- \text{ and } -\overset{\overset{OH}{|}}{CH}-CH_3$$

groups on heating with sodium hypoiodite (NaOI) or I_2 with aq. NaOH or aq. Na_2CO_3 gives yellow ppt. of iodoform and the reaction is known as iodoform.

$$H_3C-\underset{\underset{OH}{|}}{CH_2}-CH-CH_3 + OI^- \longrightarrow$$

$$CH_3-CH_2-\overset{\overset{O}{\|}}{C}-CH_3 + I^- + H_2O$$

$$CH_3-CH_2-\overset{\overset{O}{\|}}{C}-CH_3 + OI^- \longrightarrow$$

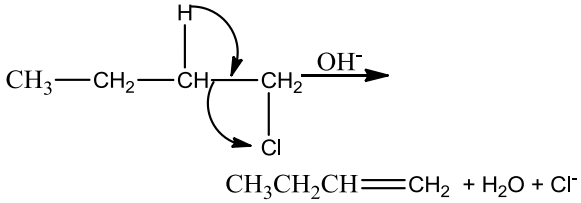
$$CH_3-CH_2-\overset{\overset{O}{\|}}{C}-CI_3 + \bar{O}H$$

$$CH_3CH_2-\overset{\overset{O}{\|}}{C}-CI_3 + HONa$$

$$CH_3-CH_2-\overset{\overset{O}{\|}}{C}-ONa + \underset{\text{iodoform}}{CHI_3}$$

232 **(a)**

Alkyl halides in presence of strong alcoholic alkali give elimination reaction.



234 **(b)**

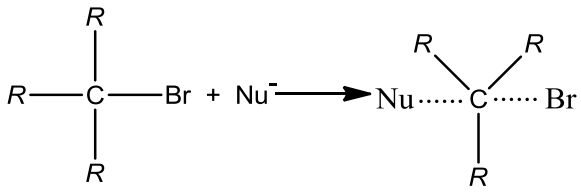
$$\underset{\text{Mol.wt.74}}{(CH_3)_3COH} \xrightarrow{H_2SO_4} \underset{\text{Mol.wt.56}}{(CH_3)_2C=CH_2}$$

$\because$ % yield $= 65$

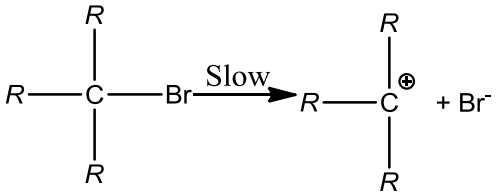
$\therefore$ Real yield $= \frac{56}{74} \times 37 \times \frac{65}{100} = 18.2$ g

235 **(a)**

In S_N2 reaction, nucleophile and alkyl halide react in one step.



Thus, tertiary carbon is under steric hindrance thus reaction does not take place until (C-Br) bond breaks



Which is the $S_N1$reaction.

236 **(b)**

$$CH_3CH_2CH_2Br \xrightarrow[\text{Dehydrobromination}]{\text{NaOH(alc.)}} CH_3CH{=}CH_2$$

(-HBr)

$$CH_3CH{=}CH_2 \xrightarrow[20^oC]{\text{HBr/acetic acid}} CH_3CHBr{\cdot}CH_3$$

Acc. To Markownikoff's rule.

$NaOH(aq.)$ will lead to the formation of $CH_3CH_2CH_2OH$; in

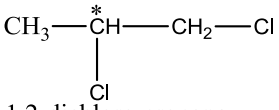
(d) $CH_3CHBrCH_2Br$ will be formed.

237 **(c)**

There are four isomers obtained.

$$CH_3 - CH_2 - CH_3 + Cl_2 \longrightarrow$$
$$CH_3 - CH_2 - CHCl_2 + 2HCl$$

(1,1,dichloro propane)



1,2-dichloro propane
(optical active)
d-and *l*-form

$$CH_2 - CH_2 - CH_2$$
$$| \qquad\qquad |$$
$$Cl \qquad\qquad Cl$$

1,3-dichloro propane

238 **(d)**

Two optical and two geometrical.

239 **(c)**

Industrial preparation of $CHCl_3$ is carried out by the action of bleaching powder over acetone.

240 **(a)**

$$RX + AgCN \rightarrow \underset{\text{alkyl isocyanide}}{RNC} + AgX$$

When alkyl halide reacts with silver cyanide, isocyanides are obtained. It is due to nucleophilic substitution in presence of Ag^+.

241 **(d)**

Neo-pentane gives only one monochloro derivative.

$$CH_3 - C(CH_3)_2 - CH_3 + Cl_2 \xrightarrow{UV} CH_3 - C(CH_3)_2 - CH_2Cl$$

242 **(d)**

$R\text{—}X + Zn \longrightarrow R\text{—}R + ZnX_2$; if Zn is used in place of Na, the reaction is called Frankland's reaction.

244 **(a)**

A gem dihalide possesses two halogens on same carbon atom.

245 **(b)**

R —MgX are obtained as ethereal solution.

246 **(a)**

Chloroform ($CHCl_3$) is formed on reaction of ethyl alcohol with bleaching powder. The reaction is complex and takes place in the following steps

(i) $CaOCl_2 + H_2O \rightarrow Ca(OH)_2 + Cl_2$

bleaching powder

(ii) $CH_3CH_2OH + Cl_2 \rightarrow CH_3CHO + 2HCl$

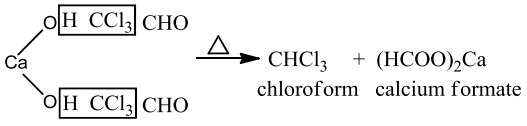
oxidation step

(iii) $CH_3CHO + 3Cl_2 \rightarrow CCl_3CHO + 3HCl$

chloral

chlorination step

(iv)



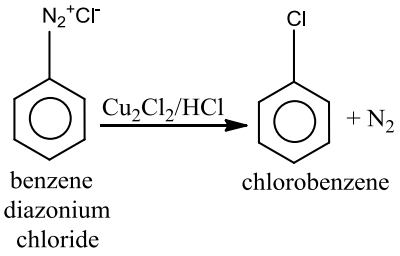
247 **(a)**

Chloral is commercial name of CCl_3CHO.

248 **(d)**

C—I bond is broken easily as well as ease of reaction is t-alkyl halide > s-alkyl halide > p-alkyl halide.

249 **(b)**



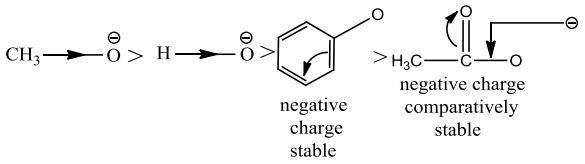
This reaction is known as Sandmeyer's reaction.

250 **(b)**

$(CH_3)_2CHCH_2Cl$ and $CH_3CH_2CH_2CH_2Cl$; only chain is different.

251 **(a)**

Nucleophilicity order is ;



254 **(a)**

$CHCl_3 + RNH_2 + 3KOH \longrightarrow \underset{\text{Foul smell}}{RNC} + 3KCl + 3H_2O$

255 **(a)**

Zn dust removes X_2 from molecule.

257 **(d)**

Order of reactivity of alkyl halide

iodide > bromide > chloride > fluoride and tertiary > secondary > primary

258 **(b)**

$R-X \xrightarrow{KOH(aq.)} R-OH$

259 **(d)**

Reactivity of t-alkyl halides to show S_N2 mechanism is least due to steric hinderance.

261 **(c)**

$CCl_4 + [H] \xrightarrow{Fe/H_2O(v)} CHCl_3$

262 **(a)**

$R-OH + PCl_5 \longrightarrow RCl + POCl_3 + HCl$

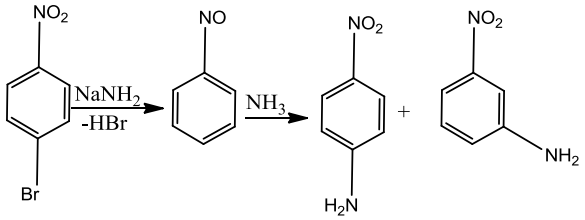
265 **(c)**

$R-I > R-Br > R-Cl > R-F$; reactivity order due to halogen atom.

$3^{\circ} > 2^{\circ} > 1^{\circ}$; reactivity order due to alkyl group.

266 **(c)**

Aryl halides in presence of strong base like$NaNH_2$, gives nucleophilic substitution reaction through benzyne intermediate.



267 **(b)**

Rest all replace —OH by —Cl.

268 **(c)**

-OH group is converted into –Cl group by $SOCl_2$ or anhydrous $ZnCl_2$/conc. HCl or HCl etc.

269 **(a)**

$\underset{\text{Chloroethane}}{C_2H_5Cl} + KCN \rightarrow \underset{\text{alcoholic}}{C_2H_5CN} + KCl$ $\quad\quad$ propanenitrile

270 **(a)**

$CH_3Br + OH^- \rightarrow CH_3OH + Br^-$

This reaction proceeds by S_N2 mechanism.

Rate $\propto$ [substrate][nucleophile]

Rate $\propto [CH_3Br][OH^-]$

271 **(b)**

$2CHCl_3 + \frac{1}{2}O_2 \longrightarrow COCl_2 + H_2O$;

$COCl_2$, *i. e.*, phosgene is poisonous gas.

272 **(d)**

Westrosol is formed during addition of Cl_2 on CH≡CH followed with action of lime. It is a very good solvent.

$CH{\equiv}CH + 2Cl_2 \longrightarrow \underset{\text{Westron}}{CHCl_2CHCl_2} \xrightarrow{\text{Lime}} \underset{\text{Westrosol}}{CHCl=CCl_2}$

274 **(c)**

C—Mg bond is covalent but polar.

275 **(c)**

$RX \longrightarrow R^+ + X^-$; $\quad \underset{\text{Carbocation}}{R^+} + OH^- \longrightarrow ROH$

277 **(a)**

10. Iodoform test is done to detect presence of CH_3CO group in organic compounds.

11. Fehling solution identifies aldehydes.

12. Tollen's reagent identifies aldehydes.

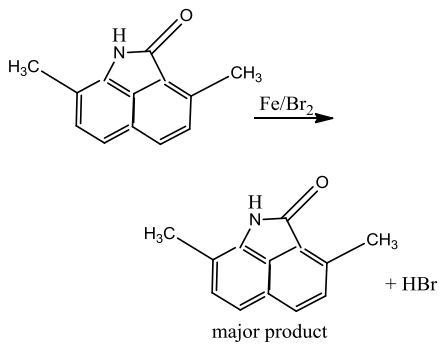
13. Schiff's reagent identifies aldehydes.

Methyl ketone is $CH_3-\overset{\overset{O}{\|}}{C}-R$.

$\because$ It has $CH_3-\overset{\overset{O}{\|}}{C}$ group. It is tested by using iodoform test.

The compound having CH_3CO group give yellow ppt. on reaction with I_2 and aqueous alkali.

278 **(b)**



major product

It is electrophilic substitution, so electrophile must be attacked on *o/p*-position due to higher electron density on this position. In this ring, the attached –NH- group will have high electron density due to resonance and *ortho* position is

blocked, so electrophile is attached on *para* position.

280 **(c)**

CCl_4 is covalent compound.

282 **(b)**

Westrosol is formed during addition of Cl_2 on CH≡CH followed with action of lime. It is a very good solvent.

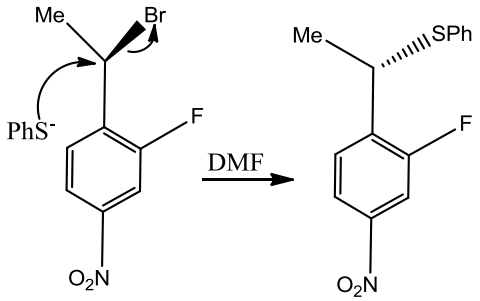
$$CH{\equiv}CH + 2Cl_2 \longrightarrow \underset{\text{Westron}}{CHCl_2CHCl_2} \xrightarrow{\text{Lime}} \underset{\text{Westrosol}}{CHCl = CCl_2}$$

283 **(b)**

Elimination reaction.

286 **(a)**

PhS^- is a strong nucleophile and dimethyl formamide (DMF) is a highly polar aprotic solvent. Condition indicates that nucleophilic substitution (S_N2) takes place at 2° benzylic place, stereochemically, it involves inversion of configuration.



287 **(a)**

C_2H_5Br gives yellow ppt. of AgBr whereas, $(CH_3)_2CHCl$ gives white ppt. if AgCl.

288 **(d)**

$$\underset{}{C_2H_5Br} \xrightarrow{AgCN} \underset{(X)}{C_2H_5NC} \xrightarrow{\text{Reduction}} \underset{(Y)}{C_2H_5NH.CH_3}$$

Ethyl isocyanide — ethyl methyl amine

289 **(d)**

S_N 1 order is TH > SH > PH.

290 **(c)**

$$C_2H_5Cl + NH_3 \longrightarrow (C_2H_5)_4N^+Cl^-$$

292 **(b)**

CH_3CHCl_2 gives aldehyde; $CH_2ClCH_2Cl_2$ gives glycol.

294 **(c)**

Chloroform is oxidised by air in the presence of light to form phosgene or carbonyl chloride which is poisonous gas.

$$\underset{\text{Chloroform}}{CHCl_3} + \frac{1}{2}O_2 \xrightarrow[\text{light}]{\text{Air}} \underset{\text{phosgene}}{COCl_2} + HCl$$

295 **(d)**

$$R{-}X \xrightarrow{KOH(aq.)} R{-}OH$$

296 **(a)**

$$CH_3CHBrCH_2CH_2CH_3 \xrightarrow{C_2H_5OK} CH_3CH{=}CHCH_2CH_3$$

α-,β- elimination gives *trans*-isomers as main product.

298 **(c)**

Oxidation of $CHCl_3$ occurs in air and light.

301 **(b)**

$$CHCl_3 \xrightarrow{4NaOH} HCOONa + 3NaCl + 2H_2O$$

303 **(d)**

Ethyl alcohol gives positive iodoform test (*i.e.*, yellow ppt. with I_2 and NaOH).

$$CH_3CH_2OH + 4I_2 + 6NaOH \rightarrow \underset{\text{yellow}}{CHI_3\downarrow} + 5NaI + CH_3COONa + 3H_2O$$

304 **(c)**

Reimer-Tiemann reaction.

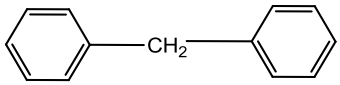
305 **(a)**

$(CH_3)_2CH{=}CH_2 \xrightarrow{HX} (CH_3)_2CX \cdot CH_3$;

Follow Markownikoff's rule.

306 **(b)**

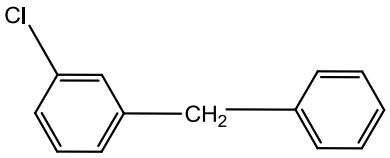
The molecular formula of diphenyl methane shows four isomers in form of monochloro derivatives.



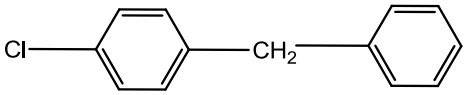
(Diphenyl methane)
$C_{13}H_{12}$

Monochloro derivatives

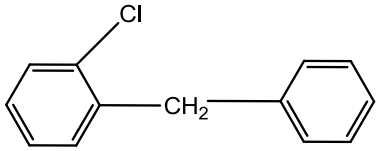
(i)



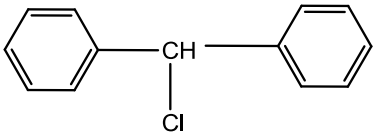
(ii)



(iii)

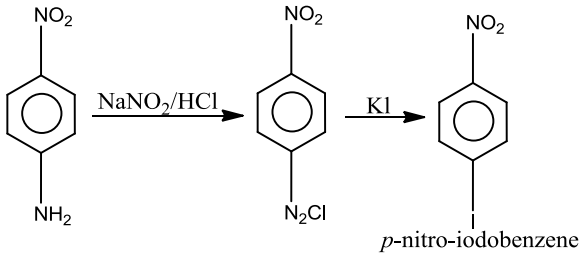


(iv)



307 **(a)**

p-nitroiodobenzene can be prepared from *p*-nitroaniline as follows



p-nitro-iodobenzene

308 **(a)**

Iodoform test is given by those compounds which have – CH_3CO group or on oxidation yields this group. HCHO does not give this test.

309 **(a)**

CCl_4 is fire extinguisher used under the name pyre

310 **(a)**

Among the primary halides reactivity order is $CH_3X > C_2H_5X > C_3H_7X$, also chlorobenzene is less reactive due to resonance.

311 **(b)**

A white ppt. of AgCl is obtained if $CHCl_3$ is impure.

312 **(d)**

$$CH_2OHCH_2OH \xrightarrow{HCl} CH_2ClCH_2Cl$$

313 **(c)**

Only iodides and fluorides are obtained.

315 **(a)**

$$CH_2{=}CH_2 + Cl_2 \longrightarrow CH_2ClCH_2Cl$$

316 **(a)**

$$CH_3CHCl_2 \xrightarrow{KOH(aq.)} CH_3CHO$$

317 **(a)**

$$C_6H_5NH_2 + CHCl_3 + 3KOH \longrightarrow \underset{\text{Bad smell}}{C_6H_5NC} + 3KCl + 3H_2O$$

318 **(c)**

An alkyl halide on heating with dry silver oxide gives ether.

$$\underset{\text{alkyl halide}}{2R - X} + \underset{\text{dry}}{Ag_2O} \xrightarrow{\Delta} \underset{\text{ether}}{R - O - R} + 2AgX$$

319 **(d)**

Ethyl alcohol converts phosgene to ethyl carbonate.

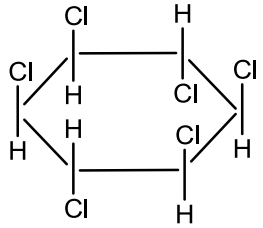
$$\underset{\text{phosgene}}{COCl_2} + 2C_2H_5OH \rightarrow \underset{\text{ethyl carbonate}}{(C_2H_5O)_2CO} + 2HCl$$

320 **(b)**

$$C_2H_5OH + HCl \xrightarrow{ZnCl_2} C_2H_5Cl$$

321 **(c)**

γ-isomer of cyclohexane hexachloride is strong pesticide. It is also known as lindane.



y-BHC

322 **(b)**

Methyl alcohol (CH_3OH) does not give iodoform test.

324 **(d)**

Elimination of HCl by alc. KOH.

325 **(b)**

Vapours of chloroform on inhaling causes unconsciousness.

327 **(a)**

Alkyl halides give elimination reaction with alcoholic KOH and yield an alkene or alkyne (from dihalides) *e. g* . ,

$$\underset{\text{1,2-dibromo ethane}}{Br\text{-}CH_2\text{-}CH_2\text{-}Br} \xrightarrow[\Delta]{\text{Alc.KOH}} \underset{\text{acetylene}}{\overset{sp}{CH} \equiv \overset{sp}{CH}}$$

Hence, product has both *sp*-hybridised carbon.

328 **(a)**

$$C_2H_5OH + PCl_5 \longrightarrow C_2H_5Cl + POCl_3 + HCl$$

329 **(c)**

$$CH_3CH_2\underset{\underset{Br}{|}}{C}HCH_3 \longrightarrow CH_3CH_2\overset{\oplus}{C}HCH_3$$

$$\xrightarrow{-H^+} \underset{\text{less Substituted}}{CH_3CH_2CH{=}CH_2} + \underset{\text{more substituted}}{CH_3CH{=}CHCH_3}$$

II I

Stability of I>II hence, I is predominant.

330 **(b)**

$$C_6H_5NH_2 + CHCl_3 + 3KOH \longrightarrow \underset{\text{Bad smell}}{C_6H_5NC} + 3KCl + 3H_2O$$

331 **(a)**

$$ROH + SOCl_2 \rightarrow RCl + SO_2 \uparrow + HCl \uparrow$$

$\because$ SO_2 and HCl are gaseous by-products and can be removed easily to get pure alkyl halide.

$\therefore$ It is best method for preparation of alkl halide.

332 **(b)**

$$CH_2{=}CHCl + HCl \longrightarrow CH_3CH_2Cl_2$$

335 **(d)**

When an alkyl halide reacts with alcoholic ammonia in a sealed tube then a mixture of primary, secondary and tertiary amine is formed.

$$RX + NH_3 \rightarrow \underset{\textit{pri}\text{-amine}}{RNH_2} + HX$$

$RNH_2 + XR \rightarrow \underset{sec\text{-amine}}{R_2NH} + HX$

$R_2NH + HX \rightarrow \underset{ter\text{-amine}}{R_3N} + HX$

336 **(d)**

Chloroform on reaction with nitric acid give chloropicrin (nitro chloroform) according to following reaction

$CHCl_3 + HNO_3 \rightarrow \underset{\substack{\text{nitrochloroform}\\(\text{chloropicrin})}}{C(NO_2)Cl_3} + H_2O$

337 **(d)**

$RMgX$ is soluble in each.

338 **(d)**

$CHCl_3 \xrightarrow{Zn/HCl(alc.)} CH_2Cl_2$

339 **(a)**

Ethyl bromide on treating with KCN, gives ethyl cyanide, which on reduction gives propyl amine.

$CH_3CH_2Br \xrightarrow{KCN} CH_3CH_2CN \xrightarrow{LiAlH_4} \underset{\text{propyl amine}}{CH_3CH_2CH_2NH_2}$

340 **(a)**

The compounds of oxyacids in which H-atom of —OH group is replaced by an alkyl group are called inorganic esters.

$R—X + K—O—N{=}O \rightarrow R—O—N{=}O + KX$

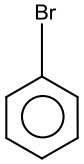
342 **(b)**

Chloroform is oxidised to a poisonous gas, phosgene ($COCl_2$) by atmospheric oxidation.

$CHCl_3 + O \rightarrow COCl_2 + HCl$

343 **(a)**

$X \xrightarrow[HNO_3]{AgNO_3}$ yellow or white ppt.



The above reaction is not give by because in bromobenzene, halogen is directly attached with the benzene ring.