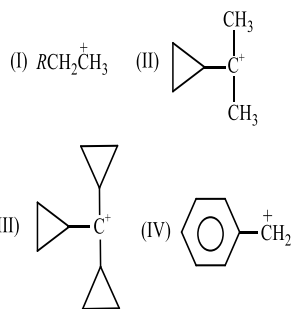


ORGANIC CHEMISTRY - SOME BASIC PRINCIPLES AND TECHNIQUES

CHEMISTRY

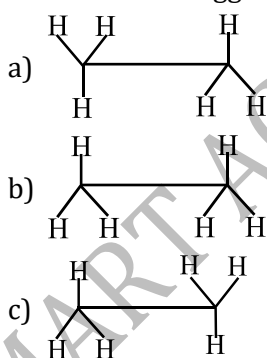
Single Correct Answer Type

- 3-phenylpropenoic acid is IUPAC name of :
a) Mendaleic acid b) Pyruvic acid c) Succinic acid d) Cinnamic acid
- How many isomers are possible for the compound having molecular formula $C_3H_5Br_3$?
a) 5 b) 4 c) 6 d) 8
- The strain in bonds of cyclopropane is :
a) $0^\circ 44'$ b) $24^\circ 44'$ c) $9^\circ 44'$ d) $5^\circ 16'$
- Chlorine in vinyl chloride is less reactive because :
a) sp^2 -hybridized carbon has more acidic character than sp^3 -hybridized carbon
b) C—Cl bond develops partial double bond character
c) Of resonance
d) All of the above are correct
- The alkene that exhibits geometrical isomerism is
a) Propene b) 2-methyl propene c) 2-butene d) 2-methyl-2-butene
- Pick out the alkane which differs from the other members of the group
a) 2,2-dimethyl propane b) Pentane c) 2-methyl butane d) 2, 2-dimethyl butane
- The IUPAC name of $\begin{array}{c} \text{CH}=\text{CH} \\ | \quad | \\ \text{OHC} \quad \text{NH}_2 \end{array}$ is :
a) 1-amino prop-2-enal
b) 3-amino prop-2-enal
c) 1-amino-2-formylethene
d) 3-amino-1-oxoprop-2-ene
- Detection of sulphur in sodium extract is done by
a) Lead acetate b) Sodium nitroprusside
c) Both (a) and (b) d) None of these
- The IUPAC name for $\begin{array}{c} \text{CH}_3 \\ | \\ \text{CH}_3\text{CHOHCH}_2-\text{C}-\text{OH} \\ | \\ \text{CH}_3 \end{array}$ is:
a) 1,1-dimethyl-1,2-butanediol
b) 2-methyl-2,4-pentanediol
c) 4-methyl-2,4-pentanediol
d) 1,3,3-dimethyl-1,3-propanediol
- In the following carbocations, the stability order is :



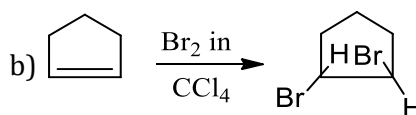
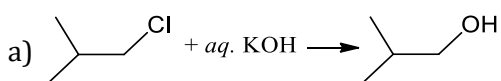
- a) III > II > IV > I b) IV > I > II > III c) IV > III > II > I d) III > IV > II > I
11. The shape of the π electron cloud in acetylene is
 a) Linear b) Planar c) Cylinder d) Doughnut
12. Acidified sodium fusion extract on addition of ferric chloride solution gives blood red colouration which confirm the presence of
 a) S and Cl b) N and S c) N d) S
13. Conversion of chlorobenzene to phenol involves
 a) Electrophilic substitution b) Nucleophilic substitution
 c) Free radical substitution d) Electrophilic addition
14. In sulphur detection of an organic compound, sodium nitroprusside solution is added to sodium extract. Formation of violet colour is due to
 a) $Na_3Fe(CN)_6$ b) $Na_3[Fe(CN)_5NOS]$ c) $Fe(CNS)_3$ d) None of these
15. The maximum bond energy is present
 a) C – H b) C – C c) C – N d) C – O
16. The number of secondary hydrogens in 2, 2-dimethyl butane is
 a) 8 b) 6 c) 4 d) 2
17. The name of the compound,
 $CH_3CH_2CH_2\overset{\overset{O}{||}}{C}CH_3$ is:
 a) 2-pentanone b) Pentanone-2 c) Pentan-2-one d) All are correct

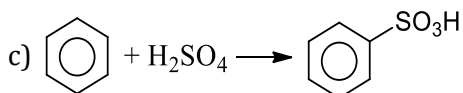
18. Find the non-staggered form(s) of ethane :



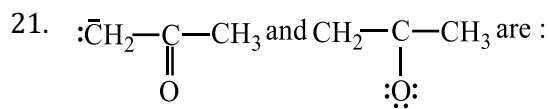
d) None of these

19. With a change in hybridisation of the carbon bearing the charge, the stability of a carbanion increase in the order
 a) $sp < sp^2 < sp^3$ b) $sp < sp^3 < sp^2$ c) $sp^3 < sp^2 < sp$ d) $sp^2 < sp < sp^3$
20. The addition reaction among the following is





d) All of the above



- a) Resonating structures
 b) Tautomers
 c) Geometrical isomers
 d) Optical isomers
22. The correct definition for organic chemistry is :
 a) Chemistry of carbon compounds
 b) Chemistry of compounds derived from living organisms
 c) Chemistry of hydrocarbons and their derivatives
 d) None of the above

23. Which of the organic compounds will give red colour in Lassaigne test?

- a) NaCNS
 b) $\begin{array}{c} \text{S} \\ || \\ \text{NH}_2 - \text{C} - \text{NH}_2 \end{array}$
 c) $\begin{array}{c} \text{O} \\ || \\ \text{NH}_2 - \text{C} - \text{NH}_2 \end{array}$
 d) None of these

24. The compound formed in the positive test for nitrogen with the Lassaigne solution of an organic compound is

- a) $\text{Fe}_4[\text{Fe}(\text{CN})_6]_3$
 b) $\text{Na}_3[\text{Fe}(\text{CN})_6]$
 c) $\text{Fe}(\text{CN})_3$
 d) $\text{Na}_4[\text{Fe}(\text{CN})_5\text{NOS}]$

25. IUPAC name of the compound, $\text{CH}_2\text{-}\overset{\text{CN}}{\underset{|}{\text{C}}}\text{-}\overset{\text{CN}}{\underset{|}{\text{C}}}\text{-}\overset{\text{CN}}{\underset{|}{\text{C}}}\text{-CH}_2$ is :

- a) 1,2,3-tricyanopropane
 b) Propane-1,2,3-tricarbonitrile
 c) 1,2,3-cyanopropane
 d) Propane tricarbylamine

26. Which of the following reactions proceeds *via* secondary free radical?

- a) $\text{CH}_3 - \text{CH} = \text{CH}_2 \xrightarrow{\text{HBr}} \text{CH}_3 - \underset{\text{Br}}{\underset{|}{\text{C}}} - \text{CH}_3$
 b) $\text{CH}_3 - \text{CH} = \text{CH}_2 \xrightarrow[\text{UV light}]{\text{HBr}} \text{CH}_3 - \text{CH}_2 - \text{CH}_2\text{Br}$
 c) $\text{C}_6\text{H}_6 \xrightarrow{\text{Br}_2/\text{FeBr}_3} \text{C}_6\text{H}_5\text{Br}$
 d) $\text{C}_6\text{H}_6 \xrightarrow[\text{UV light}]{\text{Br}_2} \text{C}_6\text{H}_5\text{Br}$

27. The production of an optically active compound from a symmetric molecule without resolution is called :

- a) Walden inversion
 b) Asymmetric synthesis
 c) Partial racemisation
 d) None of these

28. Among the following, which one has more than one kind of hybridization?

- (i) $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_3$
 (ii) $\text{CH}_3\text{CH} = \text{CHCH}_3$
 (iii) $\text{CH}_2 = \text{CH} - \text{CH} \equiv \text{CH}$
 (iv) $\text{CH} \equiv \text{CH}$
 a) (ii) and (iii) b) (ii) and (i) c) (iii) and (iv) d) (iv)

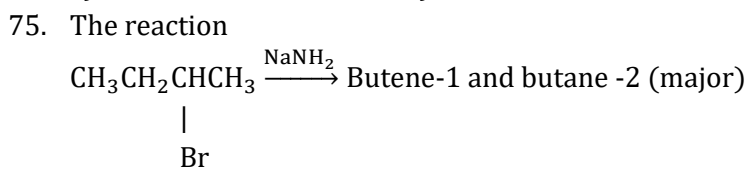
29. The IUPAC name of $\text{C}_6\text{H}_5\text{COCl}$ is

- a) Benzoyl chloride
 b) Benzene chloro ketone
 c) Benzene carbonyl chloride
 d) Chloro phenyl ketone

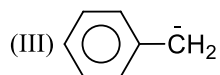
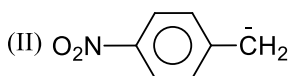
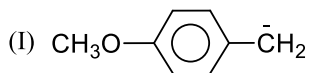
30. In the compound,

59. "The negative part of the addendum adds on the carbon atom joined to the least number of hydrogen atoms." This statement is called :
- Markownikoff's rule
 - Peroxide effect
 - Baeyer's strain theory
 - Thiele's theory
60. The total number of isomeric carbocations possible for the formula $C_4H_9^+$ is :
- 3
 - 4
 - 2
 - 5
61. The correct order for homolytic bond dissociation energies. (ΔH in kcal/mol) for CH_4 (A), C_2H_6 (B) and CH_3Br (C), under identical experimental conditions
- $C > B > A$
 - $B > C > A$
 - $C > A > B$
 - $A > B > C$
62. The sodium extract of an organic compound on treatment with $FeSO_4$ solution, $FeCl_3$ and HCl gives a red solution. The organic compound contains
- Both nitrogen and sulphur
 - Nitrogen only
 - Sulphur only
 - Halogen
63. *d*-tartaric acid and *l*-tartaric acid are :
- Structural isomers
 - Diastereoisomers
 - Tautomers
 - Enantiomers
64. Which of the following is a pair of functional isomers?
- CH_3COCH_3 , CH_3CHO
 - $C_2H_5CO_2H$, $CH_3CO_2CH_3$
 - $C_2H_5CO_2H$, $CHCO_2C_2H_5$
 - CH_3CO_2H , CH_3CHO
65. Which of the following is an optically active compound?
- Lactic acid
 - Chloro acetic acid
 - Meso*-tartaric acid
 - Acetic acid
66. Give the correct IUPAC name for
- $$\begin{array}{c} CH_3 \\ | \\ CH_3 \cdot CH_2OCH \cdot CH_2 \cdot CH_2 \cdot CH_2Cl \end{array}$$
- 2-ethoxy-5-chloropentane
 - 1-chloro-4-ethoxy-4-methylbutane
 - 1-chloro-4-ethoxypentane
 - Ethyl-1-chloropentylether
67. The IUPAC name of the compound,
- $$\begin{array}{c} CH_2 - CH - CH_2 \\ | \quad | \quad | \\ OH \quad OH \quad OH \end{array} \text{ is :}$$
- 1,2,3-trihydroxypropane
 - 3-hydroxypentane-1,5-diol
 - 1,2,3-hydroxypropane
 - Propane-1,2,3-triol
68. Bond energywith the increase in number of lone pairs on the bonded atoms.
- Decreases
 - Increases
 - Does not change
 - None of these
69. A liquid decomposes at its normal boiling point. It can be purified by
- Sublimation
 - Steam distillation
 - Vacuum distillation
 - Fractional distillation
70. On monochlorination of 2-methyl butane, the number of chiral compounds formed are :
- 2
 - 4
 - 6
 - 8
71. Stability of which intermediate is not governed by hyperconjugation?
- Carbon cation
 - Carbon anion
 - Carbon free radical
 - None of these
72. The ammonia evolved from the treatment of 0.30g of an organic compound for the estimation of nitrogen was passed in 100mL of 0.1M sulphuric acid. The excess of acid required 20mL of 0.5 M sodium hydroxide solution for complete neutralisation. The organic compound is
- Acetamide
 - Benzamide
 - Urea
 - Thiourea
73. Conversion of CH_4 to CH_3Cl is an example of which of the following reaction?
- Electrophilic substitution
 - Free radical addition

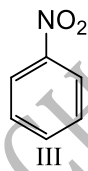
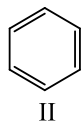
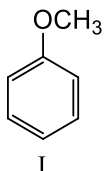
- c) Nucleophilic substitution
 74. Number of possible isomers of glucose are :
 a) 10 b) 14 c) 16 d) 20



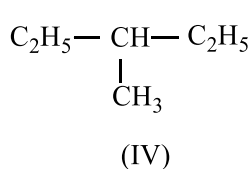
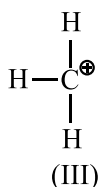
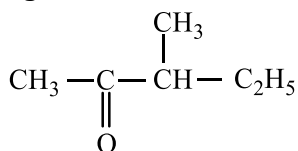
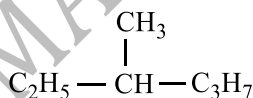
- The correct statement (s) are
 a) 2-butene is Saytzeff product b) 1-butene is Hofmann (s) product
 c) The elimination reaction follows Saytzeff rule d) All of the above
76. Consider the following carbanions



- Correct order of stability is
 a) I>II>III b) III>II>I c) II>III>I d) I>III>II
77. The stability of 2,3-dimethyl but-2-ene is more than 2-butene. This can be explained in terms of :
 a) Resonance b) Hyperconjugation c) Electromeric effect d) Inductive effect
78. Protin solvent is
 a) Diethyl ether b) n-hexane c) Acetone d) Ethanol
79. Addition of Br₂ on *trans*-butene-2 gives :
 a) A racemic mixture of 2,3-dibromobutane
 b) Meso form of 2,3-dibromobutane
 c) Dextro form of 2,3-dibromobutane
 d) Laevo form of 2,3-dibromobutane
80. Among the following compounds (I-III) the correct order of reaction with electrophilic reagent is



- a) II>III>I b) III<I<II c) I>II>III d) I=II>III
81. During AgNO₃ test for detection of halogens, sodium extract is boiled with few drops of conc. HNO₃ to decompose
 a) NaCN b) Na₂S c) Both (a) and (b) d) None of these
82. Which is true about following?



- a) Only III is a chiral compound

96. The optically active alkane with lowest molecular weight is :

- a) $\text{CH}_3\text{CH}_2\text{C}\equiv\text{CH}$ b) $\text{CH}_3\text{CH}_2-\overset{\text{CH}_3}{\underset{|}{\text{CH}}}-\text{CH}_3$ c) $\text{CH}_3-\overset{\text{H}}{\underset{\text{C}_2\text{H}_5}{\text{C}}}-\triangle$ d) $\text{CH}_3\text{CH}_2\cdot\text{CH}_2\text{CH}_3$

97. Which type of isomerism is most common among ethers?

- a) Metamerism b) Functional c) Chain d) Position

98. With a change in hybridisation of the carbon bearing the charge, the stability of a carbanion increase in the order

- a) $sp < sp^2 < sp^3$ b) $sp < sp^3 < sp^2$ c) $sp^3 < sp^2 < sp$ d) $sp^2 < sp < sp^3$

99. A molecule is $R_3\text{C}-\text{H}$. If H is replaced by $Z(R_3\text{C}-Z)$ and on doing so electron density on $R_3-\text{C}$ part increases, then Z is :

- a) Electron attracting group
b) Electron withdrawing group
c) Electron repelling group
d) Either of the above

100. Which of the following compounds are not arranged on order of decreasing reactivity towards electrophilic substitution?

- a) Fluorobenzene > chlorobenzene > bromo benzene
b) Phenol > *n*-propyl benzene > benzoic acid >
c) Chlorotoluene > *para*-nitrotoluene > 2-chloro-4-nitro toluene
d) Benzoic acid > phenol > *n*-propyl benzene

101. A mixture of camphor and benzoic acid can be separated by

- a) Sublimation b) Extraction with a solvent
c) Chemical method d) Fractional crystallisation

102. Resonance in benzene is accompanied by delocalisation of π -electrons. Each π -electron is attached with :

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

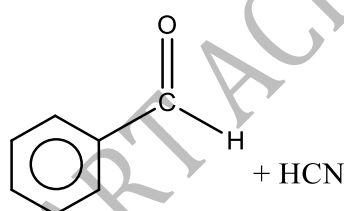
103. Grignard reagent adds to

- a) >C=O b) $-\text{C}\equiv\text{N}$ c) >C=S d) All of these

104. Resonance energy is more for

- a) C_6H_6 b) Cyclohexene
c) Cycloheptene d) Cyclohexa -1,2,3-triene

105. The reaction



is an example of

- a) Electrophilic addition b) Electrophilic substitution
c) Nucleophilic substitution d) Nucleophilic addition

106. Which of the following is not chiral?

- a) 3-bromopentane
b) 2-hydroxy propanoic acid
c) 2-butanol
d) 2,3-dibromopentane

107. The structures $(\text{CH}_3)_3\text{CBr}$ and $\text{CH}_3[\text{CH}_2]_3\text{Br}$ represent

- a) Chain isomerism b) Position isomerism
c) Chain as well as position isomerism d) Functional isomerism

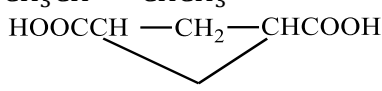
122. Which kind of fission is favoured by sunlight?

- a) Heterolytic fission b) Homolytic fission c) Both (a) and (b) d) None of these

123. The stability of the free radicals allyl, benzyl, 3°, 2°, 1° and CH₃ is in the order

- a) Benzyl > allyl > 3° > 2° > 1° > CH₃ b) Allyl > 3° > benzyl > 2° > 1° > CH₃
c) 3° > 2° > 1° > CH₃ > allyl > benzyl d) 3° > 2° > 1° > CH₃ > allyl = benzyl

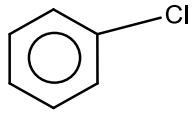
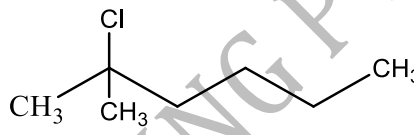
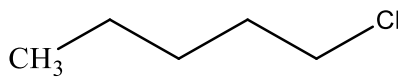
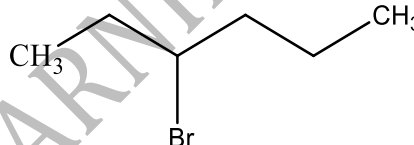
124. Which class of compounds can exhibit geometrical isomerism?

- a) C₆H₅CH = NOH
b) CH₃CH = CHCH₃
c) 
d) All of the above

125. The correct order of increasing basicity of the given conjugate bases (R=CH₃) is

- a) RCOO⁻ < HC ≡ C⁻ < R⁻ < NH₂⁻ b) R⁻ < HC ≡ C⁻ < RCOO⁻ < NH₂⁻
c) RCOO⁻ < NH₂⁻ < HC ≡ C⁻ < R⁻ d) RCOO⁻ < HC ≡ C⁻ < NH₂⁻ < R⁻

126. Which of the following shows S_N1 reaction most readily?

- a) 
b) 
c) 
d) 

127. Which of the following compounds is optically active?

- a) (CH₃)₂CHCH₂OH b) CH₃CH₂OH c) CCl₂F₂ d) CH₃CHOHC₂H₅

128. To which ring size cycloalkanes, Baeyer's strain theory is not valid?

- a) 3 carbon b) 4 carbon c) 5 carbon d) ≥ 6 carbon

129. The S_N1 mechanism for substitution reaction by nucleophile is favoured by :

- a) Low concentration of nucleophile
b) Weak nature of nucleophile
c) Polar solvent
d) All of the above

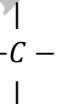
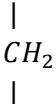
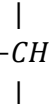
130. Which of the following orders is not correct regarding the -I effect of the substituents?

- a) -I < -Cl < -Br < -F b) -N⁺R₃ < -O⁺R₂
c) -N⁺R₂ < -O⁺R < -F d) -SR < -O⁺R < -OR₂⁺

131. Lactic acid shows optical activity in :

- a) Solution state b) Liquid state c) Crystalline state d) In all states

132. In cyclopropane, cyclobutane and cyclohexane, the common group is

- a)  b) 
c) -CH₃ d) 

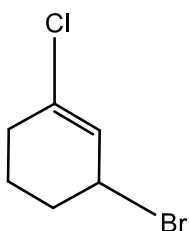
133. Total number of isomeric aldehydes and ketones that can exist with the molecular formula C₅H₁₀O :

- a) 5 b) 8 c) 6 d) 7

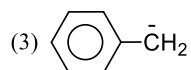
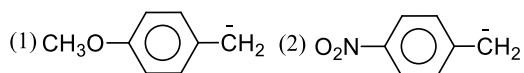
134. Allyl isocyanide has :

- a) 9σ and 4π-bonds
b) 8σ and 5π-bonds
c) 9σ, 3π and 2 non-bonded electrons
d) 8σ, 3π and 4 non-bonded electrons

135. $+I$ effect is shown by
 a) $-\text{CH}_3$ b) $-\text{Br}$ c) $-\text{Cl}$ d) $-\text{NO}_2$
136. LiAlH_4 is used as :
 a) Oxidizing agent b) Reducing agent c) A mordant d) A water softener
137. 0.765g of an acid gives 0.535g of CO_2 and 0.138 g of H_2O . Then, the ratio of the percentage of carbon and hydrogen is
 a) 19:2 b) 18:11 c) 20:17 d) 1:7
138. Which one of the following is the stable structure of cyclohexatriene?
 a) Chair form b) Boat form c) Half chair form d) Planar form
139. The IUPAC name of compound shown below is



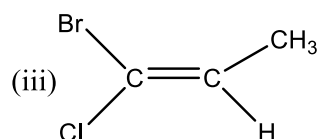
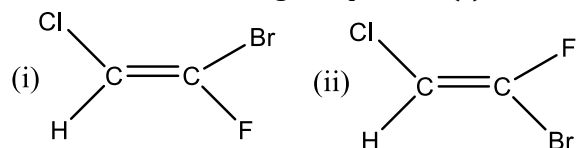
- a) 2-bromo-6-chlorocyclohex-1-ene b) 6-bromo-2-chlorocyclohexene
 c) 3-bromo-1-chlorocyclohexene d) 1-bromo-3-chlorocyclohexene
140. Total number of rotational conformers of *n*-butane are :
 a) 2 b) 6 c) 5 d) 3
141. Sublimation is a process in which a solid
 a) Changes into vapour form b) Changes into another allotropic form
 c) Changes into liquid form d) None of the above
142. IUPAC name of the compound
-
- a) 5-methyl-4-isopropyl-6,6'-diethyloctane b) 3,3-dimethyl, 3-ethyl-5-isopropyl octane
 c) 3,3-diethyl-4-methyl-5-(1,1-dimethyl) octane d) 3,3-diethyl-4-methyl-5-(1'-methylethyl) octane
143. The group named as benzal possessesnature.
 a) Monovalent b) Bivalent c) Trivalent d) Tetravalent
144. A secondary (2°) carbon is one that is joined to :
 a) 1-alkyl group b) 2-alkyl groups c) 3-alkyl groups d) None of these
145. Which type of strain is present in fully eclipsed conformation of butane?
 a) Angle strain b) Steric strain c) Both (a) and (b) d) Neither (a) nor (b)
146. 29.5 mg of organic compound containing nitrogen was digested according to Kjeldahl's method and the evolved ammonia was absorbed in 20mL of 0.1 M HCl solution. The excess of the acid required 15mL of 0.1M NaOH solution for complete neutralisation. The percentage of nitrogen in the compound is
 a) 59.0 b) 47.4 c) 23.7 d) 29.5
147. The highest electrical conductivity of the following aqueous solutions is of
 a) 0.1 M difluoroacetic acid b) 0.1 M fluoroacetic acid
 c) 0.1 M chloroacetic acid d) 0.1 M acetic acid
148. Consider the following carbanions



Correct order of stability is

- a) 1>2>3 b) 3>2>1 c) 2>3>1 d) 1>3>2

149. Which of the following compounds (s) has 'Z' configuration?



- a) (i) only b) (ii) only c) (iii) only d) (i) and (iii)

150. Nucleophiles are :

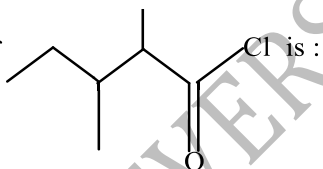
- a) Electron loving b) Electron hating c) Nucleus loving d) Nucleus hating

151. Ethyl acetoacetate exhibits :

- a) Optical isomerism
b) Geometrical isomerism
c) Tautomerism
d) enantiomerism

152. The total number of cyclic isomers possible for a hydrocarbon with the molecular formula C_4H_6 is

- a) 1 b) 3 c) 5 d) 7

153. The IUPAC name of  is :

- a) 2-ethyl-3-methylbutanoyl chloride
b) 2,3-dimethylpentanoyl chloride
c) 3,4-dimethylpentanoyl chloride
d) 1-chloro-1-oxo-2,3-dimethylpentane

154. A molecule of urea can show

- a) Chain isomerism b) Position isomerism
c) Geometrical isomerism d) Tautomerism

155. Cyclic hydrocarbon molecule (A) has all the C and H atoms in single plane. All the C-C bonds have same length, less than 1.54 \AA but more than 1.34 \AA . The \angle (angle) CCC is :

- a) $190^\circ 28'$ b) 100° c) 180° d) 120°

156. The number of π -electrons present in cyclobutadienyl ion, $(C_4H_3)^-$ is :

- a) 8 b) 6 c) 4 d) 2

157. Geometrical isomerism is possible in case of

- a) Pentene-2 b) Propane c) Pentane d) Ethene

158. The strongest base among the following is :

- a) NH_4^+
b) $:NH_3$
c) $:\bar{N}H_2$
d) $:\bar{O}H$

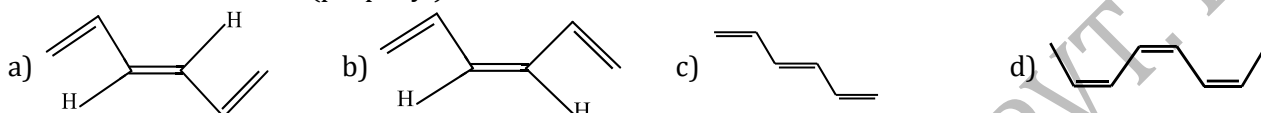
159. Anti-Markownikoff addition of HBr is not observed in :

- a) Propene b) Butene-1 c) But-2-ene d) Pent-2-ene
160. The number of 1°, 2° and 3° carbon atoms present in isopentane are respectively :
- a) 3, 2, 1 b) 2, 3, 1 c) 3, 1, 1 d) 2, 2, 1

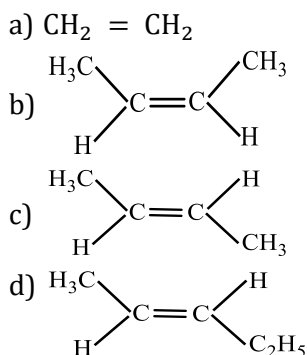
161. The restricted rotation about carbon-carbon double bond in 2-butene is due to:
- a) Overlap of two *p*-orbitals
 b) Overlap of one *p* and one *sp*²-hybridized orbitals
 c) Overlap of two *sp*²-hybridized orbitals
 d) Overlap of one *s* and one *sp*²-hybridized orbitals

162. Formation of acetylene from ethylene is an example of
- a) Addition reaction b) Substitution reaction
 c) Elimination reaction d) Condensation reaction

163. The structure of *cis-bis* (propenyl) ethane is :



164. The compound which reacts with HBr obeying Markownikoff's rule is:



165. A molecule of benzene contains :
- a) Twelve sigma-bonds and three pi-bonds
 b) Eighteen sigma-bonds and three pi-bonds
 c) Twelve pi-bonds and three sigma-bonds
 d) Six hydrogen-bonds, six sigma-bonds and three pi-bonds

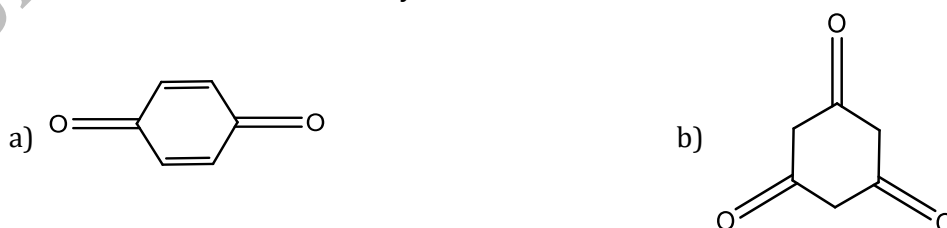
166. Zn—Cu couple used as reducing agent is :

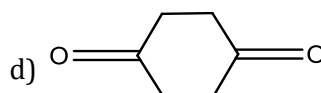
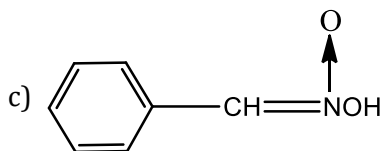
- a) Mixture of Zn and Cu powder
 b) Copper deposited on granulated zinc
 c) Zn deposited on copper fillings
 d) A rod half made of copper and half made of zinc

167. Considering the state of hybridization of carbon atoms, find out the molecule among the following which is linear?

- a) $\text{CH}_3 - \text{CH}_2 - \text{CH}_2 - \text{CH}_3$
 b) $\text{CH}_3 - \text{CH} = \text{CH} - \text{CH}_3$
 c) $\text{CH}_3 - \text{C} \equiv \text{C} - \text{CH}_3$
 d) $\text{CH}_2 = \text{CH} - \text{CH}_2 - \text{C} \equiv \text{CH}$

168. Tautomerism is not exhibited by

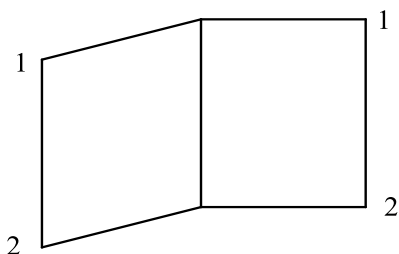




169. Which of the substance is purified by sublimation?

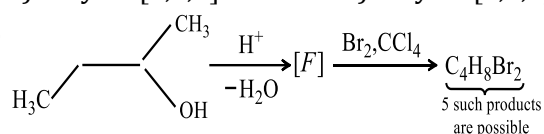
- a) Naphthalene b) Benzoic acid c) Camphor d) All of these

170. The IUPAC name of the following compound is



- a) Bicyclo [2,2,0] octane b) Bicyclo [0,2,2] hexane c) Bicyclo [2,1,1] hexane d) Bicyclo [2,2,0] hexane

171.



How many structures of F are possible?

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

172. Example of chlorinolysis is :

- a) $\text{CH}_2 = \text{CH}_2 \xrightarrow{\text{Cl}_2} \text{C}_2\text{H}_4\text{Cl}_2$
b) $\text{CCl}_4 + \text{H}_2\text{O} \rightarrow \text{COCl}_2 + 2\text{HCl}$
c) $\text{CHCl}_3 + 4\text{NaOH} \rightarrow \text{HCOONa} + 3\text{NaCl} + 2\text{H}_2\text{O}$
d) $\text{C}_3\text{H}_8 \xrightarrow{\text{Cl}_2} \text{CCl}_4 + \text{C}_2\text{Cl}_6 + 8\text{HCl}$

173. The number of optical enantiomorphs of tartaric acid :

- a) 3 b) 2 c) 4 d) 1

174. IUPAC name of $\text{CH}_3 - \text{CH} - \text{CH}_2 - \text{CHO}$ is



- a) 3-chlorobutanol b) 3-chlorobutanaldehyde
c) 3-chlorobutanal d) 2-chlorobutanol

175. 4 g of hydrocarbon on complete combustion gave 12.571 g of CO_2 and 5.143 g of water. What is the empirical formula of the hydrocarbon?

- a) CH b) C_2H_3 c) CH_2 d) CH_3

176. The compound which contains all the four 1° , 2° , 3° and 4° carbon atoms is

- a) 2, 3-dimethylpentane b) 3-chloro-2, 3-dimethylpentane
c) 2, 3, 4-trimethylpentane d) 3, 3-dimethylpentane

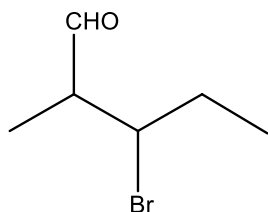
177. Which of the following is useful for making pure water from a solution of salt in water?

- a) Filtration b) Distillation c) Chromatography d) Steam distillation

178. Which of the following does not contain chiral carbon atom?

- a) Lactic acid b) 2-chlorobutanoic acid c) Tartaric acid d) Succinic acid

179.



The IUPAC name of _____ is

- a) 2-methyl-3-bromohexanal b) 3-bromo-2-methylbutanal
 c) 2-bromo-3-bromobutanal d) 3-bromo-2-methylpentanal

180. $\text{CH}_3\text{CH}_2\text{Cl}$ undergoes homolytic fission, produces

- a) $\text{CH}_3\dot{\text{C}}\text{H}_2$ and $\dot{\text{C}}\text{l}$ b) $\text{CH}_3\overset{\oplus}{\text{C}}\text{H}_2$ and $\overset{\ominus}{\text{C}}\text{l}$ c) $\text{CH}_3\overset{\oplus}{\text{C}}\text{H}_2$ and $\dot{\text{C}}\text{l}$ d) $\text{CH}_3\dot{\text{C}}\text{H}_2$ and $\overset{\ominus}{\text{C}}\text{l}$

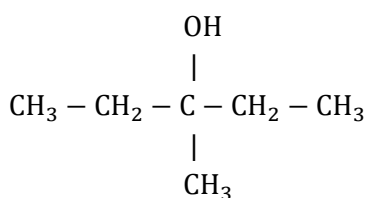
181. Among the following orbital bonds, the angle is minimum between :

- a) $sp^3 - sp^3$ bonds b) p_x and p_y -orbitals c) $\text{H}-\text{O}-\text{H}$ in water d) $sp - sp$ bonds

182. Which of the following is the correct order of decreasing $\text{S}_{\text{N}}2$ reactivity? ($\text{X}=\alpha$ halogen)

- a) $\text{RCH}_2\text{X} > \text{R}_3\text{CX} > \text{R}_2\text{CHX}$ b) $\text{RCH}_2\text{X} > \text{R}_2\text{CHX} > \text{R}_3\text{CX}$
 c) $\text{R}_3\text{CX} > \text{R}_2\text{CHX} > \text{RCH}_2\text{X}$ d) $\text{R}_2\text{CHX} > \text{R}_3\text{CX} > \text{R}_2\text{CH}_2\text{X}$

183. Write the IUPAC name of

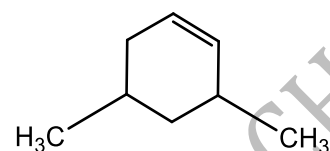


- a) 3-methylpentane-3-ol b) 3-hydroxyhexane
 c) 3-hydroxy-3-methyl pentane d) All of the above

184. Polarization of electron in acrolein may be written as

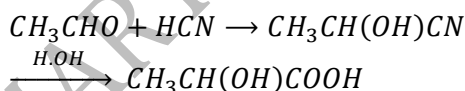
- a) $\overset{-\delta}{\text{C}}\text{H}_2=\overset{+\delta}{\text{C}}\text{H}-\text{C}\text{H}=\text{O}$ b) $\overset{-\delta}{\text{C}}\text{H}_2=\text{C}\text{H}-\overset{+\delta}{\text{C}}\text{H}=\text{O}$
 c) $\overset{-\delta}{\text{C}}\text{H}_2=\overset{+\delta}{\text{C}}\text{H}-\text{C}\text{H}=\text{O}$ d) $\overset{+\delta}{\text{C}}\text{H}_2=\text{C}\text{H}-\text{C}\text{H}=\overset{-\delta}{\text{O}}$

185. IUPAC name of the following compound is



- a) 3, 5-dimethylcyclohexene b) 3, 5-dimethyl-1-cyclohexene
 c) 1, 5-dimethyl-5-cyclohexene d) 1, 3-dimethyl-5-cyclohexene

186. In this reaction,



an asymmetric centre is generated. The acid obtained would be

- a) 50%D+50%L-isomer b) 20%D+80%L-isomer c) D-isomer d) L-isomer

187. Two crystalline forms of a substance, one being a mirror image of the other are called :

- a) Pentane b) Chain isomers c) Stereoisomers d) Functional isomers

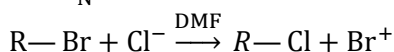
188. Which one of the following is an intermediate in the reaction of benzene with CH_3Cl in the presence of anhydrous AlCl_3 ?

- a) Cl^+ b) CH_3^- c) CH_3^+ d)

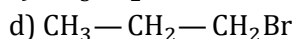
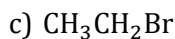
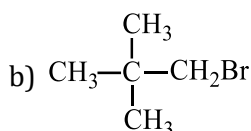
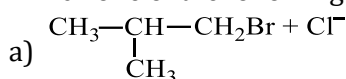
189. The number of optical isomers of $\text{CH}_3\text{CH}(\text{OH})\text{CH}(\text{OH})\text{CHO}$ is

- a) Zero b) 2 c) 3 d) 4
190. The ratio of σ -to π -bonds in benzene is:
 a) 2 b) 4 c) 6 d) 8

191. In a S_N2 substitution reaction of the type



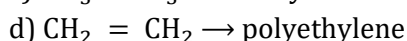
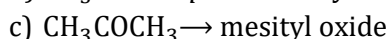
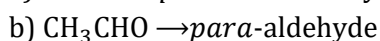
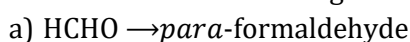
Which one of the following has the highest relative rate?



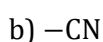
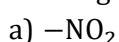
192. Hyperconjugation is

- a) $\sigma - \pi$ delocalisation b) No bond resonance c) $\sigma - \pi$ odd electron d) All of these

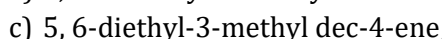
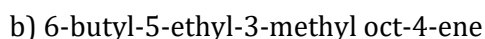
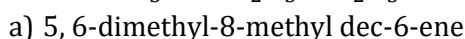
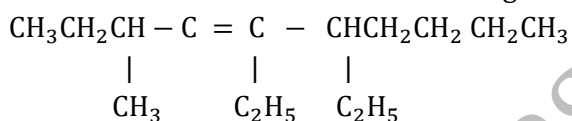
193. Which one of the following reactions is a condensation reaction?



194. Which group has the maximum-Inductive effect?



195. The correct IUPAC name of the following compound is



196. Which is incorrect about enantiomorphs?

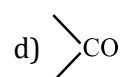
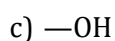
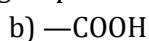
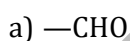
a) They rotate the plane of polarized light in different directions

b) They have mostly identical physical properties

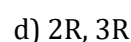
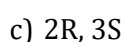
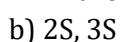
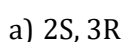
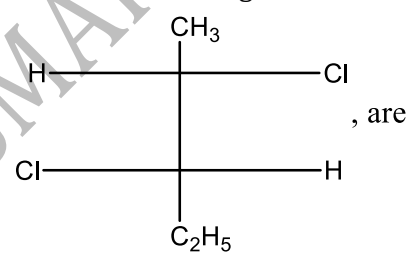
c) They have same configuration

d) They have different biological properties

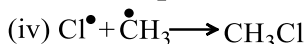
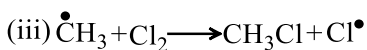
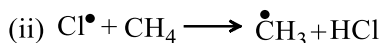
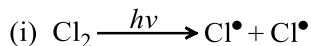
197. Which one is the seniormost functional group in the nomenclature of an organic compound if it possesses more than one functional group?



198. The absolute configuration of the following



199. Which step is chain termination step in the following mechanism?



- a) (i) b) (ii) c) (iii) d) (iv)

200. The reaction intermediate produced, by homolytic cleavage of a bond is called

- a) Carbene b) Carbocation c) Carbanion d) Free radical

201. Fractional distillation is useful in distillation of

- a) Petroleum b) Coal-tar c) Crude alcohol d) All of these

202. Which of the following species is paramagnetic?

- a) A carbocation b) A free radical c) A carbanion ion d) All of these

203. Sulphur trioxide is :

- a) An electrophile b) A nucleophile c) A homolytic reagent d) A base

204. In Kjeldahl's method, ammonia from 5g of food neutralizes 30 cm³ of 0.1 N acid. The percentage of nitrogen in the food is

- a) 0.84 b) 8.4 c) 16.8 d) 1.68

205. The number of isomeric alkanes having the molecular formula C₅H₁₂ is

- a) Three b) Five c) Nine d) Thirty two

206. Select the organic compound which was prepared for the first time in laboratory from its elements :

- a) Urea b) CH₃COOH c) C₂H₅OH d) None of these

207. Which of the following compounds can exist in optically active form?

- a) 1-butanol b) 2-butanol c) 3-pentanol d) 4-heptanol

208. The compound in which carbon uses only its sp³ hybrid orbitals for bond formation is

- a) (CH₃)₃COH b) HCOOH c) CH₃CHO d) (H₂N)₂CO

209. How many types of functional group can be present in an amine with the formula C₃H₉N?

- a) 1 b) 2 c) 3 d) 4

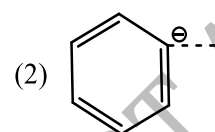
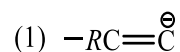
210. Select the most reactive cycloalkane :

- a) Cyclopropane b) Cyclobutane c) Cyclopentane d) Cyclohexane

211. The -I effect is shown by :

- a) -COOH b) -CH₃ c) -CH₃CH₂ d) -CHR₂

212. The stability of carbanions in the following ;



is in the order of :

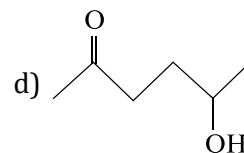
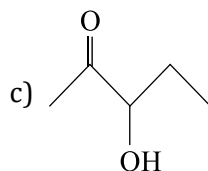
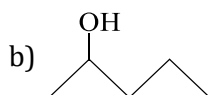
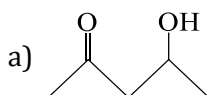
- a) (2) > (3) > (4) > (1)
b) (4) > (2) > (3) > (1)
c) (1) > (3) > (2) > (4)
d) (1) > (2) > (3) > (4)

213. Glyoxal is

- a) CH₂OH - CH₂OH b) CHO - CH₂OH c) COOH - CO - COOH d) CHO - CHO

214. IUPAC name of acraldehyde is

- a) But-3-en-1-al b) Propenyl aldehyde
c) But-2-ene-1-al d) Prop-2-en-1-al



232. The family to which methoxyethene belongs, is :

a) Hydrocarbon

b) Ketone

c) Unsaturated ether

d) Ester

233. Electrophiles are :

a) Electron loving species

b) Electron hating species

c) Nucleus loving reagents

d) Nucleus hating reagents

234. *Iso*-propyl chloride undergoes hydrolysis by

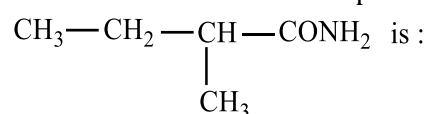
a) S_N1 mechanism

b) S_N2 mechanisms

c) S_N1 and S_N2 mechanisms

d) Neither S_N1 nor S_N2 mechanism

235. The IUPAC name of the compound,



a) 2-ethylbutanamide

b) 2-methylbutanamide

c) 1-amino-2-methylpropane

d) None of the above

236. Carbon and hydrogen are estimated in organic compounds by

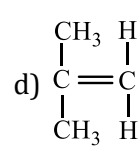
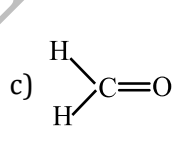
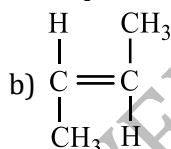
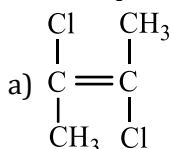
a) Kjeldahl's method

b) Duma's method

c) Leibig's method

d) Carius method

237. The compound having highest dipole moment is :



238. A free radical is :

a) Non-existing

b) Short lived

c) Diamagnetic

d) Fairly stable

239. In 2-methyl-1-propanol, the hybrid carbons of sp^3 , sp^2 and sp are respectively :

a) 3, 2, 1

b) 4, 3, 0

c) 4, 0, 0

d) 1, 2, 3

240. In electrophilic aromatic substitution reaction, the nitro group is *meta* directing because it

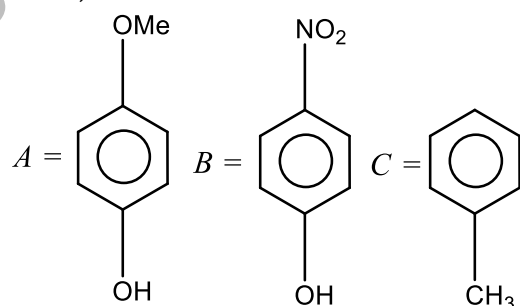
a) Decreases electron density at *ortho* and *para* positions

b) Decreases electron density at *meta* position

c) Increases electron density at *meta* position

d) Increases electron density at *ortho* and *para* positions

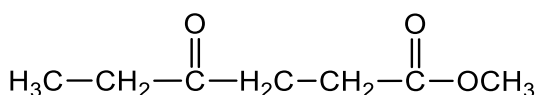
241. Given,



The decreasing order of the acidic character is

- a) $A > B < C$ b) $B > A > C$ c) $B > C > A$ d) $C > B > A$

242. Give the IUPAC name for,

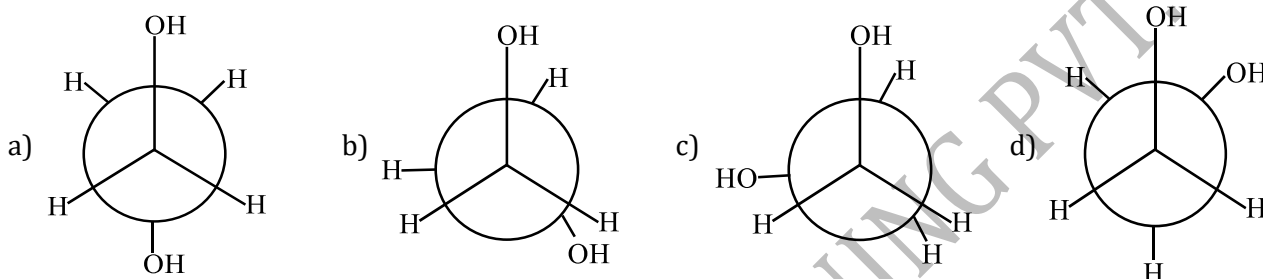


- a) Ethyl-4-oxoheptanoate
b) Methyl-4-oxoheptanoate
c) ethyl-4-oxohexanoate
d) Methyl 4-oxohexanoate

243. The total number of acyclic isomers including the stereoisomers with the molecular formula $\text{C}_4\text{H}_7\text{Cl}$

- a) 11 b) 12 c) 9 d) 10

244. Which of the following conformers for ethylene glycol is most stable?



245. Which of the following compounds is resistant to nucleophilic attack by hydroxy ion?

- a) Methylacetate b) Acetonitrile c) Acetamide d) Diethyl ether

246. The stabilization due to resonance is maximum in :

- a) Cyclohexane b) Cyclohexene c) 1,3-cyclohexadiene d) 1,3,5-cyclohexatriene

247. A mixture of camphor and benzoic acid can be easily separated by

- a) Sublimation b) Extraction with solvent
c) Fractional crystallisation d) Chemical method

248. Fractional crystallisations is carried out to separate a mixture of

- a) Organic solids mixed with inorganic solids
b) Organic solids slightly soluble in water
c) Organic solids having small difference in their solubilities in suitable solvent
d) Organic solids having great difference in their solubilities in suitable solvent

249. The type of isomerism observed in urea molecule is :

- a) Chain b) Position c) Geometrical d) Functional

250. Which of the following intermediate have the complete octet around the carbon atom?

- a) Carbonium ion b) Carbanion c) Free radical d) Carbene

251. The name of, $(\text{CH}_3)_2\text{HC}-\text{O}-\text{CH}_2-\text{CH}_2-\text{CH}_3$ is :

- a) Isopropyl propyl ether
b) Dipropyl ether
c) di-isopropyl ether
d) Isopropyl propyl ketone

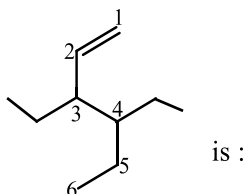
252. A neutral divalent carbon intermediate produced by the removal of two attached atoms is called :

- a) Free radical b) Carbanion c) Carbocation ion d) Carbene

253. Which types of isomerism is shown by 2, 3-dichlorobutane?

- a) Structural b) Geometric c) Optical d) Diastereo

254. The correct IUPAC name of the compound,



- a) 3-(1-ethyl propyl) hex-1-ene
 b) 4-Ethyl-3-propyl hex-1-ene
 c) 3-Ethyl-4-ethenyl heptane
 d) 3-Ethyl-4-propyl hex-5-ene
255. IUPAC name of $(\text{CH}_3)_2\text{N} - \text{C}_2\text{H}_5$ is :
 a) Dimethyl ethyl amine
 b) Dimethylaminomethane
 c) Dimethylaminoethane
 d) *N,N*-dimethylethanamine
256. Among the following compounds, the most acidic is
 a) *p*-nitrophenol
 b) *p*-hydroxybenzoic acid
 c) *o*-hydroxybenzoic acid
 d) *p*-toluic acid
257. Electrophiles are :
 a) Lewis bases
 b) Lewis acids
 c) Amphoteric
 d) None of these
258. On monochlorination of *n*-pentane, the number of isomers formed is :
 a) 4
 b) 3
 c) 2
 d) 1
259. Cyclohexane is :
 a) Aliphatic compound
 b) Alicyclic compound
 c) Aromatic compound
 d) Heterocyclic compound
260. Which of the following is a primary halide?
 a) Isopropyl iodide
 b) Secondary butyl iodide
 c) Tertiary butyl bromide
 d) Neo hexyl chloride
261. The percentage of 's' character of the hybrid orbital of carbon in ethane, ethane and ethyne respectively are :
 a) 25, 33, 50
 b) 20, 50, 33
 c) 25, 50, 75
 d) 33, 66, 99
262. Which is a chiral molecule?
 a) CH_3Cl
 b) CH_2Cl_2
 c) CHBr_3
 d) CHClBrI
263. The stability of a carbonium ion depends upon
 a) The bond angle of the attached group
 b) The substrate with which it reacts
 c) The inductive effect and hyper-conjugative effect of the attached group
 d) None of the above
264. The IUPAC name of the compound,

$$\text{CH}_3 - (\text{CH}_2)_4 - \underset{\text{CH}_3}{\text{CH}} - \overset{\text{CH}_3}{\underset{(\text{CH}_2)_3\text{CH}_3}{\text{C}}} - \text{CH}_2 - \text{CH}_3$$
 is :
 a) 3,4-dimethyl-3-*n*-propylnonane
 b) 4-ethyl-4,5-dimethyldecane
 c) 6,7-dimethyl-7-*n*-propylnonane
 d) 6,7-dimethyl-7-ethyldecane
265. Bromination of alkanes involves
 a) Carbanions
 b) Carbocations
 c) Carbenes
 d) Free radicals

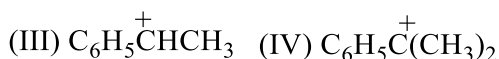
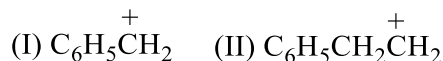
266. The isomeric *cis*-2-butene and *trans*-2-butene can be distinguished on the basis of :

- a) Their physical nature
- b) Their reduction products
- c) The products they give on ozonolysis
- d) The products they give on addition to bromine

267. Lassaigne's test is not used for the detection of

- a) Carbon
- b) Halogens
- c) Nitrogen
- d) Sulphur

268. Consider the following carbocations,



- a) II < I < III < IV
- b) II < III < I < IV
- c) III < I < II < IV
- d) IV < III < I < II

269. The simplest formula of a compound containing 50% of element X (at. wt 10) and 50% of element Y (at. wt. 20) is

- a) XY
- b) XY₂
- c) X₂Y
- d) X₂Y₂

270. *n*-pentane, iso-pentane, and *neo* - pentane are examples for isomers of the type

- a) Geometrical
- b) Optical
- c) Chain
- d) Positional

271. Homolytic fission of C—C bond in ethane gives an intermediate in which carbon ishybridized.

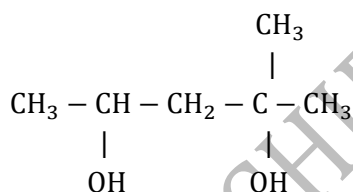
- a) sp³
- b) sp²
- c) sp
- d) sp²d

272. Pick out the correct statement from the following and choose the correct answer from the codes given below

- I. Hexa-1, 5-diene is a conjugated diene
- II. Prop-1, 2-diene is conjugated diene
- III. Hexa-1, 3-diene is a conjugated diene
- IV. Buta-1, 3-diene is an isolated diene
- V. Prop-1, 2-diene is a cumulative diene

- a) I,II
- b) II, III
- c) IV, V
- d) II, V

273. The IUPAC name of



- a) 1, 1-dimethyl-1, 3-butanediol
- b) 2-methyl-2, 4-pentanediol
- c) 4-methyl-2, 4-pentanediol
- d) 1, 3, 3-trimethyl-1, 3-propane diol

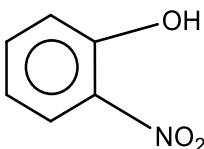
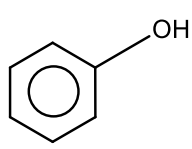
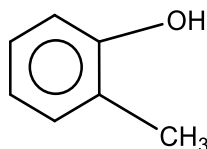
274. Which among the following is the correct IUPAC name of isoamylene?

- a) 1-pentene
- b) 2-methyl-2-butene
- c) 3-methyl-1-butene
- d) 2-mythyl-1-butene

275. Which of the following compounds exhibits geometrical isomerism?

- a) C₂H₅Br
- b) (CH)₂(COOH)₂
- c) CH₃CHO
- d) (CH₂)₂(COOH)₂

276. Which one of the following compounds, is most acidic?

- a) Cl - CH₂ - CH₂ - OH
- b) 
- c) 
- d) 

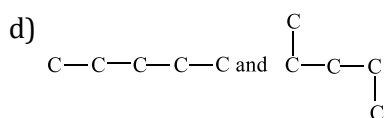
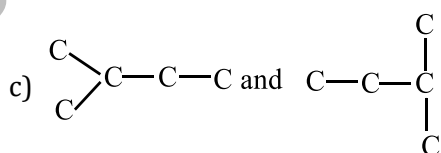
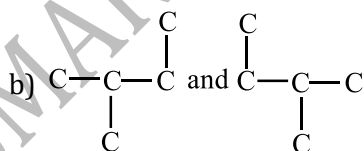
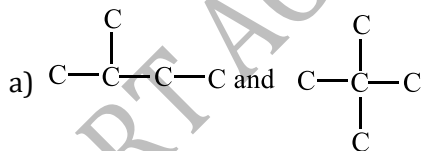
277. An organic compound has carbon and hydrogen percentage in the ratio 6:1 and carbon and oxygen percentages in the ratio 3:4. The compound has the empirical formula

- a) C₂H₆O
- b) CHO₂
- c) CH₄O
- d) CH₂O

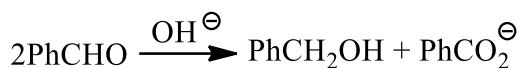
278. Among the following the one which does not exhibit functional group isomerism is :

- a) C₂H₆O
- b) C₃H₈O
- c) C₄H₁₀
- d) C₄H₁₀O

279. How many structural formulae are possible for $C_5H_{11}Cl$?
 a) 6 b) 8 c) 10 d) 12
280. Which one of the following is a secondary alcohol?
 a) 2-methyl-1-propanol b) 2-methyl-2-propanol c) 2-butanol d) 1-butanol
281. Among the following anions (a) $\bar{C}H_3$, (b) $\bar{N}H_2$, (c) OH^- , (d) F^- the order of basicity is :
 a) $a > b > c > d$ b) $b > a > c > d$ c) $c > b > a > d$ d) $c > a > b > d$
282. Electromeric effect is
 a) Permanent effect b) Temporary effect c) Resonance effect d) Inductive effect
283. In the following groups, $-OAC$ $-OMe$ $-OSO_2Me$ $-OSO_2CF_3$ the order of leaving group ability is :
 I II III IV
 a) $I > II > III > IV$ b) $IV > III > I > II$ c) $III > II > I > IV$ d) $II > III > IV > I$
284. The angle of rotation of plane of polarized light depends upon :
 a) The nature of the light beam
 b) The number of the molecules
 c) The number of asymmetric carbon atoms in the molecule of the substance
 d) All of the above
285. Which of the following shows geometrical isomerism?
 a) C_2H_5Br b) $(CH_2)(COOH)_2$ c) $(CH)_2(COOH)_2$ d) C_2H_6
286. Which of the following cannot undergo nucleophilic substitution under ordinary conditions?
 a) Chlorobenzene b) *Tert* -butylchloride c) Isopropyl chloride d) None of these
287. The C—C bond length of the following molecules is in the order.
 a) $C_2H_6 > C_2H_4 > C_6H_6 > C_2H_2$
 b) $C_2H_2 < C_2H_4 < C_6H_6 < C_2H_6$
 c) $C_6H_6 > C_2H_2 > C_2H_6 > C_2H_4$
 d) $C_2H_4 > C_2H_6 > C_2H_2 > C_6H_6$
288. Isomerism among compounds due to the migration of a proton is known as :
 a) Geometrical b) Optical c) Tautomerism d) Position
289. Removal of hydrogen atom is easier when it is attached to :
 a) 1° carbon b) 2° carbon c) 3° carbon d) Same in all
290. The order of stability of carbanions is :
 a) $CH_3^- > 1^\circ > 2^\circ > 3^\circ$ b) $3^\circ > 2^\circ > 1^\circ > CH_3^-$ c) $3^\circ > 1^\circ > 2^\circ > CH_3^-$ d) $2^\circ > 3^\circ > 1^\circ > CH_3^-$
291. Glycerine contains
 a) 1° carbon b) 2° carbon
 c) 3° carbon d) Both 1° and 2° carbon
292. Which of the following pairs of carbon skeletons in an example of isomerism?



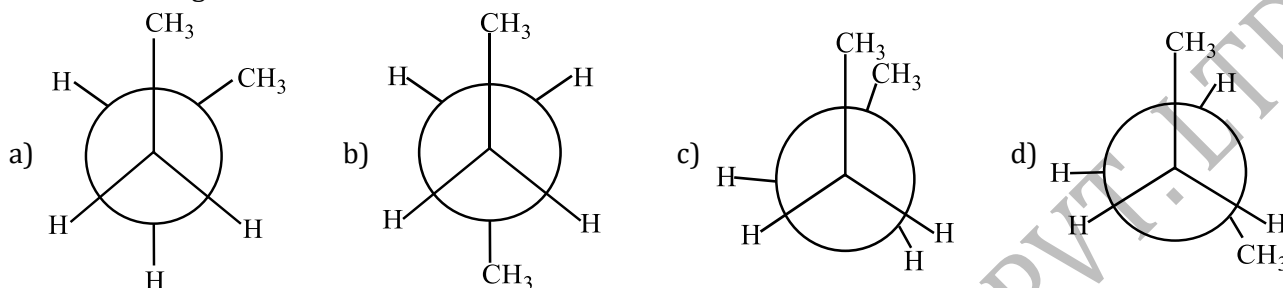
293. In cannizzaro reaction given below



The slowest step is

- The attack of $::\text{OH}^\ominus$ at the carboxyl group
- The transfer of hydride to the carbonyl group
- The abstraction of proton from the carboxylic group
- The deprotonation of PhCH_2OH

294. In the following the most stable conformation of *n*-butane is :



295. $\text{S}_{\text{N}}1$ mechanism for the reaction, $\text{R} - \text{X} + \text{KOH} \rightarrow \text{ROH} + \text{KX}$ follow :

- Carbocation mechanism
- Carbanion mechanism
- Free radical mechanism
- Either of the above

296. An electrophilic reagent must have

- A vacant orbital
- An orbital containing one electron
- An orbital containing two electrons
- All completely filled atomic orbitals

297. In which of the following structures the number of sigma bonds are equal to the number of π -bonds?

- 1,2-propadiene
- 2,3-dicyanobut-2-ene
- Tetracyanoethylene
- None of these

298. Which one of the starred carbons is the asymmetric one?

- $\text{CH}_3\text{CH}_2\overset{\times}{\text{C}}\text{HCH}_2\text{CH}_2\text{OH}$
|
Cl
- $\text{CH}_3\text{CH}_2\text{CH}_2\overset{\times}{\text{C}}\text{H}_2\text{CH}_2\text{OH}$
- $\text{CH}_3\overset{\times}{\text{C}}\text{H}_2\text{CH}_2\text{CH}_2\text{CH}_2\text{OH}$
- $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\overset{\times}{\text{C}}\text{H}_2\text{OH}$

299. The chemical name of anisole is

- Ethanoic acid
- Methoxy benzene
- Propanone
- Acetone

300. How many optically active stereoisomers are possible for butan-2, 3-diol?

- 1
- 2
- 3
- 4

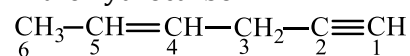
301. Naphthalene molecule contains :

- 10π -electrons
- 8π -electrons
- 12π -electrons
- 14π -electrons

302. The first organic compound urea was synthesized in the laboratory by:

- Kekule
- Liebig
- Lavoisier
- Wöhler

303. In the hydrocarbon



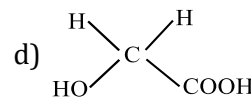
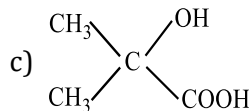
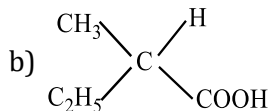
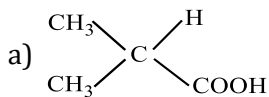
The state of hybridization of carbons 1, 3 and 5 are in the following sequence :

- sp, sp^3, sp^2
- sp, sp^2, sp^3
- sp^3, sp^2, sp
- sp^2, sp, sp^3

304. Which of the following is not a nucleophile?

- BF_3
- NH_3
- CN^-
- OH^-

305. Which of the following compounds can exhibit optical isomerism?



306. Which is the most stable carbocation?

- a) *iso*-propyl cation
c) Ethyl cation

- b) Triphenylmethyl cation
d) *n*-propyl cation

307. The correct structure of 4-bromo-3-methyl-but-1-ene.

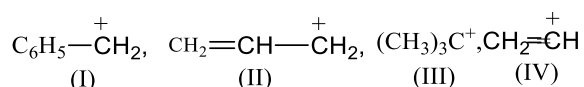
- a) $\text{Br} - \text{CH} = \text{C}(\text{CH}_3)_2$
c) $\text{CH}_2 = \text{C}(\text{CH}_3)\text{CH}_2\text{CH}_2\text{Br}$

- b) $\text{CH}_2 = \text{CH} - \text{CH}(\text{CH}_3) - \text{CH}_2\text{Br}$
d) $\text{CH}_3 - \text{C}(\text{CH}_3) = \text{CHCH}_2 - \text{Br}$

308. IUPAC name of $\text{C}_6\text{H}_5\text{COCl}$ is :

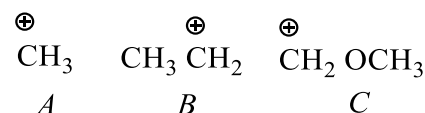
- a) Benzoyl chloride
b) Benzenechloro ketone
c) Benzene carbonyl chloride
d) Chloro phenyl ketone

309. Stability order of... is in order



- a) $\text{IV} < \text{III} < \text{II} < \text{I}$ b) $\text{IV} < \text{II} < \text{I} < \text{III}$ c) $\text{I} < \text{II} < \text{III} < \text{IV}$ d) $\text{IV} < \text{I} < \text{III} < \text{II}$

310. Relative stabilities of the following carbocations will be in the order



- a) $\text{C} > \text{B} > \text{A}$ b) $\text{C} < \text{B} < \text{A}$ c) $\text{B} > \text{C} > \text{A}$ d) $\text{C} > \text{A} > \text{B}$

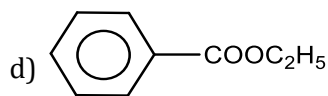
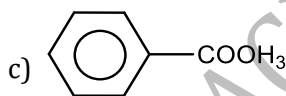
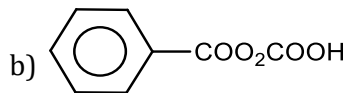
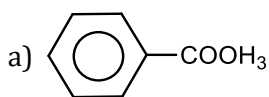
311. Which method is used to separate sugars?

- a) Fractional crystallisation b) Sublimation
c) Chromatography d) Benedict's reagent

312. Sublimation can't be used for purification of

- a) Benzoic acid b) Camphor c) Urea d) Naphthalene

313. Which of the following is phenyl ethanoate?



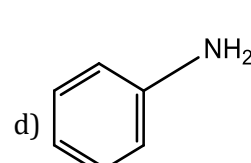
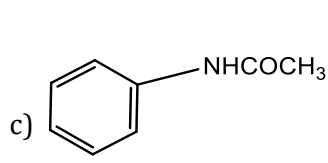
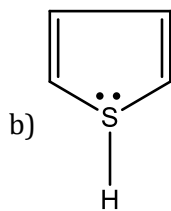
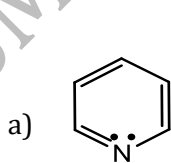
314. Zero inductive effect is shown by :

- a) $\text{C}_6\text{H}_5 -$ b) $- \text{H}$ c) $\text{CH}_3 -$ d) $\text{Cl} -$

315. Which of the following alkyl halides is used as a methylating agent?

- a) $\text{C}_2\text{H}_5\text{Cl}$ b) $\text{C}_2\text{H}_5\text{Br}$ c) $\text{C}_2\text{H}_5\text{I}$ d) CH_3I

316. Which one of the following has the most nucleophilic nitrogen?



317. Chlorobenzene is *o*, *p*-directing in electrophilic substituting reaction. The directing influence is explained by

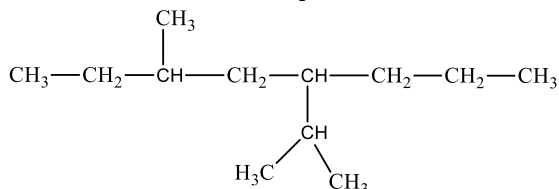
- a) $+M$ of Ph b) $+I$ of Cl c) $+M$ of Cl d) $-I$ of Ph

318. Which of the following orders regarding relative stability of free radicals is correct?
 a) $3^\circ < 2^\circ < 1^\circ$ b) $3^\circ > 2^\circ > 1^\circ$ c) $1^\circ < 2^\circ > 3^\circ$ d) $3^\circ > 2^\circ < 1^\circ$

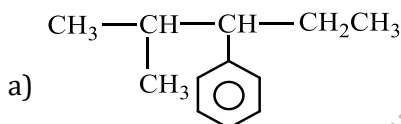
319. Carbon tetrachloride has no net dipole moment because of :

- a) Its planar structure
 b) Its regular tetrahedral nature
 c) Similar sizes of carbon and chlorine atoms
 d) Similar electron affinities of carbon and chlorine

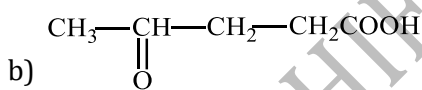
320. IUPAC name of the compound



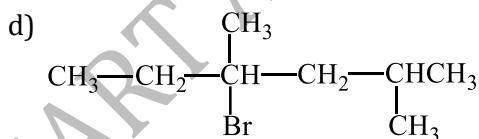
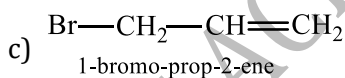
- a) 4-isopropyl, 6-methyl octane b) 3-methyl, 5-(1-methylethyl) octane
 c) 3-methyl, 5-isopropyl octane d) 6-methyl, 4-(1-methylethyl) octane
321. The isomers which are interconverted through rotation around a single bond are
 a) Conformers b) Diastereomers c) Enantiomers d) Position isomers
322. The number of optical isomers of pent-3-en-2-ol is :
 a) 2 b) 4 c) 8 d) 16
323. Dehydrohalogenation of an alkyl halide is a/an
 a) Nucleophilic substitution reaction
 b) Elimination reaction
 c) Both nucleophilic substitution and elimination reaction
 d) Rearrangement
324. The minimum number of carbon atoms which a ketone may contain is :
 a) 1 b) 2 c) 3 d) 4
325. Which nomenclature is not according to IUPAC system?



2-methyl-3-phenylpentane



5-oxohexanoic acid



4-bromo, 2, 4-di-methylhexane

326. What is the formula of tertiary butyl alcohol?

- a) $\text{CH}_3 - \text{CH}(\text{CH}_3) - \text{CH}_2 - \text{OH}$ b) $\text{CH}_3 - (\text{CH}_2)_2\text{OH}$
 c) $\text{CH}_3 - \text{CH}(\text{OH}) - \text{CH}_2 - \text{CH}_3$ d) $(\text{CH}_3)_3\text{C} - \text{OH}$

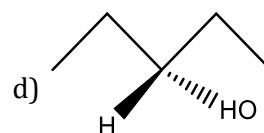
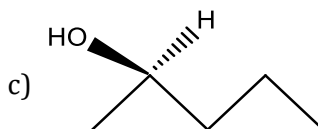
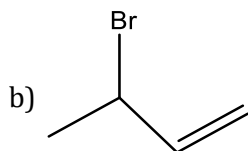
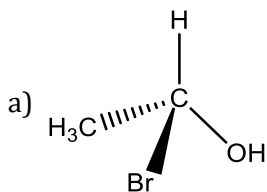
327. The IUPAC name of neopentane is

- a) 2-methylbutane b) 2,2-dimethylpropane c) 2-methylpropane d) 2,2-dimethyl butane

328. Select the strongest bond :

- a) $\text{>C}-\text{C}<$ b) $\text{>C}=\text{C}<$ c) $\begin{array}{c} | \\ -\text{C}-\text{C}= \\ | \end{array}$ d) $-\text{C}\equiv\text{C}-$

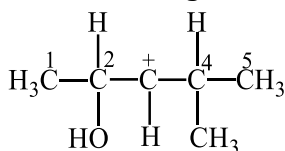
329. Which of the following molecules is achiral?



330. An enantiomerically pure acid is treated with racemic mixture of an alcohol having one chiral carbon. The ester formed will be

- a) Optically active mixture b) Pure enantiomer
c) Meso compound d) Racemic mixture

331. In the following carbocation, H/CH₃ that is most likely to migrate to the positively charged carbon is :



- a) CH₃ at C-4 b) H at C-4 c) CH₃ at C-2 d) H at C-2

332. The number of π-electrons in benzene molecule is :

- a) 3 × 2 b) 2³ c) 3 × 3 d) 3²

333. Which of the following statements is necessarily true in the case of isomeric organic compounds?

- a) They are hydrocarbons
b) They are optically active
c) They yield the same products on complete combustion
d) They have same melting or boiling points

334. *Cis* – *trans*, isomers generally

- a) Contain an asymmetric carbon atom b) Rotate the plane of polarized light
c) Are enantiomorphs d) Contain a double bonded carbon atoms

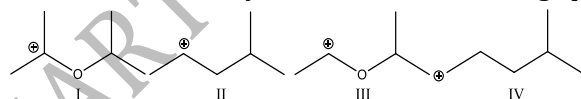
335. Among the following compounds nitrobenzene, benzene, aniline and phenol, the strongest basic behaviour in acid medium is exhibited by :

- a) Phenol b) Aniline c) Nitrobenzene d) Benzene

336. Geometrical isomerism is not shown by :

- a) $\text{CH}_3\text{CH}_2\overset{\text{CH}_3}{\underset{\text{CH}_3}{\text{C}}}=\text{CCH}_2\text{CH}_3$
b) $\text{C}_2\text{H}_5-\overset{\text{H}}{\text{C}}=\overset{\text{H}}{\text{C}}-\text{CH}_2\text{I}$
c) $\text{CH}_2 = \text{C}(\text{Cl})\text{CH}_3$
d) $\text{CH}_3-\text{CH}=\text{CH}_2 \rightarrow \text{CH}=\text{CH}_2$

337. The correct stability order for the following species as

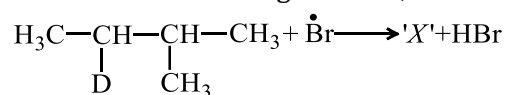


- a) II > IV > I > III b) I > II > III > IV c) II > I > IV > III d) I > III > II > IV

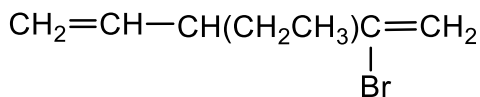
338. An optically active compound is :

- a) 1-bromobutane
b) 2-bromobutane
c) 1-bromo-2-methyl propane
d) 2-bromo-2-methyl propane

339. Consider the following reaction,

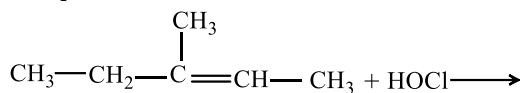


Identify the structure of the major product 'X' :



- a) 4-bromo-3-ethyl-1,4-pentadiene
 b) 2-bromo-3-ethyl-1,4-pentadiene
 c) 2-bromo-3-ethyl-1-5-pentadiene
 d) None of the above

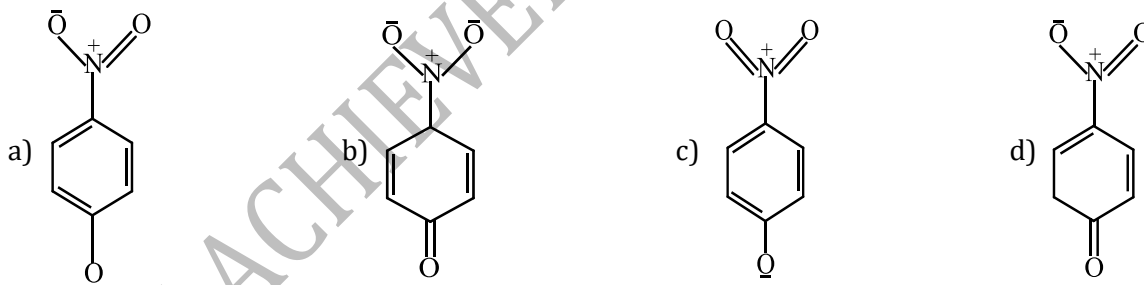
354. The product of reaction,



product is :

- a) $\text{CH}_3\text{CH}_2-\overset{\text{CH}_3}{\underset{\text{Cl}}{\text{C}}}-\underset{\text{OH}}{\text{CH}}-\text{CH}_3$
 b) $\text{CH}_3-\text{CH}_2-\overset{\text{CH}_3}{\underset{\text{OH}}{\text{C}}}-\underset{\text{Cl}}{\text{CH}}-\text{CH}_3$
 c) $\text{CH}_3-\text{CH}_2-\overset{\text{CH}_3}{\underset{\text{H}}{\text{C}}}-\underset{\text{Cl}}{\overset{\text{OH}}{\text{C}}}-\text{CH}_3$
 d) $\text{CH}_3-\text{CH}_2-\overset{\text{OH}}{\underset{\text{CH}_3}{\text{C}}}-\text{CH}_2-\text{CH}_2\text{Cl}$

355. The most unlikely representation of resonance structures of *p*-nitrophenoxide ion is :



356. For all practical purposes, influence of inductive effect is neglected after :

- a) 2nd carbon atom b) 1st carbon atom c) 3rd carbon atom d) None of these



N (isomeric produces) $\xrightarrow{\text{Fractional distillation}}$ *M* (isomeric product)

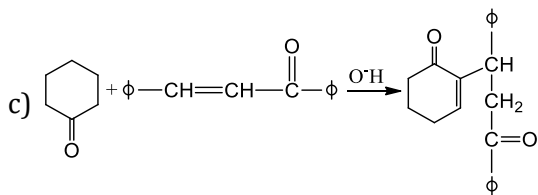
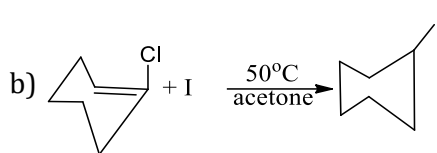
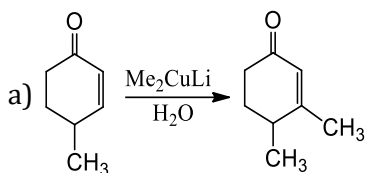
what are the no. of *N* and *M*?

- a) 6, 6 b) 6, 4 c) 4, 4 d) 3, 3

358. Geometrical isomers differ in :

- a) Position of functional groups
 b) Position of atoms
 c) Spatial arrangement of atoms
 d) Length of carbon chain

359. Which of the following is an example of substitution reaction?



d) None of the above

360. The study of three dimensional structure of molecule is called :

- a) Stereochemistry b) Solid state chemistry c) Chirality d) None of these

361. Orbital interaction between the σ -bonds of a substituent group and a neighbouring π -orbital is known as

- a) Hyperconjugation b) Inductive effect
c) Steric effect d) Electric quadrapole interactions

362. The shape of $\bar{C}H_3$ is :

- a) Linear b) Planar c) Pyramidal d) None of these

363. Which of the following contains only three pairs of electrons?

- a) Carbocation
b) Carbanion
c) Free radical
d) None of these

364. 2-hexyne gives *trans*-2-hexene on treatment with

- a) Li/NH₃ b) Pd/BaSO₄ c) LiAlH₄ d) Pt/H₂

365. Lassaigne's test for the detection of nitrogen fails in

- a) H₂N - CO - NHNH₂. HCl b) NH₂ - NH₂. HCl
c) NH₂ - CO - NH₂ d) C₆H₅ - NH - NH₂. HCl

366. Which of the following compounds yields most stable carbanion after rupture ^(C-C)_{1 2} of bond?

- a)
b)
c)
d) None of these

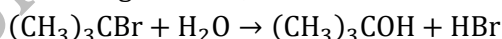
367. The IUPAC name of C₂H₅ - O - CH

- a) Ethoxy propane b) 1, 1-dimethyl ether c) 2-ethoxy *iso*-propane d) 2-ethoxy propane

368. The relative adsorption of each component of the mixture is expressed in terms of

- a) adsorption factor b) retention factor
c) co-factor d) sorption factor

369. Following reaction,



is an example of

- a) Elimination reaction b) Free radical substitution
c) Nucleophilic substitution d) Electrophilic substitution

370. The most stable carbonium ion among the following is

- a) C₆H₅CH₂⁺CH₂ b) CH₃⁺CH₂ c) C₆H₅CH⁺CH₂C₆H₅ d) C₆H₅CH₂⁺

371. *t*-butyl alcohol is

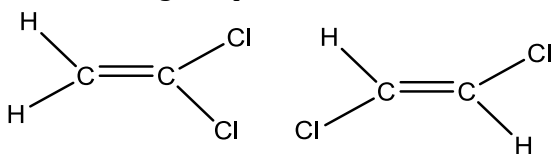
a) 2-methyl propane-2-ol

c) 3-methyl butan-1-ol

b) 2-methyl propane-1-ol

d) 3-methyl butan-2-ol

372. The following compound differ in



a) Configuration

b) Conformation

c) Structure

d) Chirality

373. A compound containing 80% C and 20% H is likely to be

a) C_6H_6

b) C_2H_6

c) C_2H_4

d) C_2H_2

374. Overlap of which of the following atomic orbitals would be maximum to form the strongest covalent bond?

a) $1s - 2s(\sigma)$

b) $1s - 2p(\sigma)$

c) $2p - 2p(\pi)$

d) $2p - 2p(\sigma)$

375. A strong base can abstract an α -hydrogen from :

a) Amine

b) Ketone

c) Alkane

d) Alkene

376. During elimination reactions, the hybrid state of carbon atoms involved in change shows:

a) sp^3 to sp^2 nature

b) sp^2 to sp nature

c) No change in hybridized state

d) Either of the above

377. IUPAC name of $\text{C}_6\text{H}_5\text{CN}$ is :

a) Phenyl nitrile

b) Benzene nitrile

c) Benzyl nitrile

d) Phenyl cyanide

378. Who proposed the tetrahedral mirror image structures to a pair of enantiomers?

a) Kekule

b) Wöhler

c) van't Hoff

d) None of these

379. The $\text{S}_{\text{N}}1$ reactivity of following halides will be in the order

(i) $(\text{CH}_3)_3\text{CBr}$ (ii) $(\text{C}_6\text{H}_5)_2\text{CHBr}$

(iii) $(\text{C}_6\text{H}_5)_2\text{C}(\text{CH}_3)\text{Br}$ (iv) $(\text{CH}_3)_2\text{CHBr}$

(v) $\text{C}_2\text{H}_5\text{Br}$

a) (v) > (iv) > (i) > (ii) > (iii)

b) (ii) > (i) > (iii) > (v) > (iv)

c) (i) > (iii) > (v) > (ii) > (iv)

d) (iii) > (ii) > (i) > (iv) > (v)

380. Heterolysis of propane gives :

a) Methyl and ethyl free radicals

b) Methyl cation and ethyl anion

c) Methyl anion and ethyl cation

d) Methyl cation and ethyl cation

381. Delocalised electrons are present in

a) 1, 3- butadiene

b) C_6H_6

c) 1, 3, 5-hexatriene

d) All of these

382. Compounds which rotate plane polarised light in clockwise direction are known as :

a) Dextrorotatory

b) Laevorotatory

c) Optically inactive compounds

d) Racemic

383. Carbanions initiate :

a) Addition reactions

b) Substitution reactions

c) Both (a) and (b)

d) None of these

384. Impure glycerine can be purified by

a) Steam distillation

b) Simple distillation

c) Vacuum distillation

d) Extraction with a solvent

385. IUPAC name of urea is :

- a) Diaminoketone
- b) 1-aminoethanamide
- c) 1-aminomethanamide
- d) aminoacetamide

386. Which of the following process is not used for the purification of solid impurities?

- a) Distillation
- b) Sublimation
- c) Crystallisation
- d) Vaporisation

387. When the hybridization state of a carbon atom changes from sp^3 to sp^2 and finally to sp , the angle between the hybridized orbitals :

- a) Is not affected
- b) Increases progressively
- c) Decreases considerably
- d) Decreases gradually

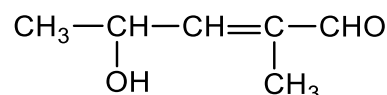
388. The chief reaction product of reaction in between n -butane and bromine at 130°C is :

- a) $\text{CH}_3\text{CH}_2\cdot\text{CH}_2\cdot\text{CH}_2\text{Br}$
- b) $\text{CH}_3\cdot\text{CH}_2\cdot\underset{\text{CH}_3}{\text{CH}}\text{Br}$
- c) $\text{CH}_3-\underset{\text{CH}_3}{\text{CH}}\cdot\text{CH}_2\text{Br}$
- d) $\text{CH}_3-\overset{\text{CH}_3}{\underset{\text{CH}_3}{\text{C}}}-\text{Br}$

389. Dehydration of alcohol is an example of which type of reaction?

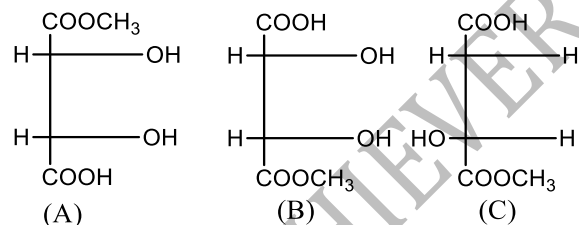
- a) Substitution
- b) Elimination
- c) Addition
- d) Rearrangement

390. The IUPAC name of



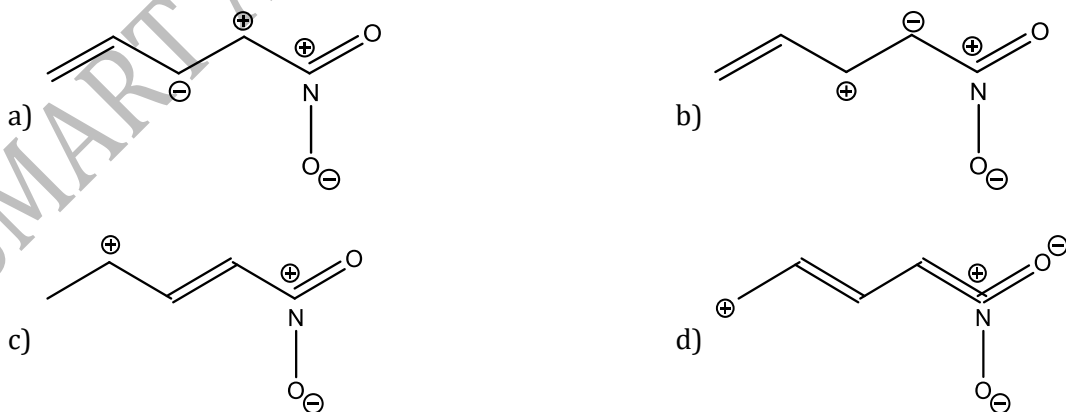
- a) 4-hydroxy-1-methylpentanal
- b) 4-hydroxy-4-methylpent-2-en-1-al
- c) 2-hydroxy-4-methylpent-2-en-5-al
- d) 2-hydroxy-3-methylpent-2-en-5-al

391. The correct statement about the compounds (A), (B) and (C) is



- a) (A) and (B) are identical
- b) (A) and (B) are diastereomers
- c) (A) and (C) are enantiomers
- d) (A) and (B) are enantiomers

392. Among the following the least stable resonance structure is



393. The organic liquid that mix freely with water is :

- a) CHCl_3
- b) CCl_4
- c) CS_2
- d) $\text{C}_2\text{H}_5\text{OH}$

394. The increasing order of +ve I -effect shown by H , CH_3 , C_2H_5 and C_3H_7 is :

- a) $H < CH_3 < C_2H_5 < C_3H_7$
 b) $H > CH_3 < C_2H_5 > C_3H_7$
 c) $H < C_2H_5 < CH_3 < C_3H_7$
 d) None of the above

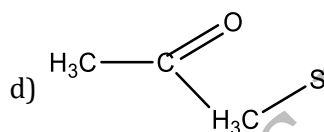
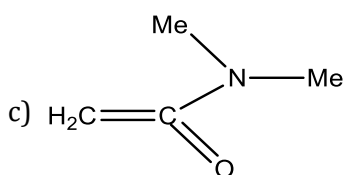
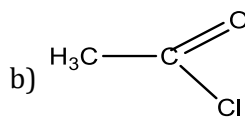
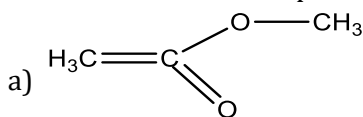
395. The best method for the separation of naphthalene and benzoic acid from their mixture is

- a) Chromatography b) Crystallisation c) Distillation d) Sublimation

396. The reagent used in dehydrohalogenation process is :

- a) Alcoholic KOH b) $NaNH_2$ c) C_2H_5ONa d) All of these

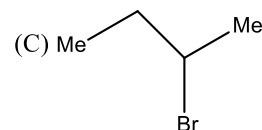
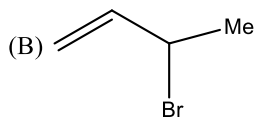
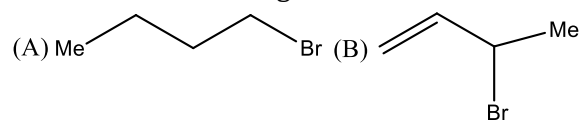
397. The least active electrophile is



398. The isomerism which exists between CH_3CHCl_2 and CH_2ClCH_2Cl is :

- a) Chain b) Functional c) Positional d) Metamerism

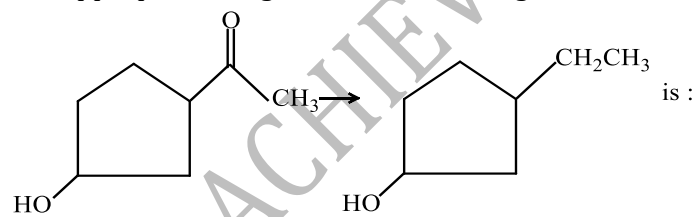
399. Consider the following bromides



The correct order is S_N1 reactivity is

- a) (B) > (C) > (A) b) (B) > (A) > (C) c) (C) > (B) > (A) d) (A) > (B) > (C)

400. The appropriate reagent for the following transformation,



- a) $Zn(Hg), HCl$
 b) NH_2NH_2, OH^-
 c) H_2/Ni
 d) $NaBH_4$

401. Hydride shift from C-2 will give the most stable resonance stabilized carbocation as

- a) CH_3 at C - 4 b) H at C - 4 c) CH_3 at C - 2 d) H at C-2

402. Hyperconjugation involves overlap of the following orbitals

- a) $\sigma - \sigma$ b) $\sigma - \rho$ c) $p - p$ d) $\pi - \pi$

403. Most stable carbonium ion is

- a) $C_2H_5^+$ b) $(CH_3)_3C^+$ c) $(C_6H_5)_3C^+$ d) $C_6H_5CH_2^+$

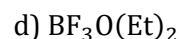
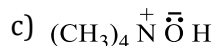
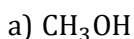
404. During a nitration of benzene, the attacking electrophile is

- a) NO_3^- b) NO_2^- c) NO_2^+ d) HNO_3

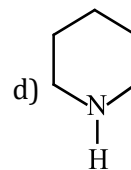
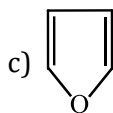
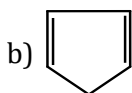
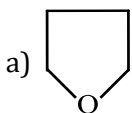
405. The (R) and (S) enantiomers of an optically active compound differ in

- a) Their reactivity b) Their optical rotation of plane polarised light

422. Many organic compounds are prepared by using PCl_5 because :
- OH group of alcohol is easily replaced by chlorine atom
 - Chlorines are added to the unsaturated compounds
 - It removes water from organic compounds
 - Phosphorus atoms are entered in the alcohol
423. Which of the following conformations of cyclohexane is chiral?
- Twist boat
 - Rigid
 - Chair
 - Boat
424. Which type of isomerism is shown by propanal and propanone?
- Functional group
 - Metamerism
 - Tautomerism
 - Chain isomerism
425. Identify the product in the given reaction:
 $\text{CH}_3 - \text{CH} = \text{CH}_2 + \text{NOCl} \rightarrow \text{Product}$
- $\text{CH}_3\text{CHCl} \cdot \text{CH}_2 \cdot \text{NO}$
 - $\text{CH}_3\text{CH}(\text{NO}) \cdot \text{CH}_2\text{Cl}$
 - $\text{CH}_3\text{CH}_2\text{CH}(\text{Cl})(\text{NO})$
 - $\text{CH}_2(\text{NO}) \cdot \text{CH}_2 \cdot \text{CH}_2\text{Cl}$
426. A straight chain hydrocarbon has the molecular formula C_8H_{10} . The hybridization for the carbon atoms from one end of the chain to the other are respectively $sp^3, sp^2, sp^2, sp^3, sp^2, sp^2, sp$ and sp . The structural formula of the hydrocarbon would be :
- $\text{CH}_3 - \text{C} \equiv \text{C} - \text{CH}_2 - \text{CH} = \text{CH} - \text{CH} = \text{CH}_2$
 - $\text{CH}_3 - \text{CH}_2 - \text{CH} = \text{CH} - \text{CH} = \text{CH} - \text{CH} \equiv \text{CH}$
 - $\text{CH}_3 - \text{CH} = \text{CH} - \text{CH}_2 - \text{C} \equiv \text{C} - \text{CH} = \text{CH}_2$
 - $\text{CH}_3 - \text{CH} = \text{CH} - \text{CH}_2 - \text{CH} = \text{CH} - \text{C} \equiv \text{CH}$
427. Reaction,
- $$\begin{array}{c} R \\ \diagdown \\ \text{CO} \\ \diagup \\ R \end{array} + \text{HCN} \longrightarrow \begin{array}{c} R \\ | \\ R - \text{C} - \text{OH} \\ | \\ \text{CN} \end{array} \text{ is a :}$$
- Electrophilic substitution
 - Nucleophilic substitution
 - Electrophilic addition
 - Nucleophilic addition
428. The total number of acyclic isomers including the stereoisomers (geometrical and optical), with the molecular formula $\text{C}_4\text{H}_7\text{Cl}$ is
- 12
 - 11
 - 10
 - 9
429. The best method to separate the mixture of *ortho* - and -*para* nitrophenol (1:1) is
- Vaporisation
 - Colour spectrum
 - Distillation
 - Crystallisation
430. Which of the following does not show electrometric effect?
- Alkenes
 - Ethers
 - Aldehyde
 - Ketones
431. Shifting of electrons of a multiple bond under the influence of a reagent is called :
- I*-effect
 - E*-effect
 - M*-effect
 - T*-effect
432. 0.4 g of a silver salt of a monobasic organic acid gave 0.26 g pure silver on ignition. the molecular weight of the acid is (atomic weight of silver=108)
- 58
 - 37
 - 89
 - 105
433. The $\text{S}_{\text{N}}2$ mechanism for, $\text{R} - \text{X} + \text{KOH}(\text{aq}) \rightarrow \text{R} - \text{OH} + \text{KX}$ follows with :
- 100% inversion
 - 50% inversion
 - 40% inversion
 - 30% inversion
434. IUPAC name of,  is :
- 4,5-dimethyl oct-4-ene
 - 3,4-dimethyl oct-5-ene
 - 4,5-dimethyl oct-5-ene
 - None of the above
435. The reaction,



447. Which of the following is heterocyclic aromatic species?



448. A mixture of *o*-nitrophenol and *p*-nitrophenol can be separated by

a) Fractional crystallisation

b) Sublimation

c) Chemical separation

d) Steam distillation

449. The total number of cyclic structural as well as stereo isomers possible for a compound with the molecular formula C_5H_{10} is

a) 2

b) 4

c) 6

d) 7

450. State the hybridization of carbon present in triplet carbene

a) sp^3 b) sp^2 c) sp

d) None of these

451. Which of the following cannot show electromeric effect ?

a) Alkenes

b) Ketones

c) Aldehydes

d) Ethers

452. Hydride ion transfer takes place in

a) Frankland method

b) Wurts reaction

c) Cannizzaro's reaction

d) Wolff-Kishner reduction

453. An organic compound contains 29.27% carbon, 5.69 % hydrogen and 65.04% bromine. Its empirical formula is

a) $\text{C}_3\text{H}_5\text{Br}$ b) $\text{C}_3\text{H}_3\text{Br}$ c) $\text{C}_2\text{H}_4\text{Br}_2$ d) $\text{C}_3\text{H}_7\text{Br}$

454.

IUPAC name of is :

a) but-2-ene-2,3-diol

b) pent-2-ene-2,3-diol

c) 2-methylbut-2-ene-2,3-diol

d) Hex-2-ene-2,3-diol

455. The IUPAC name of $(\text{CH}_3)_3\text{C} - \text{CH} = \text{CH}_2$ is

a) 1, 1, 1-trimethyl-2-propene

b) 3, 3, 3-trimethyl-2-propene

c) 2, 2-dimethyl-3-butene

d) 3, 3-dimethyl-1-butene

456. The function of soda lime, a mixture of solid NaOH and solid CaO during decarboxylation of carboxylic acids is :

a) To increase the rate of reaction

b) To decrease the rate of reaction

c) To change the rate of reaction

d) None of the above is correct

457. *t*-butyl chloride reacts with OH^- by $\text{S}_\text{N}1$ mechanism and rate $\propto [\textit{t}\text{-butyl chloride}]$. One of the reasons for this is that

a) Stereochemical inversion takes place

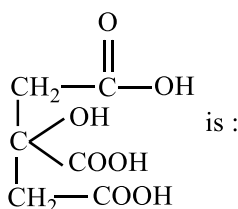
b) *t*- butyl carbocation is first formed which is more stablec) The product *t*-butyl alcohol is more stabled) The intermediate *t*-butyl carbocation is stabilized by solvation

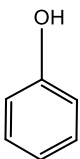
458. Heterolysis of $\text{CH}_3\text{CH}_2\text{CH}_3$ result in formation of

a) $\overset{\oplus}{\text{C}}\text{H}_3$ and $\overset{-}{\text{C}}_2\text{H}_5$ b) $\overset{\bullet}{\text{C}}\text{H}_3$ and $\overset{\bullet}{\text{C}}_2\text{H}_5$ c) $\overset{-}{\text{C}}\text{H}_3$ and $\overset{\oplus}{\text{C}}_2\text{H}_5$ d) CH_3 and C_2H_5

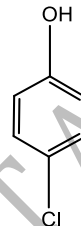
459. Alkyl cyanide $\text{R} - \text{C} \equiv \text{N}$ and alkyl isocyanides $\text{R} - \text{N} \equiv \text{C}$ are :

- a) Tautomers b) Metamers c) Functional isomers d) Geometrical isomers
460. A racemic mixture is a mixture of :
 a) *meso* and its isomers
 b) *d*- and its *l*-isomers in equal proportions
 c) *d*- and its *l*-isomers in different proportions
 d) *meso* and *d*-isomers
461. A mixture of iodine and sodium chloride can be easily separated by
 a) Fractional distillation b) Steam distillation
 c) Chromatography d) Sublimation
462. The property by virtue of which a compound can turn the plane of polarization of light is known as :
 a) Photolysis b) Phosphorescence c) Optical activity d) polarization
463. Correct order of stability is
 a) $\text{HC} \equiv \bar{\text{C}} > \text{CH}_2 = \bar{\text{C}}\text{H} > \text{CH}_3 - \bar{\text{C}}\text{H}_2$ b) $\text{CH}_3 - \bar{\text{C}}\text{H}_2 > \text{CH}_2 = \bar{\text{C}}\text{H} > \text{CH} \equiv \bar{\text{C}}$
 c) $\text{CH}_3 - \bar{\text{C}}\text{H}_2 > \text{CH} \equiv \text{CH} \cong \text{CH}_2 = \bar{\text{C}}\text{H}$ d) All are equally stable
464. In the estimation of sulphur in an organic compound, fuming nitric acid is used to convert sulphur into
 a) SO_2 b) H_2S c) H_2SO_3 d) H_2SO_4
465. The IUPAC name of compound

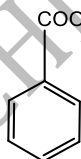


- a) 1,2,3-tricarboxy-2,1-propane
 b) 3-carboxy-3-hydroxy-1,5-pentanedioic acid
 c) 3-hydroxy-3-carboxy-1,5-pentanedioic acid
 d) None of the above
466. Which of the following will be chiral?
 a) CH_3CHCl_2 b) CH_3CHBrCl c) CD_2Cl_2 d) CH_2ClBr
467. In the dehydration reaction $\text{CH}_3\text{CONH}_2 \xrightarrow{\text{P}_2\text{O}_5} \text{CH}_3\text{C} \equiv \text{N}$, the hybridization state of carbon change from
 a) sp^3 to sp^2 b) sp to sp^3 c) sp^2 to sp d) sp to sp^3
468. The correct acidity order of the following is
- 

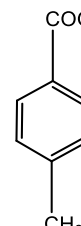
(I)



(II)



(III)



(IV)
- a) (III) > (IV) > (II) > (I) b) (IV) > (III) > (I) > (II) c) (III) > (II) > (I) > (IV) d) (II) > (III) > (IV) > (I)
469. Which of the following is not a nucleophile?
 a) BF_3 b) CN^- c) OH^- d) NH_3
470. Least stable conformer of cyclohexane is
 a) Chair b) Boat c) Twist boat d) Planar hexagon
471. The compound isomeric with acetone is :
 a) Propionaldehyde b) Propionic acid c) Ethoxy ethane d) None of these
472. Which of the chloride is less reactive towards hydrolysis?
 a) Vinyl chloride b) Allyl chloride c) Ethyl chloride d) *t*-butyl chloride
473. Glycerol is an alcohol which can be classified as
 a) Trihydric b) Monohydric c) Dihydric d) Hexahydric
474. Addition of Br_2 on $\text{CH}_2 = \text{CH}_2$ in presence of NaCl(aq.) gives :

- a) $\text{CH}_2\text{Br} \cdot \text{CH}_2\text{Br}$ b) $\text{CH}_2\text{Br} \cdot \text{CH}_2\text{Cl}$ c) $\text{CH}_2\text{Br} \cdot \text{CH}_2\text{OH}$ d) All of these

475. The electromeric effect in organic compounds is a :

- a) Temporary effect
b) Permanent effect
c) Temporary-permanent effect
d) None of the above

476. The function of boiling the sodium extract with conc. HNO_3 before testing for halogen is

- a) To make the solution acidic b) To make the solution clear
c) To convert Fe^{2+} to Fe^{3+} d) To destroy CN^- and S^{2-} ions

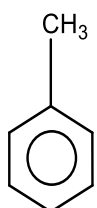
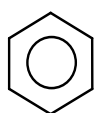

477. Copper wire test of halogens is known as

- a) Liebig's test b) Lassaigne's test c) Fusion test d) Beilstein's test

478. Which of the following is singlet carbene?

- a) $(\text{CH}_3)_3\text{C}^+$ b) $\text{C}_2\text{H}_5\ddot{\text{C}}-\text{H}$ c) $\text{CH}_3\ddot{\text{C}}\text{HCH}_3$ d) $\text{CH}_2=\text{CH}-\overset{+}{\text{C}}\text{H}_2$

479. Which of the following will be easily nitrated?

- a)  b)  c) CH_3NO_2 d) 

480. Optical isomerism is shown by

- a) Propanol-2 b) Butanol-2 c) Ethanol d) Methanol

481. Williamson's synthesis involves

- a) $\text{S}_{\text{N}}1$ mechanism b) Nucleophilic addition
c) $\text{S}_{\text{N}}2$ mechanism d) S_{E} mechanism

482. Free radicals can undergo :

- a) Disproportionation to two species
b) Rearrangement to a more stable free radical
c) Decomposition to give another free radical
d) All of the above are correct

483. During addition of bromine on ethene, the first species formed is

- a)  b) $\text{C}_2\text{H}_4\text{OH}^+$ c) $\overset{+}{\text{C}}\text{H}_2\text{CH}_2\text{Br}$ d) C_2H_5^+

484. Metamers of ethyl propionate are

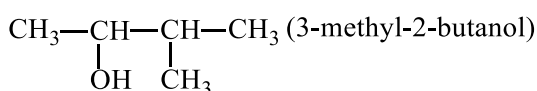
- a) $\text{C}_4\text{H}_9\text{COOH}$ and HCOOC_4H_9 b) $\text{C}_4\text{H}_9\text{COOH}$ and $\text{CH}_3\text{COOC}_3\text{H}_7$
c) $\text{CH}_3\text{COOCH}_3$ and $\text{CH}_3\text{COOC}_3\text{H}_7$ d) $\text{CH}_3\text{COOC}_3\text{H}_7$ and $\text{C}_3\text{H}_7\text{COOCH}_3$

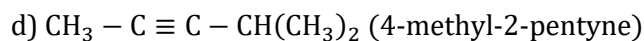
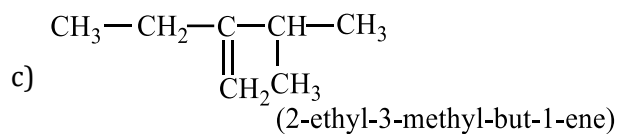
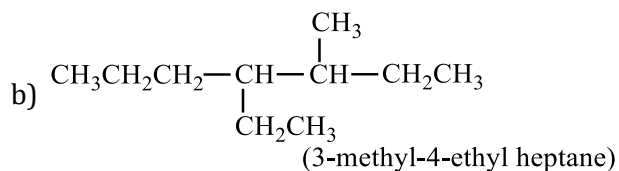
485. Which statement is correct about the hybridization of carbon atoms in,



- a) C_1 and C_4 are sp^2 -hybridized
b) C_2 and C_3 are sp^2 -hybridized
c) All are sp -hybridized
d) All are sp^2 -hybridized

486. Which one is not is IUPAC system?

- a) 



487. The compound which exhibits optical isomerism is :

- a) $\text{CH}_3\text{CHOHCH}_3$ b) $(\text{CH}_3)_2\text{CHCH}_2\text{CH}_3$ c) $\text{CH}_3\text{CHClCH}_2\text{CH}_3$ d) $\text{CH}_3\text{CCl}_2\text{CH}_2\text{CH}_3$

488. Which of the following applies in the reaction $\text{CH}_3\text{CHBrCH}_2\text{CH}_3 \xrightarrow{\text{Alco.KOH}} ?$

(I) $\text{CH}_3\text{CH}=\text{CHCH}_3$ (Major product)

(II) $\text{CH}_2=\text{CHCH}_2\text{CH}_3$ (Minor product)

- a) Hofmann's rule b) Saytzeff's rule c) Kharasch effect d) Markownikoff's rule

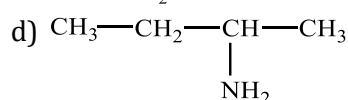
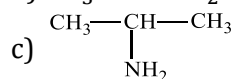
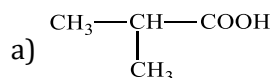
489. Homologous compounds have :

- a) Same chemical properties
b) Same molecular weight
c) Same physical properties
d) Same m.p. and b.p.

490. How many chiral compound are possible on mono chlorination of 2-methyl butane?

- a) 2 b) 4 c) 6 d) 8

491. Which of the following may exist in enantiomorphs?



492. How many isomers are possible for the alkane C_4H_{10} ?

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

493. Which of the following IUPAC names is correct?

- a) 2-methyl-3-ethylpentane
b) 2-ethyl-3-methylpentane
c) 3-ethyl-2-methylpentane
d) 3-methyl-2-ethylpentane

494. Ethyl acetoacetate shows, which type of isomerism?

- a) Chain b) Optical c) Metamerism d) Tautomerism

495. Enol content is highest in

- a) Acetone b) Acetophenone c) Acetic acid d) Acetyl acetone

496. The maximum number of stereoisomers possible for 3-hydroxy-2-methyl butanoic acid is :

- a) 1 b) 2 c) 3 d) 4

497. Which of the following will exhibit *cis-trans* isomerism?

- a) $\text{CH}_2\text{Br}-\text{CH}_2\text{Br}$ b) CBr_3-CH_3 c) $\text{CHBr}=\text{CHBr}$ d) $\text{CBr}_2=\text{CH}_2$

498. Which of the following is most reactive towards electrophilic nitration?

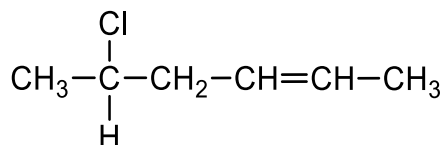
- a) Toluene b) Benzene c) Benzoic acid d) Nitrobenzene

499. The number of structural isomers possible for an organic compound with molecular formula C_5H_{12} is :

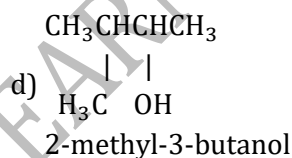
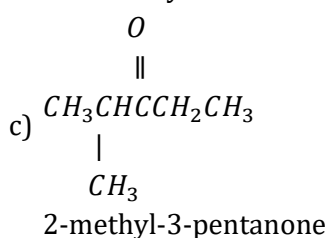
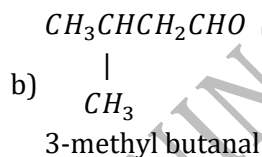
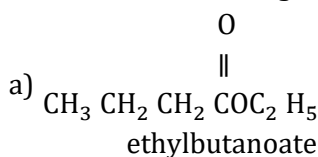
- a) 5 b) 3 c) 4 d) 2

500. Ethylene dichloride and ethylidene chloride are isomeric compounds. The false statement about these isomers is that they
- React with alcoholic potash and give the same product
 - Are position isomers
 - Contain the same percentage of chlorine
 - Are both hydrolysed to the same product

501. The IUPAC name of



- 5-chloro-hex-2-ene
 - 2-chloro-hex-5-ene
 - 1-chloro-1-methyl-pent-3-ene
 - 5-chloro-5-methyl-pent-2-ene
502. Which of the following compounds has incorrect IUPAC nomenclature?



503. The IUPAC name for tertiary butyl iodide is

- 4-iodo butane
 - 2-iodo butane
 - 1-iodo-3-methyl propane
 - 2-iodo-2-methyl propane
504. Geometry of methyl free radical is
- Pyramidal
 - Planar
 - Tetrahedral
 - Linear

505. Dehydrogenation of ethanol to give ethanal is :

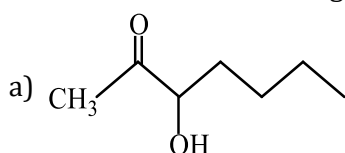
- Addition reaction
- α - α elimination reaction
- α - β elimination reaction
- α - γ elimination reaction

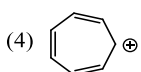
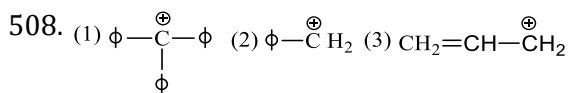
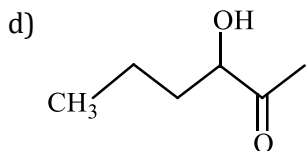
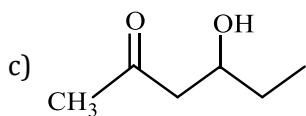
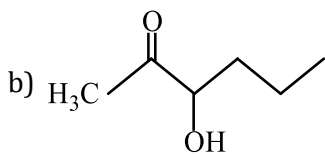
506. The arrangement of decreasing order of stability of

$\dot{\text{C}}\text{H}_3$, $\dot{\text{C}}_2\text{H}_5$, $(\text{CH}_3)_2\dot{\text{C}}\text{H}$ and $(\text{CH}_3)_3\dot{\text{C}}$ free radicals is :

- $\dot{\text{C}}\text{H}_3 > \dot{\text{C}}_2\text{H}_5 > (\text{CH}_3)_2\dot{\text{C}}\text{H} > (\text{CH}_3)_3\dot{\text{C}}$
- $(\text{CH}_3)_3\dot{\text{C}} > (\text{CH}_3)_2\dot{\text{C}}\text{H} > \dot{\text{C}}_2\text{H}_5 > \dot{\text{C}}\text{H}_3$
- $\dot{\text{C}}_2\text{H}_5 > \dot{\text{C}}\text{H}_3 > (\text{CH}_3)_2\dot{\text{C}}\text{H} > (\text{CH}_3)_3\dot{\text{C}}$
- $(\text{CH}_3)_3\dot{\text{C}} > (\text{CH}_3)_2\dot{\text{C}}\text{H} > \dot{\text{C}}\text{H}_3 > \dot{\text{C}}_2\text{H}_5$

507. Which one of the following compounds will be most readily dehydrated ?





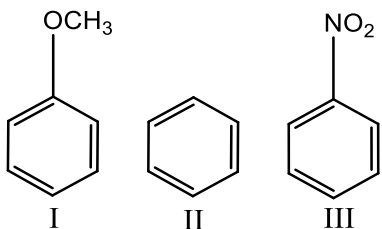
Correct order of stability is

- a) 1>4>2>3 b) 1>2>3>4 c) 1>2>4>3 d) 1>3>4>2

509. The organic chloro compound, which shows complete stereochemical inversion during an $\text{S}_{\text{N}}2$ reaction, is

- a) CH_3Cl b) $(\text{C}_2\text{H}_5)_2\text{CHCl}$ c) $(\text{CH}_3)_3\text{CCl}$ d) $(\text{CH}_3)_2\text{CHCl}$

510. Among the following compounds (I-III) the correct order of reaction with the electrophile is

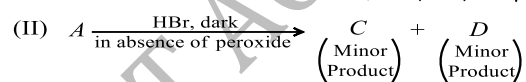
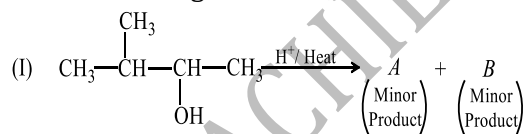


- a) II>III>I b) III<I<II c) I>II>III d) I≈II>III

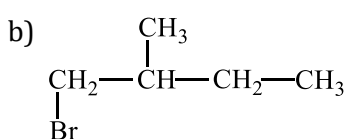
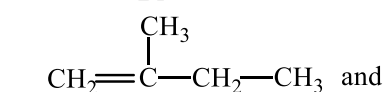
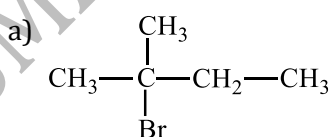
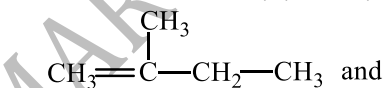
511. Which of the following is an electrophile?

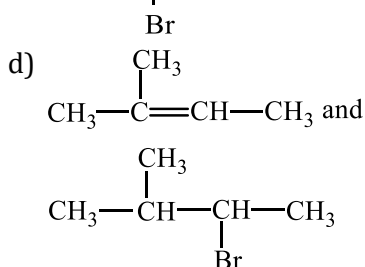
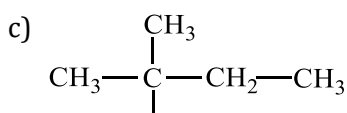
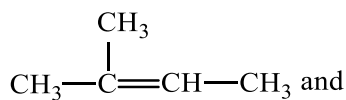
- a) :CCl_2 b) CO_2 c) H_2O d) NH_3

512. In the following reactions,

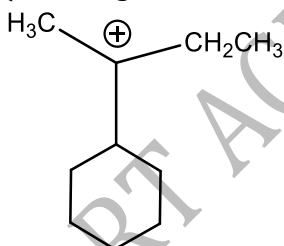


the major products (A) and (C) are respectively :



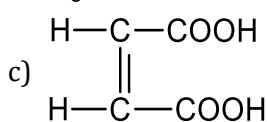
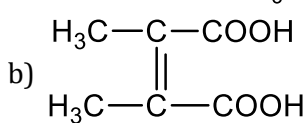
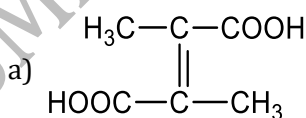


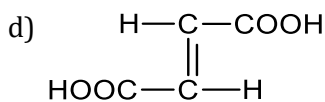
513. An organic compound having carbon, hydrogen and sulphur contains 4% of sulphur. The minimum molecular weight of the compound is
 a) 500 b) 800 c) 400 d) 100
514. The structure of tertiary butyl carbonium ion is :
 a) Pyramidal b) Trigonal planar c) Tetrahedral d) Square planar
515. A carbonium ion contains :
 a) A + vely charged carbon centre
 b) A -vely charged carbon centre
 c) A carbon with odd electron on it
 d) None of the above
516. The formula of 3-chloro-2,2-dimethylbutane is :
 a) $\text{CH}_3\text{CH}(\text{CH}_3)\text{C}(\text{CH}_3)_2\text{Cl}$ b) $\text{CH}_3(\text{CH}_3)_2\text{CH}_2\text{Cl}$ c) $\text{CH}_3\text{C}(\text{CH}_3)_2\text{CH}_2\text{Cl}$ d) $\text{CH}_3\text{CHClC}(\text{CH}_3)_3$
517. Which shows the easier electrophilic substitution in ring?
 a) N-acetyl aniline b) $\text{C}_6\text{H}_5\text{NH}_3\text{Cl}$ c) Aniline d) Nitrobenzene
518. The number of isomeric pentyl alcohols possible is
 a) Two b) Four c) Six d) Eight
519. Naphthalene can be easily purified by
 a) Sublimation b) Crystallisation c) Distillation d) Vaporisation
520. The total number of contributing structures showing hyperconjugation (involving - C - H bonds) for the following carbocation is



- a) Three b) Five c) Eight d) Six

521. What is the structural formula of fumaric acid?

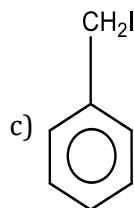
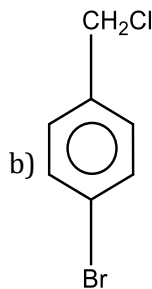
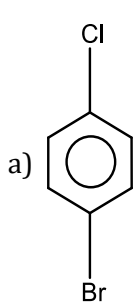




522. The correct structure of dimethylbutyne is :

- a) $\text{CH}_3\text{CH}_2-\text{C}\equiv\text{C}-\text{CH}_2\text{CH}_3$
 b) $(\text{CH}_3)_3\text{C}-\text{C}-\text{C}\equiv\text{CH}$
 c) $\text{CH}_3-\text{C}\equiv\text{CCH}(\text{CH}_3)_2$
 d)
$$\begin{array}{c} \text{CH}_3-\text{C}=\text{C}-\text{CH}_3 \\ | \quad | \\ \text{CH}_3 \quad \text{CH}_3 \end{array}$$

523. Which one of the following gives white precipitate with AgNO_3 ?



d) None of these

524. The reaction $(\text{CH}_3)_3\text{CBr} \xrightarrow{\text{H}_2\text{O}} (\text{CH}_3)_3\text{C.OH}$ is:

- a) Elimination reaction
 b) Free radical reaction
 c) Substitution reaction
 d) Displacement reaction

525. Which of the following is free radical?

- a) Cl^+ b) Cl^- c) $\dot{\text{C}}\text{l}$ d) NO_2

526. An organic compound X having molecular formula $\text{C}_6\text{H}_7\text{O}_2\text{N}$ has 6 carbons in a ring system, two double bonds and also a nitro group as substituent. The X is :

- a) Homocyclic but not aromatic
 b) Aromatic but not homocyclic
 c) Homocyclic and aromatic
 d) Heterocyclic

527. Quantitative measurement of nitrogen in an organic compound is done by the method

- a) Berthelot method b) Belstein method c) Lassaigne test d) Kjeldahl method

528. During pyrolysis of an alkane, C—C bond breaks faster than the C—H bond because :

- a) C—C bond is stronger
 b) C—H bond is weaker
 c) C—C bond involves π -bond in alkane
 d) The bond energy of C—C bond is less than that of C—H bond

529. State of hybridization of carbon atom of carbene in the singlet state is :

- a) sp^2 b) sp c) sp^3 d) None of these

530. IUPAC name of $(\text{CH}_3)_3\text{CCl}$ is

- a) *n*-butyl chloride b) 3-chloro butane
 c) 2-chloro 2-methyl propane d) *t*-butyl chloride

531. Most stable carbocation is formed during the heating of which one of the following compound with conc. H_2SO_4 ?

- a) $(\text{CH}_3)_3\text{COH}$ b) $\text{C}_6\text{H}_5\text{CH}_2\text{OH}$ c) $(\text{CH}_3)_2\text{CHOH}$ d) $\text{CH}_3\text{CH}(\text{OH})\text{CH}_2\text{CH}_3$

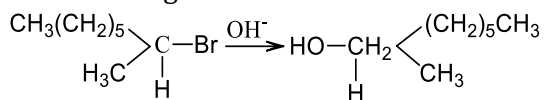
532. The number of 1° and 2° carbon atoms in *n*-pentane are respectively :

- a) 2, 3 b) 3, 2 c) 2, 4 d) 1, 3

533. In benzene, all the C—C bonds are of equal length because of :

- a) Isomerism b) Resonance c) Tautomerism d) Inductive effect
534. Nitration of benzene is
 a) Electrophilic substitution b) Electrophilic addition
 c) Nucleophilic substitution d) Nucleophilic addition

535. The following reaction is described as



- a) $S_E 2$ b) $S_N 2$ c) $S_N 1$ d) $S_N 0$
536. Nitrogen containing organic compound when fused with sodium forms
 a) Sodium azide b) Sodium cyanide c) Sodamide d) Sodium cyanate
537. Which of the following is strongest nucleophile?
 a) Br^- b) :OH^- c) :CN^- d) $\text{C}_2\text{H}_5\text{O}^-$
538. In Kjeldahl's method for the estimation of nitrogen, the formula used to
 a) $\% \text{ of N} = \frac{1.4 V_W}{N}$ b) $\% \text{ of N} = \frac{1.4 V_N}{w}$ c) $\% \text{ of N} = \frac{V_N w}{1.8}$ d) $\% \text{ of N} = \frac{1.4 w N}{V}$


539. The most satisfactory method to separate sugars is to use

- a) Fractional crystallisation b) Chromatography
 c) Benedict's reagent d) Carius method
540. The IUPAC name of an unsymmetrical ether with the molecular formula $\text{C}_4\text{H}_{10}\text{O}$
 a) Ethoxy propane b) Methoxy ethane c) Ethoxy ethane d) Methoxy propane

541. $S_N 1$ reaction on optically active substrates mainly gives :

- a) Retention in configuration
 b) Inversion in configuration
 c) Racemic product
 d) No product
542. The structures that do not actually exist are called :
 a) Tautomers
 b) Conformational isomers
 c) Canonical structures
 d) Optical isomers

543.

The correct IUPAC name of,  is :

- a) Isopropyl benzene b) Cumene c) Phenyl isopropane d) 2-phenyl propane
544. When SCN^- is added to an aqueous solution containing $\text{Fe}(\text{NO}_3)_3$, the complex ion produced is
 a) $[\text{Fe}(\text{OH}_2)_2(\text{SCN})]^{2+}$ b) $[\text{Fe}(\text{OH}_2)_5(\text{SCN})]^{2+}$ c) $[\text{Fe}(\text{OH}_2)_8(\text{SCN})]^{2+}$ d) $[\text{Fe}(\text{OH}_2)(\text{SCN})]^{6+}$
545. Which of the following is the most stable carbocation?

- a) C^+H_3 b) $\text{R}^+\text{C}^+\text{H}_2$ c) $\text{R}_2\text{C}^+\text{H}$ d) R_3C^+

546. Which one of the following compound is most acidic?

- a) $\text{Cl}-\text{CH}_2-\text{CH}_2-\text{OH}$ b)  c)  d) 

547. The number of carbon atoms present in neopentane are :

- a) Four 1° carbon, one 4° carbon
 b) two 1° carbon, two 2° carbon
 c) one 1° carbon, three 4° carbon
 d) None of the above is correct

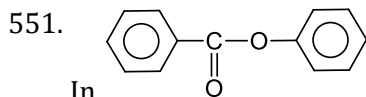
548. The Cl—C—Cl angle in 1,1,2,2-tetrachloroethene and tetrachloromethane respectively will be about :
 a) 120° and 109.5° b) 90° and 109.5° c) 109.5° and 90° d) 109.5° and 120°

549. $C_6H_5C \equiv N$ and $C_6H_5N \equiv C$ exhibit which type of isomerism?

- a) Position b) Functional c) Metamerism d) Dextroisomerism

550. The number of possible enantiomeric pairs that can be produced during monochlorination of 2-methyl butane is :

- a) 2 b) 3 c) 4 d) 1



In

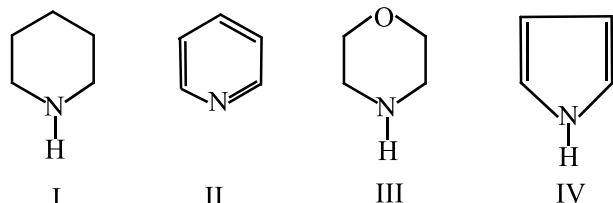
Electrophilic substitution occurs at

- a) *ortho/para* at first ring b) *meta* at first ring
 c) *ortho/para* at second ring d) *meta* at second ring

552. In estimation of nitrogen by Duma's method 1.18 g of an organic compound gave 224 mL of N_2 at NTP. The percentage of nitrogen in the compound is

- a) 20.0 b) 11.8 c) 47.7 d) 23.7

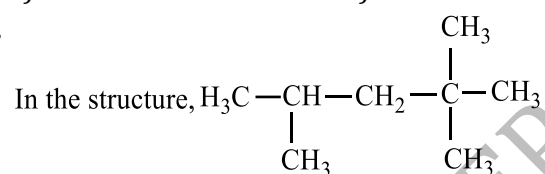
553. In the following compounds,



the order of basicity is :

- a) IV > I > III > II b) III > I > IV > II c) II > I > III > IV d) I > III > II > IV

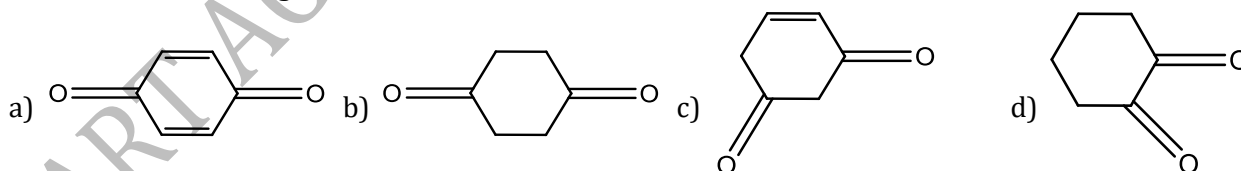
554.



the number of carbons are :

- a) One primary, two secondary and one tertiary
 b) Four primary, two tertiary and one secondary
 c) One primary, one secondary, one tertiary and one quaternary
 d) Five primary, one secondary, one tertiary and one quaternary

555. Which of the following does not exhibit tautomerism?



556. Chromatography technique is used for the separation of

- a) Small sample of mixture b) Plant pigments
 c) Dyestuff d) All of the above

557. CH_3CH_2OH and CH_3OCH_3 are the example of

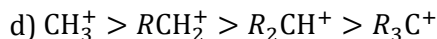
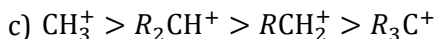
- a) Chain isomerism b) Functional isomerism c) Position isomerism d) Metamerism

558. The number of geometrical isomers in case of a compound with the structure, $CH_3-CH=CH-CH=CH-C_2H_5$ are .

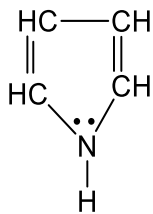
- a) Four b) Three c) Two d) five

559. The stability of the carbocation decreases in the order

- a) $R_2CH^+ > R_3C^+ > RCH_2^+ > CH_3^+$ b) $R_3C^+ > R_2CH^+ > RCH_2^+ > CH_3^+$



560. How many delocalized π -electrons are there in the compounds



a) 8

b) 2

c) 4

d) 6

561. What will be the compound if two valencies of carbonyl group are satisfied by two alkyl groups?

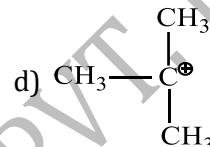
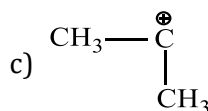
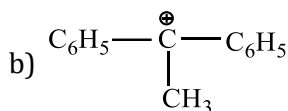
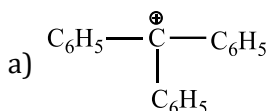
a) Aldehyde

b) Ketone

c) Acid

d) Acidic anhydride

562. The most stable carbocation is :



563. Which of the following belongs to $-I$ group?

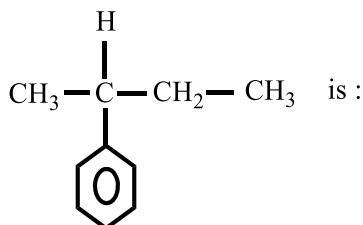
a) $-\text{C}_6\text{H}_5$

b) $-\text{CH}_3$

c) $-\text{CH}_2\text{CH}_3$

d) $-\text{C}(\text{CH}_3)_3$

564. IUPAC name of following compound,



a) 2-cyclohexylbutane

b) 2-phenylbutane

c) 3-cyclohexylbutane

d) 3-phenylbutane

565. Which is most commonly used to dry organic liquids?

a) Lithium

b) Sodium

c) Potassium

d) Rubidium

566. In Lassaigne's solution, pink/violet colouration is produced when sodium nitroprusside solution is added.

It indicates the presence of

a) Sulphur

b) Nitrogen

c) Chlorine

d) None of these

567. A carbonium ion is formed when a covalent bond between two atoms in an organic compound undergoes :

a) Homolysis

b) Heterolysis

c) Cracking

d) Pyrolysis

568. Racemic mixture is formed by mixing two

a) Isomeric compounds

b) Chiral compounds

c) *meso* compounds

d) Enantiomers with chiral carbon

569. In a solution, solvent can be separated from solute by one of the following process

a) Decantation

b) Filtration

c) Distillation

d) Sedimentation

570. Buta-1,3-diene and But-2-yne are :

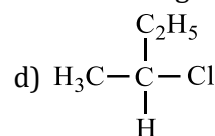
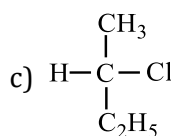
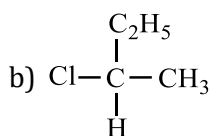
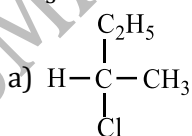
a) Position isomers

b) Functional isomers

c) Chain isomers

d) Tautomers

571. $\text{CH}_3-\text{CHCl}-\text{CH}_2-\text{CH}_3$ has a chiral centre. Which one of the following represent its *R*-configuration?



572. Which of the following statements (s) is (are) not true?

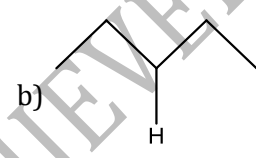
a) Carbanions and carbonium ions, usually exist in ion pairs or else solvated

Acidity increases and basicity decreases in going from left to right across a row of Periodic Table

b) $\text{CH}_4 < \text{NH}_3 < \text{H}_2\text{O} < \text{HF}$ (acidity)

$\text{CH}_3^- > \text{NH}_2^- > \text{OH}^- > \text{F}^-$ (basicity)

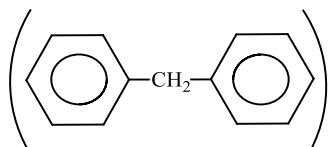
c) RCOOH like RCOR reacts with H_2NOH to give an oxime

- d) Decreasing order of ionizing power of solvents is
 $\text{CF}_3\text{COOH} > \text{HCOOH} > \text{H}_2\text{O} > \text{CH}_3\text{COOH} > \text{CH}_3\text{OH} > \text{C}_2\text{H}_5\text{OH} > (\text{CH}_3)_2\text{SO} > \text{CH}_3\text{CN}$
573. The intermediate during the addition of HCl to propene in the presence of peroxide is :
 a) $\text{CH}_3\overset{\cdot}{\text{C}}\text{HCH}_2\text{Cl}$ b) $\text{CH}_3\overset{\cdot}{\text{C}}\text{HCH}_3$ c) $\text{CH}_3\text{CH}_2\overset{\cdot}{\text{C}}\text{H}_2$ d) $\text{CH}_3\text{CH}_2\overset{\cdot}{\text{C}}\text{H}_2$
574. Which of the following represents *neo* –pentyl alcohol?
 a) $\text{CH}_3\text{CH}(\text{CH}_3)\text{CH}_2\text{CH}_2\text{OH}$ b) $(\text{CH}_3)_3\text{C} - \text{CH}_2\text{OH}$ c) $\text{CH}_3(\text{CH}_2)_3\text{OH}$ d) $\text{CH}_3\text{CH}_2\text{CH}(\text{OH})\text{C}_2\text{H}_5$
575. 2-methyl-2-butene will be represented as :
 a) $\begin{array}{c} \text{CH}_3 - \text{CH} - \text{CH}_2 - \text{CH}_3 \\ | \\ \text{CH}_3 \end{array}$
 b) $\begin{array}{c} \text{CH}_3 - \text{CH} - \text{CH} = \text{CH}_2 \\ | \\ \text{CH}_3 \end{array}$
 c) $\begin{array}{c} \text{CH}_3 - \text{CH}_2 - \text{C} = \text{CH}_2 \\ | \\ \text{CH}_3 \end{array}$
 d) $\begin{array}{c} \text{CH}_3 - \text{C} = \text{CH} - \text{CH}_3 \\ || \\ \text{CH}_3 \end{array}$
576. The most abundant organic compound in the world is :
 a) CH_4 b) Chlorophyll c) Alkaloids d) Cellulose
577. The chain initiating species in free radical chlorination of methane is :
 a) Cl free radical b) HCl c) CH_3 radical d) Methylene radical
578. Which of the following belongs to +I group?
 a) $-\text{OH}$ b) $-\text{OCH}_3$ c) $-\text{COOH}$ d) $-\text{CH}_3$
579. Different structures generated due to rotation about, C – C axis, of an organic molecule, are examples of
 a) Geometrical isomerism b) Conformational isomerism
 c) Optical isomerism d) Structural isomerism
580. Which of the following molecules is expected to rotate the plane of plane-polarised light?
 a) $\begin{array}{c} \text{CHO} \\ | \\ \text{HO} - \text{C} - \text{H} \\ | \\ \text{CH}_2\text{OH} \end{array}$ b)  c) $\begin{array}{c} \text{H}_2\text{N} \quad \text{NH}_2 \\ | \quad | \\ \text{H} \cdots \text{C} - \text{C} \cdots \text{H} \\ | \quad | \\ \text{Ph} \quad \text{Ph} \end{array}$ d) $\begin{array}{c} \text{COOH} \\ | \\ \text{H}_2\text{N} - \text{C} - \text{H} \\ | \\ \text{H} \end{array}$
581. Chromatography was discovered by
 a) Kekule b) Pauling c) Rutherford d) Tswett
582. Sodium nitroprusside when added to an alkaline solution of sulphide ions produces a colouration
 a) Red b) brown c) Blue d) Purple
583. $(\text{CH}_3)_4\text{N}^+$ is neither an electrophile, nor a nucleophile because it :
 a) Does not have electron pair for donation as well as cannot attract electron pair
 b) Neither has electron pair available for donation nor can accommodate electron since all shells of N are fully occupied
 c) Can act as Lewis acid and base
 d) None of the above
584. Isopentane can form four isomeric mono bromo derivatives. How many of them are optically active?
 a) 1 b) 2 c) 3 d) None of these
585. Which one of the following does not show resonance?
 a) Carbon dioxide b) Benzene c) Nitromethane d) Propane
586. Select the organic compounds aliphatic in nature but burn with smoky flame :

587. Which of the following is an electrophilic reagent?
 a) CCl_4 b) CHCl_3 c) $\text{C}_6\text{H}_5\text{CH}_2\text{OH}$ d) Both (a) and (b)

a) RO^- b) BF_3 c) NH_3 d) $\text{R} \ddot{\text{O}} \text{H}$

588. The molecular formula of diphenyl methane is $\text{C}_{13}\text{H}_{12}$.



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

589. A mixture of iron filings and sulphur cannot be separated by

a) Heating b) Magnet
 c) Shaking with CS_2 d) Washing in a current of water

590. Isomers of propionic acid are

a) HCOOC_2H_5 and $\text{CH}_3\text{COOCH}_3$ b) HCOOC_2H_5 and $\text{C}_3\text{H}_7\text{COOH}$
 c) $\text{CH}_3\text{COOCH}_3$ and $\text{C}_3\text{H}_7\text{OH}$ d) $\text{C}_3\text{H}_7\text{OH}$ and CH_3COCH_3

591. Reactions involving heterolytic fission are said to proceed *via* :

a) Ionic mechanism b) Polar mechanism c) Both (a) and (b) d) None of these

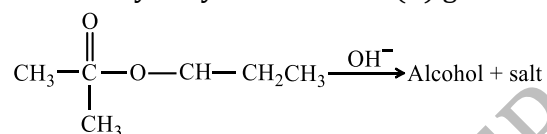
592. Which of the following orders is true regarding the acidic nature of COOH ?

a) Formic acid > acetic acid > propanoic acid b) Formic acid > acetic acid < propanoic acid
 c) Formic acid < acetic acid > propanoic acid d) Formic acid > acetic acid < propanoic acid

593. Which behaves both as a nucleophile as well as an electrophile?

a) CH_3OH b) CH_3NH_2 c) CH_3CN d) CH_3Cl

594. Alkaline hydrolysis of an ester (A) gives alcohol and salt



The correct statement about the reaction is :

a) In alcohol configuration about chiral carbon atom is retained
 b) In alcohol configuration about chiral carbon atom is inverted
 c) Alcohol loses optical activity
 d) All statements are incorrect

595. In which case the carbon-carbon bond length is same?

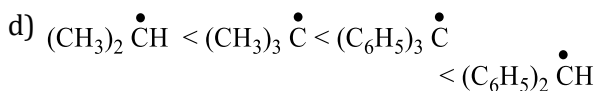
a) 2-butene b) Benzene c) 1-butene d) 1-propyne

596. Incorrect statement is

a) Aniline can be purified by steam distillation
 b) Beilstein test is not given by fluorine
 c) Kjeldahl's method is used for estimation of sulphur
 d) Lassaigne's test is used in the qualitative detection of elements in organic compounds

597. The increasing order of stability of the following free radicals are

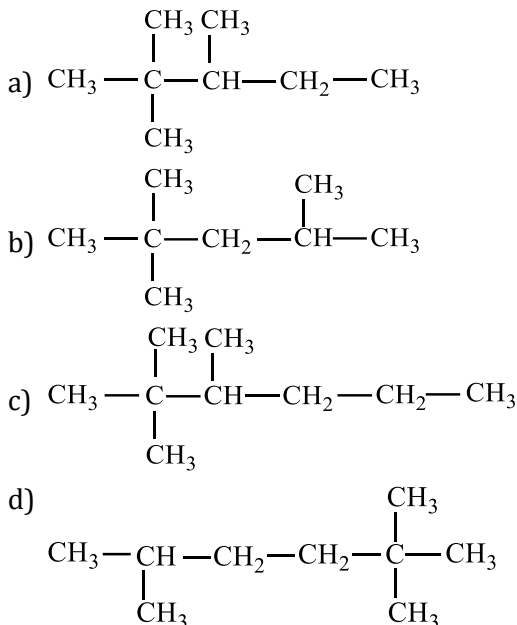
a) $(\text{CH}_3)_2 \dot{\text{C}}\text{H} < (\text{CH}_3)_3 \dot{\text{C}} < (\text{C}_6\text{H}_5)_2 \dot{\text{C}}\text{H} < (\text{C}_6\text{H}_5)_3 \dot{\text{C}}$
 b) $(\text{C}_6\text{H}_5)_3 \dot{\text{C}} < (\text{C}_6\text{H}_5)_2 \dot{\text{C}}\text{H} < (\text{CH}_3)_3 \dot{\text{C}} < (\text{CH}_3)_2 \dot{\text{C}}\text{H}$
 c) $(\text{C}_6\text{H}_5)_2 \dot{\text{C}}\text{H} < (\text{C}_6\text{H}_5)_3 \dot{\text{C}} < (\text{CH}_3)_3 \dot{\text{C}} < (\text{CH}_3)_2 \dot{\text{C}}\text{H}$



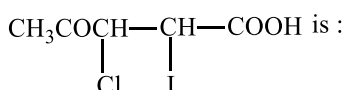
598. Which one of the following explain, why propene undergo electrophilic addition with HBr, but not with HCN?

- Br^- is better nucleophile than CN^-
- HBr being better source of proton as it is stronger acid than HCN
- HCN attacks preferentially *via* lone pair of nitrogen
- The C – Br bond being stronger is formed easily as compared to C – CN bond

599. The structural formula of 2,2,3-trimethyl hexane is :



600. The IUPAC name of the compound,

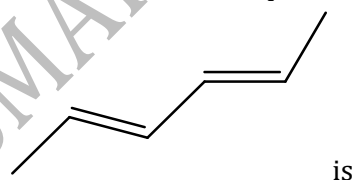


- 2-iodo-3-chloro-4-pentanoic acid
- 4-oxo-3-chloro-2-iodo pentanoic acid
- 4-carboxy-4,3-chloro-2-butanone
- 3-chloro-2-iodo-4-oxo-pentanoic acid

601. Select the correct statement about the detection of sulphur in organic compounds

- Sulphur present in organic compound on fusion with sodium is converts to $\text{Na}_2\text{S}_2\text{O}_3$
- FeCl_3 gives purple colour when added to the sodium fusion extract
- Sodium nitroprusside is used to detect the presence of sulphur
- All of the above

602. The name of the compound



- (2Z,4Z)-2, 4-hexadiene
- (2Z-, 4E)-2, 4-hexadiene
- (2E, 4Z)-2, 4-hexadiene
- (4E, 4Z)-2, 4-hexadiene

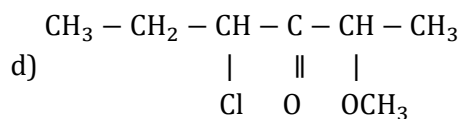
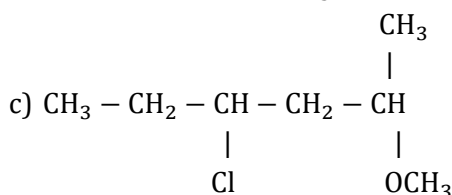
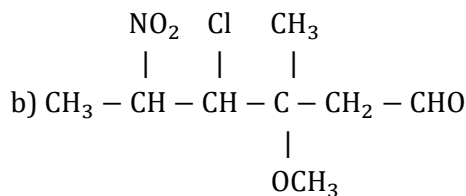
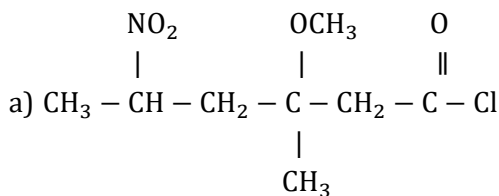
603. Rotation of plane polarized light can be measured by :

- Manometer
- Calorimeter
- Polarimeter
- Viscometer

604. A molecule having three different chiral carbon atoms, how many stereoisomers it will have?

- 8
- 3
- 9
- 6

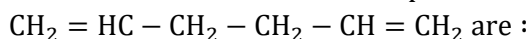
605. Correct the structural formula of compound-5-nitro-3-methoxy-3-methylhexanoyl chloride is



606. Which of the following is the strongest base?

- a) Acetamide b) Aniline c) Methylamine d) Dimethylamine

607. The isomeric monosubstitution products theoretically possible for the structure,

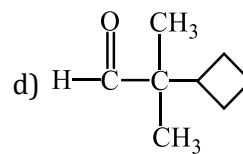
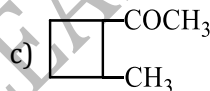
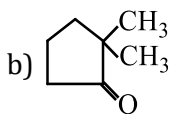
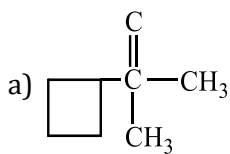
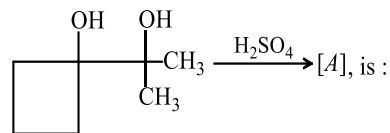


- a) 3 b) 2 c) 4 d) 6

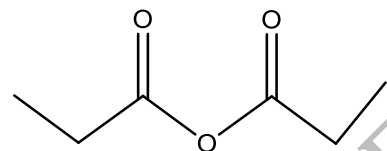
608. Intermediate product formed in the acid catalysed dehydration of *n*-propyl alcohol is :

- a) $\text{CH}_3 - \text{CH}_2 - \text{CH}_3$ b) $\text{CH}_3 - \text{CH} = \text{CH}_2$ c) $\text{CH}_3 - \overset{+}{\text{C}}\text{H} - \text{CH}_3$ d) $\text{CH}_3 - \text{CH}_2 - \overset{+}{\text{C}}\text{H}_2$

609. Product [A] in the reaction :



610. The IUPAC name of the following compound is



- a) Propionic anhydride b) Dipropanoic anhydride
c) Ethoxy propanoic acid d) Propanoic anhydride

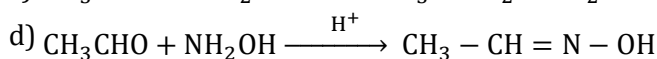
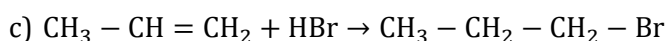
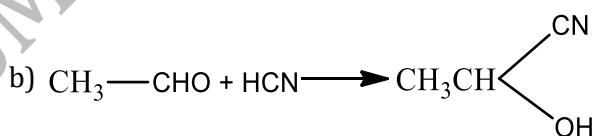
611. Which of the following has the highest nucleophilicity?

- a) F^- b) OH^- c) CH_3^- d) NH_2^-

612. Anthracene is purified by

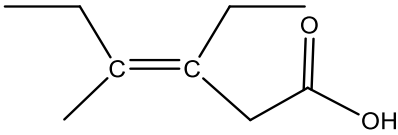
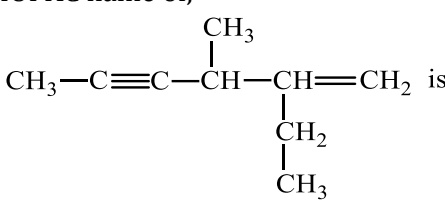
- a) Filtration b) Distillation c) Crystallisation d) Sublimation

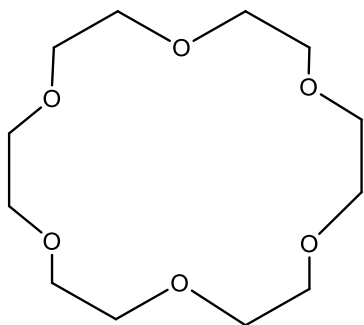
613. Which of the following requires radical intermediate?



614. Chiral molecules are those which:

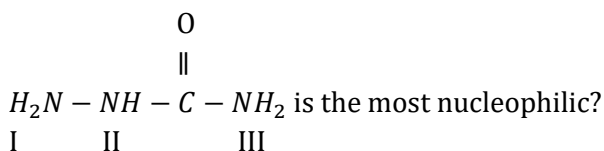
- a) Are not superimposable on their mirror images
b) Are superimposable on their mirror images

- c) Show geometrical isomerism
d) Are unstable molecules
615. Who is called the 'Father of Chemistry'?
- a) Faraday b) Priestley c) Rutherford d) Lavoisier
616. With a change in hybridization of the carbon bearing the charge, the stability of a carbanion increase in the order
- a) $sp < sp^3 < sp^2$ b) $sp < sp^2 < sp^3$ c) $sp^2 < sp < sp^3$ d) $sp^3 < sp^2 < sp$
617. The correct IUPAC name of the acid
- 
- a) Z-3-ethyl-4-methyl hex-3-en-1-oic acid b) Z-3-ethyl-4-methyl hexanoic acid
c) Z-3, 4-diethylpent-3-en-1-oic acid d) E-3-ethyl-4-methylhex-4-en-1-oic acid
618. IUPAC name of,
- 
- CH₃—C≡C—CH(CH₃)—CH(CH₂CH₃)=CH₂ is:
- a) 2-ethyl-3-methyl-hexa-1-en-4-yne
b) 5-ethyl-4-methyl-hexa-2-yn-5-ene
c) 3-methylene-4-methylhepta-5-yne
d) 5-methylene-5-ethyl-4-methylhepta-2-yne
619. The total number of alkenes possible by dehydrohalogenation of 3-bromo-3-cyclopentylhexane using alcoholic KOH is
- a) 1 b) 3 c) 5 d) 7
620. The Cl—C—Cl bond angle in dichloro methane will be :
- a) $> 109^{\circ}28'$ b) $< 109^{\circ}28'$ c) $109^{\circ}28'$ d) 120°
621. In the following reaction sequence, the chain initiation steps is :
- a) $\text{Cl}-\text{Cl} \rightarrow \dot{\text{Cl}} + \dot{\text{Cl}}$
b) $\text{CH}_4 + \dot{\text{Cl}} \rightarrow \dot{\text{C}}\text{H}_3 + \text{HCl}$
c) $\dot{\text{C}}\text{H}_3 + \text{Cl}_2 \rightarrow \text{CH}_3\text{Cl} + \dot{\text{Cl}}$
d) $\dot{\text{C}}\text{H}_3 + \dot{\text{Cl}} \rightarrow \text{CH}_3\text{Cl}$
622. Amongst the following which of the above are true for S_N2 reaction?
- (i) The rate of reaction is independent of the concentration of the nucleophile.
(ii) The nucleophile attacks the carbon atom on the side of the molecule opposite to the group being displaced.
(iii) the reaction proceeds with simultaneous bond formation and bond rupture.
- a) (i), (ii) b) (i), (iii) c) (i), (ii), (iii) d) (ii), (iii)
623. Predict the nature of principal product in the reaction,
 $\text{BrCH}_2\text{CH}_2\text{CH}_2\text{CH}_2\text{Br} + \text{KOH (alc.)} \rightarrow \text{Product}$:
- a) 1,3-butadiene b) Cyclobutane c) $\text{BrCH}_2\text{CH}_2\text{CH} = \text{CH}_2$ d) None of these
624. The most stable carbanion is
- a) CH_3^{\ominus} b) RCH_2^{\ominus} c) $\text{R}_3\text{C}^{\ominus}$ d) $^{\ominus}\text{CH}_2\text{CHO}$
625. Crown ethers are named as X-crown-Y. In the following crown ether, X and Y are respectively

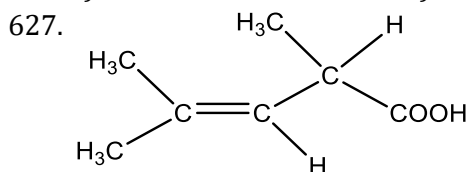


- a) 6 and 12 b) 18 and 6 c) 24 and 6 d) 6 and 24

626. Which one of the nitrogen atoms in



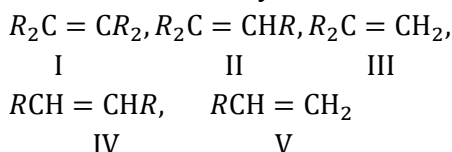
- a) III b) I c) II d) All three N atoms



Compound can exhibit

- a) Geometrical isomerism b) Tautomerism
c) Optical isomerism d) Geometrical and optical isomerism

628. The order of stability of the alkenes



- a) I>II>IV>III>V b) I=II>III>IV>V c) II>I>IV>III>V d) V>IV>III>I>II

629. If a compound on analysis was found to contain C = 18.5%, H = 1.55%, Cl = 55.04% and O = 24.81% then its empirical formula is

- a) CH₂OCl b) CH₂ClO₂ c) ClCH₂O d) CHClO

630. 2-pentanone and 3-methyl-2-butanone are a pair of isomers.

- a) Functional b) Chain c) Positional d) Stereo

631. The number of isomeric ethers with molecular formula C₄H₁₀O is/ are.

- a) One b) Two c) Three d) Four

632. Liebig's test is used to estimate

- a) H b) C c) C and H Both d) N

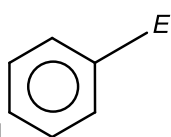
633. Number of isomers possible for C₄H₈O is

- a) 3 b) 4 c) 5 d) 6

634. Most stable carbonium ion is

- a) C_2H_5^+ b) $(\text{CH}_3)_3\text{C}^+$ c) $(\text{C}_6\text{H}_5)_3\text{C}^+$ d) $\text{C}_6\text{H}_5\text{C}^+\text{H}_2$

635.



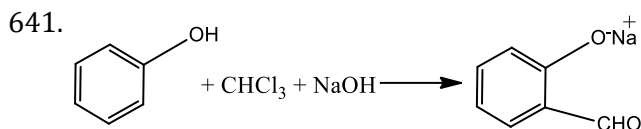
In a compound electrophilic substitution has occurred. The substitute-*E* are methyl

-CH₂Cl, -CCl₃ and -CHCl₂. The correct increasing order towards electrophilic substitution is

- a) -CH₃ < -CH₂Cl < -CHCl₂ < -CCl₃ b) -CH₃ < -CHCl₂ < -CH₂Cl < -CCl₃
c) -CCl₃ < -CH₂Cl < -CHCl₂ < -CH₃ d) -CCl₃ < -CHCl₂ < -CH₂Cl < -CH₃

636. In fructose, the possible optical isomers are

- a) 12 b) 8 c) 16 d) 4
637. Which structure can be explained by taking ground state configuration of atom?
 a) BeH_2 b) BF_3 c) CH_4 d) H_2O
638. Which one of the following carbanions is the least stable?
 a) CH_3CH_2^- b) $\text{HC} \equiv \text{C}^-$ c) $(\text{C}_6\text{H}_5)_3\text{C}^-$ d) $(\text{CH}_3)_3\text{C}^-$
639. Which one of the following is the most energetic conformation of cyclohexane?
 a) Boat b) Twisted boat c) Chair d) Half chair
640. The energy difference between the chair and boat form of cyclohexane is :
 a) 44 kJ mol^{-1} b) 24 kJ mol^{-1} c) 34 kJ mol^{-1} d) 68 kJ mol^{-1}



The electrophile involved in the above reaction is

- a) Dichloromethyl cation $(\text{CHCl}_2)^+$ b) Dichlorocarbene $(:\text{CCl}_2)$
- c) Trichloromethyl anion $(\text{CCl}_3)^-$ d) Formyl cation $(\text{CHO})^+$
642. Addition of HI on double bond of propene yields isopropyl iodide as major product. It is because the addition proceeds through :
 a) More stable carbocation
 b) more stable carbanion
 c) More stable free radical
 d) Homolysis
643. For which of the following parameters the structural isomers $\text{C}_2\text{H}_5\text{OH}$ and CH_3OCH_3 would be expected to have the same values? (Assume ideal behaviour)
 a) Heat of vaporisation
 b) Vapour pressure at the same temperature
 c) Boiling points
 d) Gaseous densities at the same temperature and pressure
644. The IUPAC name of  is :
 a) Bicyclo (2,1,0) pentane
 b) 1,2-cyclopropyl cyclobutane
 c) Cyclopentane (4,3)annulene
 d) 1,2-methylene cyclobutane
645. The IUPAC name of neopentane is :
 a) 2,2-dimethylpropane b) 2-methylpropane c) 2,2-dimethylbutane d) 2-methylbutane
646. In Carius method of 0.099 g organic compound gave 0.287 g AgCl. The percentage of chlorine in the compound will be
 a) 28.6 b) 71.7 c) 35.4 d) 64.2
647. The most common type of reaction in aromatic compounds is
 a) Elimination reaction b) Addition reaction
 c) Electrophilic substitution reaction d) Rearrangement reaction
648. Select the correct order of basic nature :
 a) $\text{CH}_3\text{CH}_2^- > \text{CH}_2 = \text{CH}^- > \text{CH} \equiv \text{C}^- \rightarrow \text{OH}^-$
 b) $\text{CH}_3\text{CH}_2^- > \text{CH} \equiv \text{C}^- > \text{CH}_2 = \text{CH}^- > \text{OH}^-$
 c) $\text{CH}_3\text{CH}_2^- > \text{OH}^- > \text{CH} \equiv \text{C}^- > \text{CH}_2 = \text{CH}^-$
 d) $\text{OH}^- > \text{CH} \equiv \text{C}^- > \text{CH}_2 = \text{CH}^- > \text{CH}_3 - \text{CH}_2^-$
649. Arrange the following carbocations in order of stability

benzyl allyl methyl vinyl
I II III IV

a) IV>III>II>I b) I>II>III>IV c) II>IV>III>I d) III>II>I>IV

650. The prefix name of —SH group in IUPAC system is :

a) Mercapto b) Thiol c) Sulphide d) None of these

651. The correct name for $\text{CH}_3\text{COCH}_2\text{OH}$ is :

a) 2-keto propanol
b) 1-hydroxy propan-2-one
c) Propan-2-one-1-ol
d) 3-hydroxy propan-2-one

652. The maximum number of alkyl groups in C_8H_{18} is :

a) 6 b) 5 c) 4 d) 2

653. The chlorination of methane to give CCl_4 is an example of

a) Addition b) Elimination c) Substitution d) Chain reaction

654. The number of isomers for the aromatic compound of the formula $\text{C}_7\text{H}_8\text{O}$ is :

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

655. The IUPAC name of the compound having the formula $\text{CH} \equiv \text{C} - \text{CH} = \text{CH}_2$ is :

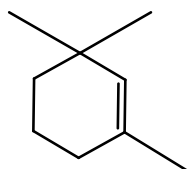
a) 1-butene-3-yne b) 3-butene-1-yne c) 1-butyn-3-ene d) But-1-yne-3-ene

656. $\text{H}_3\text{C} - \text{C} = \text{CH} - \text{CH} - \text{CH}_3$



a) 2-chloro-4-methyl-2-pentene b) 4-chloro-2-methyl-3-pentene
c) 4-methyl-2-chloro-2-pentene d) 2-chloro-4, 4-dimethyl-2-butene

657. Give the IUPAC name of the compound



a) 1,1,3-trimethylcyclohex-2-ene b) 1,3,3-trimethylcyclohex-1-ene
c) 1,1,5-trimethylcyclohex-5-ene d) 2,6,6-trimethylcyclohex-1-ene

658. C - H bond energy is about 101 kcal/mol for methane, ethane and other alkanes but is only 77 kcal/mol for C - H bond of CH_3 in toluene. This is because

a) Of inductive effect due to $-\text{CH}_3$ in toluene
b) Of the presence of benzene ring in toluene
c) Of resonance among the structures of benzyl radical in toluene
d) Aromaticity of toluene

659. The reaction $(\text{CH}_3)_3\text{C} - \text{Br} \xrightarrow{\text{H}_2\text{O}} (\text{CH}_3)_3\text{COH}$ is

a) Elimination b) Substitution c) Free radical d) Addition

660. The number of structural and configurational isomers of a bromo compound, $\text{C}_5\text{H}_9\text{Br}$, formed by the addition of HBr to 2-pentyne respectively are :

a) 1 and 2 b) 2 and 4 c) 4 and 2 d) 2 and 1

661. Fractional distillation is a process by which the separation of different fractions from mixture of solution is carried by making use of the following property of the fractions

a) Freezing point b) Boiling point c) Melting point d) Solubility

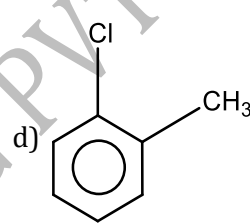
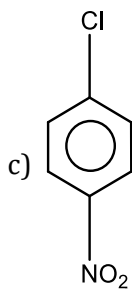
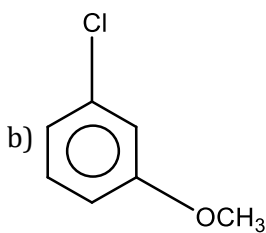
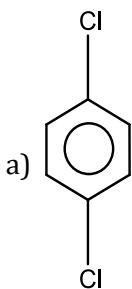
662. The maximum number of carbon atoms arranged linearly in the molecule, $\text{CH}_3 - \text{C} \equiv \text{C} - \text{CH} = \text{CH}_2$ is

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

663. α -D-glucose and β -D-glucose have a specific rotation of $+112^\circ$ and $+19^\circ$ respectively. In aqueous solution

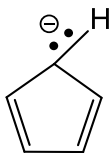
the rotation becomes +52°. This process is called :

- a) Inversion b) Racemization c) Mutarotation d) enolisation
664. Which of the following is an electrophile?
a) Na⁺ b) Li⁺ c) H⁺ d) Ca²⁺
665. Which of the following is singlet carbene?
a) CH₃ $\overset{\cdot\cdot}{\text{C}}$ HCH₃ b) C₂H₅ $\overset{\cdot\cdot}{\text{C}}$ -H c) CH₂=CH- $\overset{\oplus}{\text{C}}$ H₂ d) (CH₃)₃C⁺
666. Which of the following is the correct order of priority of groups in D-glyceraldehyde?
a) OH(1), CHO(2), CH₂OH(3) and H(4) b) OH (1), CH₂OH(2), CHO(3) and H(4)
c) CH₂OH(1), CHO(2), OH(3) and H(4) d) CHO(1), OH(2), CH₂OH(3) and H(4)
667. *o*-hydroxytoluene and benzyl alcohol are :
a) Position isomers b) Keto-enol tautomers c) Chain isomers d) None of these
668. Which of the following would react most readily with nucleophiles?



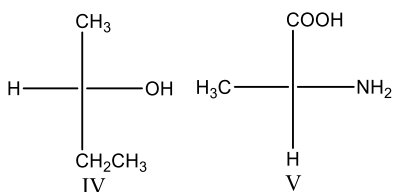
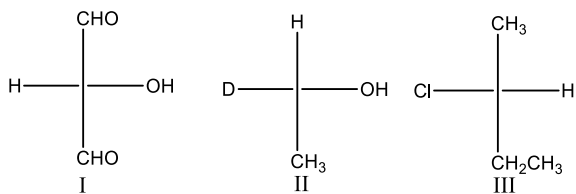
669. Which group has the highest + Inductive effect?

- a) CH₃ - b) CH₃CH₂ - c) (CH₃)₂CH - d) (CH₃)₃C -
670. The Prussian blue colour obtained during the test of nitrogen by Lassaigne's test is due to the formation of
a) Fe[Fe(CN)₆]₃ b) Na₄[Fe(CN)₆] c) Fe₃[Fe(CN)₆]₄ d) Fe₂[Fe(CN)₆]
671. How many π-electrons are there in the following structure?



- a) 2 b) 4 c) 6 d) 8
672. Which of the following statements is correct?
a) Allyl carbonium ion (CH₂=CH- $\overset{\oplus}{\text{C}}$ H₂) is more stable than propyl carbonium ion
b) Propyl carbonium ion is more stable than the allyl carbonium ion
c) Both are equally stable
d) None of the above
673. Which of the following possesses an sp-hybridized carbon in its structure?
a) CCl₂=CCl₂
b) CH₂=C=CH₂
c) CH₂=CH-CH=CH₂
d) CH₂=CCl-CH=CH₂

674. Select *R*-isomers from the following



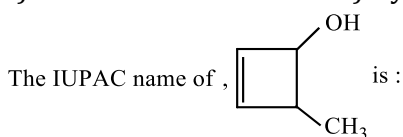
- a) I and III b) II, IV and V c) I, II and III d) II and III

675. Di-chloroacetic acid is a stronger acid than acetic acid.

This due to occurrence of

- a) Mesomeric effect b) Hyperconjugation c) Inductive effect d) Steric effect

676.



- a) 3-methyl cyclo-1-buten-2-ol
b) 4-methyl cyclo-2-buten-1-ol
c) 4-methyl cyclo-1-buten-3-ol
d) 2-methyl cyclo-3-buten-1-ol

677. The sodium extract of an organic compound on boiling with HNO_3 and addition of ammonium molybdate of solution gives a yellow precipitate. The compound contains

- a) Nitrogen b) Phosphorus c) Sulphur d) Chlorine

678. Unpaired electron in $\dot{\text{C}}\text{H}_3$ occupies :

- a) sp -hybrid orbital b) sp^3 -hybrid orbital c) p -orbital d) sp^2 -hybrid orbital

679. In which of the following ways does the hydride ion tend to function?

- a) An electrophile b) A nucleophile c) A free radical d) An acid

680. The number of isomers of the compound with molecular formula $\text{C}_2\text{H}_2\text{Br}_2$ is

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

681. The treatment of CH_3MgX with $\text{CH}_3\text{C}\equiv\text{C}-\text{H}$ produces :

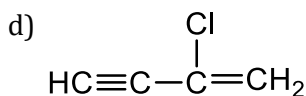
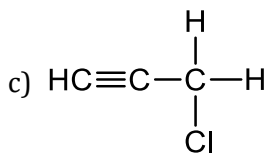
- a) CH_4 b) $\text{CH}_3-\text{CH}=\text{CH}_2$ c) $\text{CH}_3\text{C}\equiv\text{C}-\text{CH}_3$ d) $\text{CH}_3-\overset{\text{H}}{\underset{\text{H}}{\text{C}}}=\overset{\text{H}}{\underset{\text{H}}{\text{C}}}-\text{CH}_3$

682. The correct decreasing order of priority for the functional groups of organic compounds in the IUPAC system of nomenclature is

- a) $-\text{COOH}$, $-\text{SO}_3\text{H}$, $-\text{CONH}_2$, $-\text{CHO}$ b) $-\text{SO}_3\text{H}$, $-\text{COOH}$, $-\text{CONH}_2$, $-\text{CHO}$
c) $-\text{CHO}$, $-\text{COOH}$, SO_3H , $-\text{CONH}_2$ d) $-\text{CONH}_2$, $-\text{CHO}$, $-\text{SO}_3\text{H}$, $-\text{COOH}$

683. Which of the following is most likely to show optical isomerism?

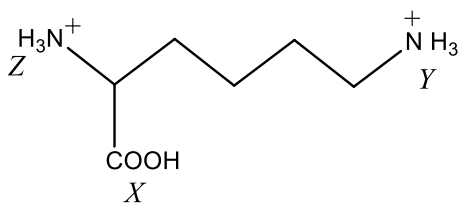
- a) $\text{HC}\equiv\text{C}-\overset{\text{H}}{\underset{\text{Cl}}{\text{C}}}-\text{C}\equiv\text{CH}$
b) $\text{HC}\equiv\text{C}-\overset{\text{H}}{\underset{\text{Cl}}{\text{C}}}-\text{CH}_3$



684. Which of the following statements is incorrect?

- The rate of reaction increases with increase in water concentration in the hydrolysis of tertiary butyl bromide in methanol and water
- The relative nucleophilicity in protic solvent is $\text{CN}^- > \text{I}^- > \text{OH}^- > \text{Br}^- > \text{Cl}^- > \text{F}^- > \text{H}_2\text{O}$
- In $\text{S}_{\text{N}}2$ reactions, the order of reactivity of alkyl halides is in the order methyl > primary > secondary > tertiary
- $\text{S}_{\text{N}}2$ reaction involves carbonium ions

685. Arrange in order of increasing acidic strength.



- $\text{X} > \text{Z} > \text{Y}$
- $\text{Z} < \text{X} > \text{Y}$
- $\text{X} > \text{Y} > \text{Z}$
- $\text{Z} > \text{X} > \text{Y}$

686. For the purification, isolation and separation of organic compounds, the latest technique followed is

- Chromatography
- Steam distillation
- Fractional crystallisation
- Sublimation

687. Arrange *p*-toluidine (I) *N,N*-dimethyl-*p*-toluidine (II) *p*-nitroaniline (III) and aniline (IV) in order of decreasing basicity

- $\text{I} > \text{IV} > \text{III} > \text{II}$
- $\text{I} > \text{II} > \text{III} > \text{IV}$
- $\text{II} > \text{I} > \text{IV} > \text{III}$
- $\text{III} > \text{I} > \text{II} > \text{IV}$

688. The reagent showing addition on alkene against the Markownikoff's rule of:

- Br_2
- H_2S
- HF
- HBr

689. Carbocation can undergo:

- Loss of a proton
- Addition to multiple bond
- Combination with anions
- All of the above

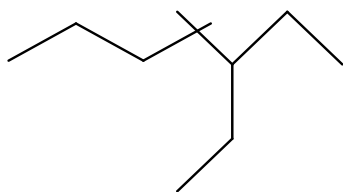
690. Lactic acid is:

- Propionic acid
- β -hydroxypropanoic acid
- α -hydroxypropanoic acid
- None of the above

691. Of the following compounds which will have a zero dipole moment?

- 1,1-dichloroethylene
- trans*-1,2-dichloroethylene
- cis*-1,2-dichloroethylene
- None of the above

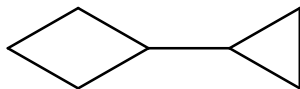
692. The IUPAC name of



- a) 1,1-diethyl-2,2-dimethylpentane
c) 5,5-diethyl-4,4-dimethylpentane

- b) 4,4-dimethyl-5,5-diethylpentane
d) 3-ethyl-4,4-dimethylheptane

693.



The correct IUPAC name

- a) 1-cyclopropylcyclobutane
c) 1-cyclobutane-1-cyclopropane

- b) 1,1-dicyclobutane
d) None of the above

694. Reactivity towards nucleophilic addition reaction of

- I. HCHO II. CH₃CHO
III. CH₃COCH₃ is

- a) II>III>I b) III>II>I c) I>II>III d) I>III>II

695. Arrange the following compounds in order of their decreasing reactivity with an electrophile, E[⊕].

- (A) Chlorobenzene,
(B) 2,4-dinitrochlorobenzene,
(C) *p*-nitrochlorobenzene

- a) C>B>A b) B>C>A c) A>C>B d) A>B>C

696. Isomerism exhibited by acetic acid and methyl formate is :


- a) Functional b) Chain c) Geometrical d) Central

697. C₃H₅Cl + aq. NaOH → C₂H₅OH + NaCl;
this reaction is

- a) Electrophilic substitution of I order b) Electrophilic substitution of II order
c) Nucleophilic substitution of I order d) Nucleophilic substitution of II order

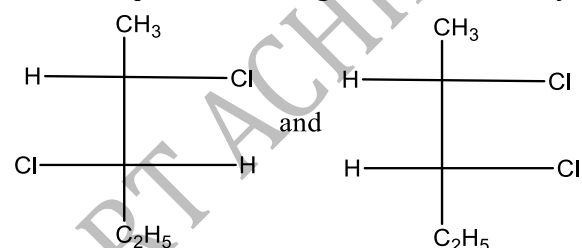
698. In IUPAC suffix name of —COX is :

- a) Oyl halide b) Halo carbonyl c) Carbamoyl d) None of these

699. IUPAC name of the compound,  is :

- a) but-2-en-1-ol b) 1-hydroxy but-1-ene c) 4-hydroxy butene-3 d) But-1-en-1-ol

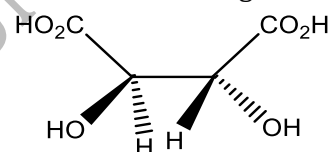
700. The two optical isomers given below, namely



- a) Enantiomers
c) Diastereomers

- b) Geometrical isomers
d) Structural isomers

701. The absolute configuration of

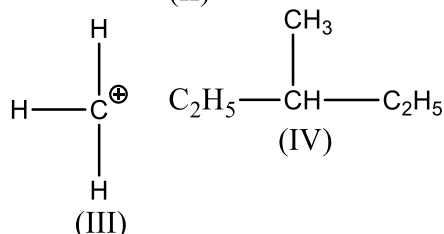
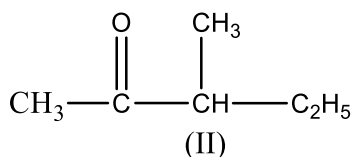
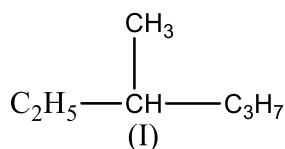


- a) S, S b) R, R c) R, S d) S, R

702. Which one of the following compounds is most reactive towards nucleophilic addition?

- a) CH₃CHO b) PhCOCH₃ c) PhCOPh d) CH₃COCH₃

703. Among the following four structures I to IV



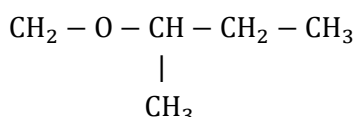
it is true that

- a) All four are chiral compounds
 b) Only I and II are chiral compounds
 c) Only III is a chiral compound
 d) Only II and IV are chiral compounds

704. Which of the following is the most stable cation?

- a) $\text{F}_3\text{C}-\text{CH}_2^{\oplus}$ b) $(\text{CH}_3)_2\text{CH}^{\oplus}$ c) CH_3^{\oplus} d) CF_3^{\oplus}

705. Write the IUPAC name of



- a) 3-methoxy butane b) 2-methoxy butane
 c) 3-methyl-3-methoxy propane d) Butoxy methane

706. Which of the following species is not electrophilic in nature?

- a) Cl^{\oplus} b) BH_3 c) $\text{H}_3\text{O}^{\oplus}$ d) NO_2^{\oplus}

707. List the following alkoxide nucleophile in decreasing order of their $\text{S}_{\text{N}}2$ reactivity



- a) $2 > 3 > 5 > 4 > 1$ b) $5 > 3 > 2 > 1 > 4$ c) $1 > 5 > 2 > 3 > 4$ d) $3 > 5 > 1 > 2 > 3$

708. The Beilstein test for organic compound is used to detect

- a) Nitrogen b) Sulphur c) Carbon d) Halogens

709. Which of the following statements is not characteristic of free radical chain reaction?

- a) It gives major product derived from most stable free radical
 b) It is usually sensitive to change in solvent polarity
 c) It proceeds in three main steps like initiation, propagation and termination
 d) It may be initiated by UV light

710. The presence of carbon in an organic compound is detected by heating it with

- a) Sodium metal to convert it into NaCN
 b) CaO to convert it into CO which burns with a blue flame
 c) CuO to convert it into CO_2 which turns lime water milky
 d) Cu wire to give a bluish green flame

711. IUPAC name of the compound, $\text{CH}_2 - \text{CH}_2\text{CH}_2\text{Cl}$ is :

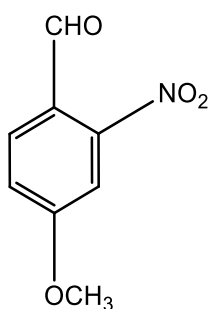


- a) 1-chloro-2,3-epoxypropane
 b) 3-chloro-1,2-epoxypropane

c) 1-chloroethoxymethane

d) None of the above

712. What is the correct IUPAC name of



a) 4-methoxy-2-nitrobenzaldehyde

c) 4-methoxy-6-nitrobenzaldehyde

b) 4-formyl-3-nitro anisole

d) 2-formyl-5-methoxy nitrobenzene

713. Which one is an elimination reaction?

a) $\text{CH}_3\text{CH}_3 + \text{Cl}_2 \rightarrow \text{CH}_3\text{CH}_2\text{Cl} + \text{HCl}$

b) $\text{CH}_3\text{Cl} + \text{KOH}(\text{aq.}) \rightarrow \text{CH}_3\text{OH} + \text{KCl}$

c) $\text{CH}_2 = \text{CH}_2 + \text{Br} \rightarrow \text{CH}_2\text{BrCH}_2\text{Br}$

d) $\text{C}_2\text{H}_5\text{Br} + \text{KOH}(\text{alc.}) \rightarrow \text{C}_2\text{H}_4 + \text{KBr} + \text{H}_2\text{O}$

714. Identify the compound that exhibits tautomerism

a) 2-butene

b) Lactic acid

c) 2-pentanone

d) Phenol

715. Which of the following is an electrophile?

a) H_2O

b) SO_3

c) NH_3

d) ROR

716. The formula of ethanenitrile is :

a) $\text{C}_2\text{H}_5\text{NC}$

b) $\text{C}_2\text{H}_5\text{CN}$

c) CH_3CN

d) None of these

717. Which of the following acids shows stereoisomerism?

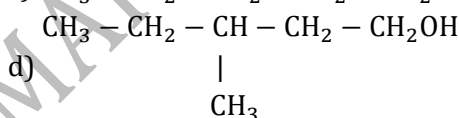
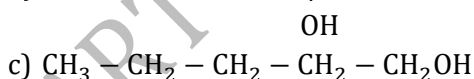
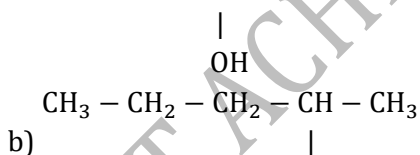
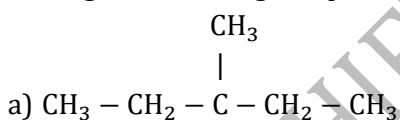
a) Oxalic acid

b) Tartaric acid

c) Acetic acid

d) Formic acid

718. Among the following compounds which can be dehydrated very easily is



719. Mark the incorrect statement in nitrogen Kjeldahl's method of estimation

a) Nitrogen gas is collected over caustic potash solution

b) Potassium sulphate is used as boiling point elevator of H_2SO_4

c) Copper sulphate or mercury acts as a catalyst

d) Nitrogen is quantitatively decomposed to give ammonium sulphate

720. Which of the following orders is correct regarding the $-I$ effect of the substituents?

a) $-\text{NR}_2 > -\text{OR} > -\text{F}$ b) $-\text{NR}_2 < -\text{OR} < -\text{F}$ c) $-\text{NR}_2 > -\text{OR} < -\text{F}$ d) $-\text{NH}_2 < -\text{OR} > -\text{F}$

721. The ease of dehydrohalogenation of alkyl halide with alcoholic KOH is

a) $3^\circ < 2^\circ < 1^\circ$

b) $3^\circ > 2^\circ > 1^\circ$

c) $3^\circ < 2^\circ > 1^\circ$

d) $3^\circ > 2^\circ < 1^\circ$

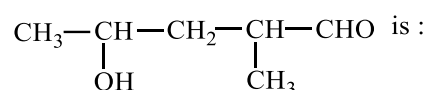
722. Lactic acid in which a methyl group, a hydroxyl group, a carboxylic acid group and a hydrogen atom are attached to a central carbon atom shows optical isomerism due to the molecular geometry at the :
- Carbon atom of the methyl group
 - Carbon atom of the carboxylic acid group
 - Central carbon atom
 - Oxygen of the hydroxyl group
723. Which of the following process is suitable for the purification of aniline?
- Simple distillation
 - Fractional distillation
 - Fractional crystallisation
 - Steam distillation
724. Maleic and fumaric acids are :
- Tautomers
 - Geometrical isomers
 - Chain isomers
 - Functional isomers
725. $\text{CH}_3\text{Br} + \text{Nu}^- \rightarrow \text{CH}_3 - \text{Nu} + \text{Br}^-$ The decreasing order of the rate of the above reaction with nucleophiles (Nu^-) A to D is :
- [$\text{Nu}^- = (\text{A})\text{PhO}^-, (\text{B})\text{AcO}^-, (\text{C})\text{HO}^-, (\text{D})\text{CH}_3\text{O}^-$]
- $D > C > A > B$
 - $D > C > B > A$
 - $A > B > C > D$
 - $B > D > C > A$
726. Which one is least reactive in a nucleophile substitution reaction?
- $\text{CH}_3\text{CH}_2\text{Cl}$
 - $\text{CH}_2 = \text{CHCH}_2\text{Cl}$
 - $\text{CH}_2 = \text{CHCl}$
 - $(\text{CH}_3)_3\text{CCl}$
727. In methanol solution, bromine reacts with ethylene to yield $\text{BrCH}_2\text{CH}_2\text{OCH}_3$ in addition to 1,2-dibromoethane because :
- The intermediate carbocation may react with Br^- or CH_3OH
 - The methyl alcohol solvolates the bromine
 - The reaction follows Markownikoff's rule
 - This is a free radical mechanism
728. Number of tertiary carbon atoms in tertiary butyl alcohol is :
- 1
 - 2
 - Zero
 - 4
729. Which step is chain propagation step in the following mechanism?
- $\text{Cl}_2 \xrightarrow{h\nu} \text{Cl}^\bullet + \text{Cl}^\bullet$
 - $\text{Cl}^\bullet + \text{CH}_4 \rightarrow \dot{\text{C}}\text{H}_3 + \text{HCl}$
 - $\text{Cl}^\bullet + \text{Cl}^\bullet \rightarrow \text{Cl}_2$
 - $\dot{\text{C}}\text{H}_3 + \text{Cl}^\bullet \rightarrow \text{CH}_3\text{Cl}$
- (i)
 - (ii)
 - (iii)
 - (iv)
730. The IUPAC name of the compound $\text{CH}_3 - \text{N} \equiv \text{C}$ is :
- Ethane nitrile
 - Methane isonitrile
 - Ethane isonitrile
 - None of these
731. IUPAC name of $\text{CH}_3\text{CH}_2\text{C}(\text{Br}) = \text{CH} - \text{Cl}$ is
- 2-bromo-1-chloro butene-1
 - 1-chloro-2-bromo butene-1
 - 3-chloro-2-bromo butene-2
 - None of the above
732. Which of the following undergoes nucleophilic substitution exclusively $\text{S}_\text{N}1$ mechanism?
- Benzyl chloride
 - Isopropyl chloride
 - Chlorobenzene
 - Ethyl chloride
733. The sigma bond energy of C—H bond in C_2H_6 is :
- 99 kcal
 - 140 kcal
 - 200 kcal
 - 60 kcal
734. The general formula $\text{C}_n\text{H}_{2n}\text{O}_2$ could be for open chain
- Diketones
 - Carboxylic acids
 - Diols
 - Dialdehydes
735. The correct sequence of steps involved in the mechanism of Cannizzaro's reaction is
- Nucleophilic attack, transfer of H^- and transfer of H^+
 - Transfer of H^- , transfer of H^+ and nucleophilic attack
 - Transfer of H^+ , nucleophilic attack and transfer of H^-
 - Electrophilic attack by OH^- , transfer of H^+ and transfer of H^-
736. Examine the following statements regarding $\text{S}_\text{N}2$ reaction

- (1) The rate of reaction is independent of concentration of nucleophile
 (2) The nucleophile attacks the carbon atom on the side of molecule opposite to the group being displaced
 (3) The reaction proceeds with simultaneous bond formation and rupture

Which of the above written statements is correct?

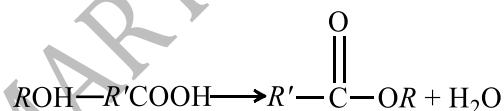
- a) 1, 2 b) 1, 3 c) 1, 2, 3 d) 2, 3
737. Propanol and propanone are
 a) Functional isomers b) Enantiomers c) Chain isomers d) Structural isomers
738. Diastereomers can be separated by :
 a) Fractional distillation b) Simple distillation c) Electrophoresis d) All of these
739. Angle strain in cyclopropane is
 a) 24°44' b) 9°44' c) 44' d) -5°16'
740. The function of AlCl_3 in Friedel-Craft's reaction is
 a) To absorb HCl b) To absorb water c) To produce nucleophile d) To produce electrophile
741. In Kjeldahl's method of estimation of nitrogen, CuSO_4 acts as
 a) Oxidising agent b) Reducing agent c) Catalytic agent d) Hydrolysis agent
742. A mixture of acetone and methanol can be separated by
 a) Steam distillation b) Vacuum distillation
 c) Fractional distillation d) None of these

743. The IUPAC name of,



- a) 4-hydroxy-1-methylpentanal
 b) 4-hydroxy-2-methylpentanal
 c) 3-hydroxy-2-methylpentanal
 d) 3-hydroxy-3-methylpentanal
744. The oxygen atom in phenol
 a) Exhibits only inductive effect
 b) Exhibits only resonance effect
 c) Has more dominating resonance effect than inductive effect
 d) Has more dominating inductive effect than the resonance effect
745. 2-methylpent-3-enoic acid shows :
 a) Optical isomerism
 b) Geometrical isomerism
 c) Both (a) and (b)
 d) None of these

746. In the reaction,



water is formed by the combination of :

- a) Hydroxyl of acid with alcoholic hydroxyl hydrogen
 b) Hydroxyl of alcohol with carboxylic hydrogen
 c) Both the above changes
 d) None of the above
747. Pyridine is :
 a) An aromatic compound and a primary base
 b) A heterocyclic amino compound and a tertiary base
 c) An aromatic amino compound and forms salts
 d) A cyano derivative of benzene and secondary base

748. The reason for the loss of optical activity of lactic acid when -OH group is changed by H is that

- a) Chiral centre of the molecule is destroyed b) Molecules acquires asymmetry
c) Due to change in configuration d) Structural changes occurs

749. The correct order of nucleophilicity among the following is :

- a) $\text{CH}_3\text{-C}(=\text{O})\text{-O}^-$ b) CH_3O^- c) CN^- d) $\text{CH}_3\text{-C}_6\text{H}_4\text{-SO}_3^-$

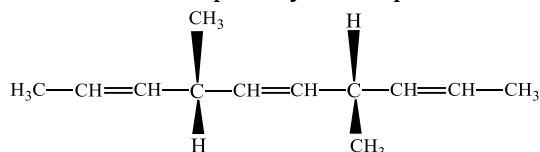
750. Which of the following compounds exhibits rotamers?

- a) 2-butene b) Maleic acid c) Butane d) Fumaric acid

751. Ammonia molecule is :

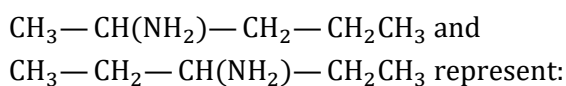
- a) A nucleophile b) An electrophile c) A homolytic d) An acid

752. The number of optically active products obtained from the complete ozonolysis of the given compound is :



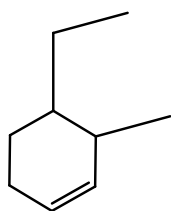
- a) 0 b) 1 c) 2 d) 4

753. The structures,



- a) Chain isomers b) Position isomers c) Stereo isomers d) mesomers

754. The systematic (IUPAC) name of the compound with the following structural formula shall be



- a) 1-ethyl-2-methyl cyclohexene b) 2-methyl-1-ethyl cyclohexene
c) 3-ethyl-2-methyl cyclohexene d) 4-ethyl-3-methyl cyclohexene

755. 0.5 g of hydrocarbon gave 0.9 g water on combustion. The percentage of carbon hydrocarbon is

- a) 60.6 b) 28.8 c) 80.0 d) 68.6

756. Which one of the following is most reactive towards electrophilic attack?

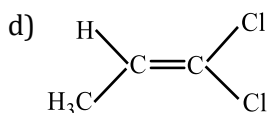
- a) b) c) d)

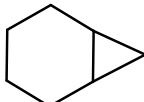
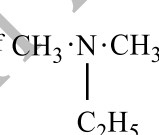
757. Identify, which of the below does not possess any element of symmetry?

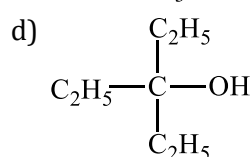
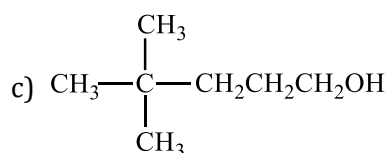
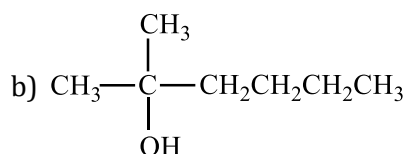
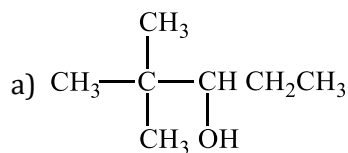
- a) (+)(-) tartaric acid b) Carbon tetrachloride c) Methane d) *Meso*-tartaric acid

758. Geometrical isomerism is shown by :

- a) b) c)



759. When thiourea is heated with metallic sodium, the compound which can't be formed is
 a) NaCNS b) NaCN c) Na₂SO₄ d) Na₂S
760. An unknown compound *A* has a molecular formula C₄H₆. When *A* is treated with excess of Br₂ a new substance *B* with formula C₄H₆Br₄ is formed. *A* forms a white ppt. with ammoniacal silver nitrate solution. *A* may be :
 a) But-1-yne b) But-2-yne c) But-1-ene d) But-2-ene
761. The racemisation of optically active compounds is driven by :
 a) Entropy b) Enthalpy c) Entropy and enthalpy d) Element of symmetry
762. A cyclic stereoisomer having the molecular formula C₄H₇Cl are classified and tabulated. Find out the correct set of numbers.
 Geometrical Optical
 a) 6 2 b) 4 2
 c) 6 0 d) 4 0
763. The correct name for the following hydrocarbon is

 a) Tricycle [4.1.0]heptane b) Bicyclo [5.2.1] heptane
 c) Bicyclo [4.1.0] heptane d) Bicyclo [4.1.0] hexane
764. Which of the following is the most stable radical?
 a) CH₃[•] b) RCH₂[•] c) R₂CH[•] d) R₃C[•]
765. The number of 4° carbon atoms in 2,2,4,4-tetramethylpentane :
 a) 1 b) 2 c) 3 d) 4
766. Inductive effect involves
 a) Delocalisation of σ-electrons b) Displacement of σ-electrons
 c) Delocalisation of π –electrons d) Displacement of π-electrons
767. Compounds whose molecules are superimposable on their mirror images even though they contain asymmetric carbon atoms or chiral centres are known as :
 a) Enantiomers b) Racemers c) Mesomers d) Conformers
768. Percentage of hydrogen is maximum in .
 a) C₂H₄ b) CH₄ c) C₂H₂ d) C₆H₆
769. Which of the following has most acidic hydrogen?
 a) 3-hexanone b) 2, 4-hexanedione c) 2, 4-hexanedione d) 2, 3-hexanedione
770. IUPAC name of 
 a) *N,N*- dimethylethanamine
 b) *N*-methyl, *N*-ethylmethanamine
 c) Dimethyl-ethylamine
 d) None of the above
771. Ease of abstraction of hydrogen is greater when attached to :
 a) 1° carbon b) 2° carbon c) 3° carbon d) *neo*-carbon
772. *neo*-Heptyl alcohol is correctly represented as :



773. The IUPAC name for $\text{CH}_3\text{COCH}(\text{CH}_3)_2$ is :

- 4-methyl isopropyl ketone
- 3-methyl-2-butanone
- Isopropyl methyl ketone
- 2-methyl-3-butanone

774. Steam distillation is based on the fact that vaporisation of organic liquid takes place at

- Lower temperature than its boiling point
- Higher temperature than its boiling point
- Its boiling point
- Water and organic liquid both undergo distillation

775. IUPAC name of $\text{CH}_2 = \text{CH} - \text{CH}(\text{CH}_3)_2$ is :

- 1,1-dimethyl-2-propene
- 3-methyl-1-butene
- 2-vinylpropane
- 1-isopropyl ethylene

776. The hybridization of central carbon atom in 1,2- propadiene (allene) is

- sp^3
- sp^2
- sp
- None of these

777. The fairly neutral character of CH_3OH is changed to which of the following by adding sodium metal?

- Acidic
- Neutral
- An electrophile
- A nucleophile

778. The kind of delocalisation involving sigma bond is called

- Inductive effect
- Hyperconjugation effect
- Electromeric effect
- Mesomeric effect

779. In the case of homologous series of alkanes, which one of the following statements is incorrect?

- The members of the series have the general formula $\text{C}_n\text{H}_{2n+2}$, where n is an integer
- The difference between any two successive members of the series corresponds to 14 unit of relative atomic mass
- The members of the series are isomers of each other
- The members of the series have similar chemical properties

780. Which of the following reagents will be fruitful for separating a mixture of nitrobenzene and aniline?

- Aq. NaHCO_3
- H_2O
- Aq. HCl
- Aq. NaOH

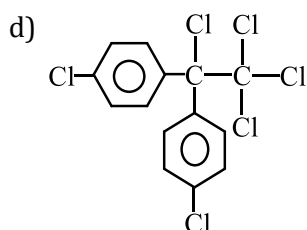
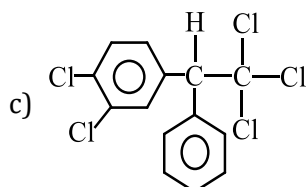
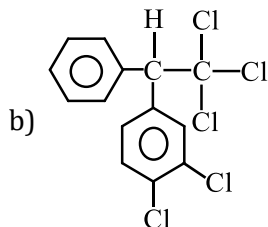
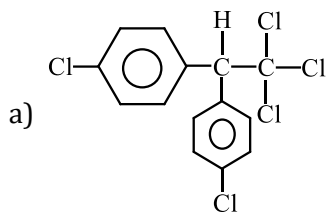
781. The name formic acid was given for HCOOH because it was prepared from :

- Acetum
- Ant
- Wood
- Oxalis plant

782. 2, 3-dimethyl hexane contains tertiary secondary andprimary carbon atoms, respectively

- 2, 2, 1
- 2, 4, 3
- 4, 3, 2
- 3, 2, 4

783. Which one of the following is the correct formula for dichlorodiphenyltrichloro ethane?



784. How many sigma and pi bonds are there in the molecule of di cyano ethane ($\text{CN} - \text{CH} = \text{CH} - \text{CN}$)?

- a) 3 sigma and 3 pi b) 5 sigma and 2 pi c) 7 sigma and 5 pi d) 2 sigma and 3 pi

785. Out of the following, the alkene that exhibits optical isomerism is

- a) 3-methyl-2-pentene b) 4-methyl-1-pentene c) 3-methyl-1-pentene d) 2-methyl-2-pentene

786. The species which use sp^2 -hybrid orbitals in its bonding :

- a) PH_3 b) NH_3 c) CH_3^+ d) CH_4

787. Carbanion can undergo :

- a) Rearrangement
b) Combination with cation
c) Addition to a carbonyl group
d) All of the above are correct

788. An organic compound $\text{C}_5\text{H}_{11}\text{X}$ on dehydrohalogenation gives pentene-2 only. What is halide?

- a) $\text{CH}_3\text{CH}_2\text{CHXCH}_2\text{CH}_3$ b) $(\text{CH}_3)_2\text{CHCHXCH}_3$ c) $\text{CH}_3\text{CH}_2\text{CH}_2\text{CHXCH}_3$ d) $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_2\text{X}$

789. Percentage composition of an organic compound is as follows

$$\text{C}=10.06, \text{H}=0.84, \text{Cl}=89.10$$

Which of the following corresponds to its molecular formula if the vapour density is 60.0?

- a) CH_3Cl b) CHCl_3 c) CH_2Cl_2 d) None of these

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

- a) $\text{CH}_2 = \text{CH} - \text{Cl}$ b) $\text{C}_6\text{H}_5\text{Cl}$ c) $\text{C}_6\text{H}_5\text{CH}_2\text{Cl}$ d) $\text{ClCH}_2 - \text{CH} = \text{CH}_2$

791. Which among the following statements is correct with respect to the optical isomers?

- a) Enantiomers are non-superimposable mirror images.
b) Diastereomers are superimposable mirror images.
c) Enantiomers are superimposable mirror image.
d) *Meso* forms have no plane of symmetry.

792. Consider thiol anion (RS^\ominus) and alkoxy anion (RO^\ominus). Which of the following statement is correct?

- a) RS^\ominus is less basic and less nucleophilic than RO^\ominus
b) RS^\ominus is less basic but more nucleophilic than RO^\ominus

c) RS^{\ominus} is less basic and more nucleophilic than RO^{\ominus}

d) RS^{\ominus} is more basic but less nucleophilic than RO^{\ominus}

793. The maximum number of alkene isomers for an alkene with molecular formula C_4H_8 is :

a) 2

b) 3

c) 4

d) 5

794. The IUPAC name of the compound $(CH_3)_2CH - CH = CH - CHOH - CH_3$ is

a) 5-methyl-hex-3-en-2-ol

b) 2-methyl-hex-3-en-5-ol

c) 2-hydroxy-5-nethyl-3-hexene

d) 5-hydroxy-2-methyl-3-hexene

795. The number of isomers in $C_4H_{10}O$ are

a) 7

b) 8

c) 6

d) 5

796. Which alkyl halide is preferentially hydrolysed by S_N1 mechanism?

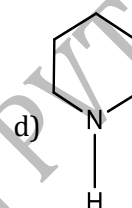
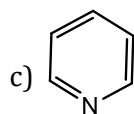
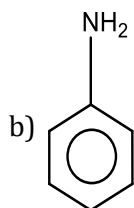
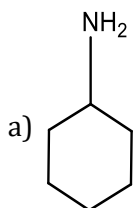
a) $(CH_3)_3C.Cl$

b) $CH_3CH_2CH_2Cl$

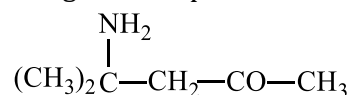
c) CH_3CH_2Cl

d) CH_3Cl

797. Which of the following is most basic?



798. The given compound in IUPAC may be called,



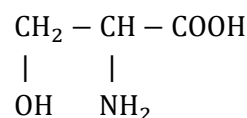
a) Diacetone

b) Acetoneamine

c) Diacetoneamine

d) 4-amino-4-methylpentan-2-one

799. The IUPAC name of the compound,



a) 2-amino-3-hydroxy propanoic acid

b) 1-hydroxy-2-amino propan-3-oic acid

c) 1-amino-2-hydroxypropanoic acid

d) 3-hydroxy-2-amino propanoic acid

800. Which of the following compounds is not chiral?

a) 1-chloro-2-methyl pentane

b) 2-chloropentane

c) 1-chloropentane

d) 3-chloro-2-methyl pentane

801. If X is halogen the correct order for S_N2 reactivity is :

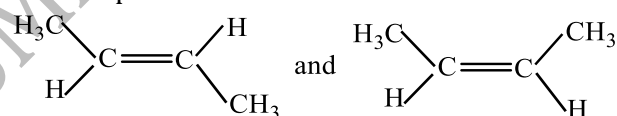
a) $R_2CHX > R_3CX > RCH_2X$

b) $RCH_2X > R_3CX > RCH_2X$

c) $RCH_2X > R_2CHX > R_3X$

d) $R_3CX > R_2CHX > RCH_2X$

802. The compound



can be distinguished by their :

a) Chlorinated products

b) Products formed by addition of bromine

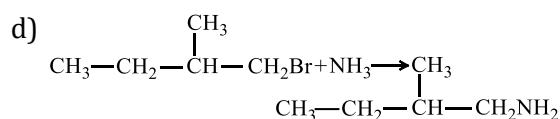
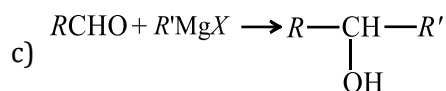
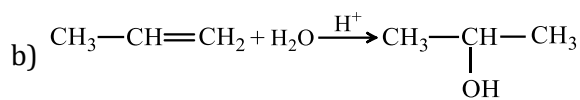
c) Reaction with H_2/Ni

d) None of the above

803. How many stereoisomers does this molecule have?



- a) 6 b) 8 c) 4 d) 2
804. What is the number of possible optical isomers in glucose?
a) 3 b) 4 c) 12 d) 16
805. In which reaction addition takes place according to Markownikoff's rule?
a) $\text{CH}_3\text{CH} = \text{CHCH}_3 + \text{Br} \rightarrow$ b) $\text{CH}_2 = \text{CH}_2 + \text{HBr} \rightarrow$
c) $\text{CH}_3\text{CH} = \text{CH}_2 + \text{HBr} \rightarrow$ d) $\text{CH}_3\text{CH} = \text{CH}_2 + \text{Br}_2 \rightarrow$
806. Presence of halogen in organic compounds can be detected using
a) Leibig's test b) Duma's test c) Kjeldahl test d) Beilstein's test
807. The bond energy for catenation next to carbon is :
a) N b) S c) Si d) P
808. The hydrolysis of alkyl halides by aqueous NaOH is best termed as :
a) Electrophilic substitution reaction
b) Electrophilic addition reaction
c) Nucleophilic addition reaction
d) Nucleophilic substitution reaction
809. Which of the following compounds exhibit stereoisomerism?
a) 3-methyl butyne -1 b) 2-methyl butene -1
c) 2-methyl butanoic acid d) 3-methyl butanoic acid
810. The + I.E.(inductive effect) is shown by :
a) CH_3 b) $-\text{OH}$ c) F d) $-\text{C}_6\text{H}_5$
811. In paper chromatography
a) Mobile phase is liquid and stationary phase is solid
b) Mobile phase is solid and stationary phase is liquid
c) Both phases are liquids
d) Both phases are solids
812. Which one of the following is not found in alkenes?
a) Chain isomerism
b) Geometrical isomerism
c) Metamerism
d) Position isomerism
813. Select the correct statement :
a) The prefixes are written before the name of compound
b) The suffixes are written after the name of compound
c) The IUPAC name of a compound is always written as one word
d) All of the above
814. A compound contains 2 dissimilar asymmetric carbon atoms. The number of optically active isomers is :
a) 2 b) 3 c) 4 d) 5
815. The inductive effect
a) Implies the atom's ability to cause bond polarization
b) Increases with increase of distance
c) Implies the transfer of lone pair of electrons from more electronegative atom to the lesser electronegative atom in a molecule
d) Implies the transfer of lone of electrons from lesser electronegative atom to the more electronegative atom in a molecule
816. IUPAC name of the compound, $\text{ClCH}_2\text{CH}_2\text{COOH}$ is :
a) 3-chloropropanoic acid
b) 2-chloropropanoic acid
c) 2-chloroethanoic acid
d) Chlorosuccinic acid
817. Which one is a nucleophilic substitution reaction among the following?
a) $\text{CH}_3\text{CHO} + \text{HCN} \rightarrow \text{CH}_3\text{CH}(\text{OH})\text{CN}$



818. If there is no rotation of plane polarised light by a compound in a specific solvent, though to be chiral, it means that :

- a) It is certainly *meso*
- b) It is racemic mixture
- c) It is certainly not chiral
- d) No such compound

819. Formation of ethylene from acetylene is an example of

- a) Elimination reaction
- b) Substitutions reaction
- c) Condensation reaction
- d) Addition reaction

820. Which of the following is nucleophilic addition reaction?

- a) Hydrolysis of ethyl chloride by NaOH
- b) Purification of acetaldehyde by NaHSO_3
- c) Alkylation of anisole
- d) Decarboxylation of acetic acid

821. The reagent used in dehalogenation process is :

- a) KOH alc.
- b) Zn dust + alc.
- c) Na
- d) KOH(aq)

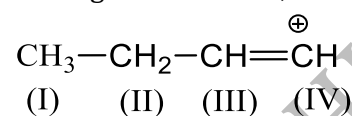
822. Benzaldoxime exists in how many forms?

- a) 1
- b) 2
- c) 3
- d) 4

823. Resonance arises due to the :

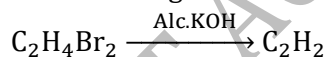
- a) Migration of atoms
- b) Migration of proton
- c) Delocalisation of σ -electron
- d) Delocalisation of π -electron

824. In the given structure, which carbon atom is most electronegative?



- a) (I)
- b) (II)
- c) (III)
- d) (IV)

825. The following reaction is an example of Reaction.

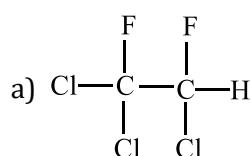


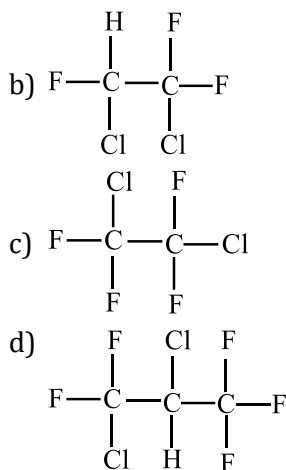
- a) Addition
- b) Dehydrobromination
- c) Substitution
- d) Debromination

826. Which one of the following pair represents stereoisomerism?

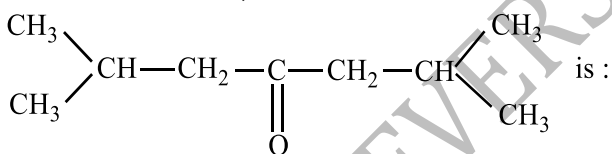
- a) Structural and geometrical isomerism
- b) Linkage and geometrical isomerism
- c) Chain and rotational isomerism
- d) Optical and geometrical isomerism

827. Freon-114 is an organic compound. It is chemically called 1,2-dichlorotetrafluoroethane. Its correct structural formula is :

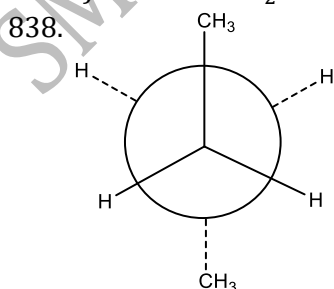




828. Which of the following compounds is expected to be optically active?
 a) $(\text{CH}_3)_2\text{CHCHO}$ b) $\text{CH}_3\text{CH}_2\text{CH}_2\text{CHO}$ c) $\text{CH}_3\text{CH}_2\text{CHBrCHO}$ d) $\text{CH}_3\text{CH}_2\text{CBr}_2\text{CHO}$
829. Which of the following is least reactive in a nucleophilic substitution reaction?
 a) $(\text{CH}_3)_3\text{C}-\text{Cl}$ b) $\text{CH}_2=\text{CHCl}$ c) $\text{CH}_3\text{CH}_2\text{Cl}$ d) $\text{CH}_2=\text{CHCH}_2\text{Cl}$
830. During debromination of meso-dibromo-butane, the major compound formed is :
 a) *n*-butane b) *l*-butene c) *cis*-2-butene d) *trans*-2-butene
831. What is the empirical formula of a compound having 40% carbon, 6.66% hydrogen and 53.34% oxygen?
 a) $\text{C}_2\text{H}_2\text{O}$ b) $\text{C}_2\text{H}_4\text{O}$ c) CH_2O d) CHO
832. Which of the following can act as a nucleophile?
 a) BF_3 b) FeCl_3 c) ZnCl_2 d) $\text{C}_2\text{H}_5\text{MgBr}$
833. The hybrid orbitals at carbon 2 and 3 in the compound $\text{CH}_3\text{CH}=\text{CHCH}_3$ are :
 a) sp^3, sp b) sp^2, sp^2 c) sp, sp d) sp^2, sp
834. The alkyl halide that undergoes $\text{S}_{\text{N}}1$ reaction more readily is
 a) Ethyl bromide b) Isopropyl bromide c) Vinyl bromide d) *n*-propyl bromide
835. The IUPAC name of,

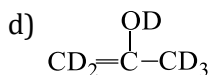
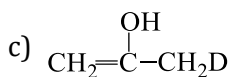


- a) 2,4-dimethylhexanone-3
 b) 2,6-dimethylheptanone-4
 c) 2,6-dimethylhexanone-4
 d) 2,6-dimethylheptanone-5
836. In Lassaigne's test, a blue colour is obtained if the organic compound contains nitrogen. The blue colour is due to
 a) $\text{K}_4[\text{Fe}(\text{CN})_6]$ b) $\text{Fe}_4[\text{Fe}(\text{CN})_6]_3$ c) $\text{Na}_3[\text{Fe}(\text{CN})_6]$ d) $\text{Cu}_2[\text{Fe}(\text{CN})_6]$
837. According to Gahn-Ingold-Prelog sequence rules, the correct order of priority for the given group is
 a) $-\text{COOH} > -\text{CH}_2\text{OH} > -\text{OH} > -\text{CHO}$ b) $-\text{COOH} > -\text{CHO} > -\text{CH}_2\text{OH} > -\text{OH}$
 c) $-\text{OH} > -\text{CH}_2\text{OH} > -\text{CHO} > -\text{COOH}$ d) $-\text{OH} > -\text{COOH} > -\text{CHO} > -\text{CH}_2\text{OH}$



C_2 is rotated anticlockwise 102°C about $\text{C}_2 - \text{C}_3$ bond. The resulting conformer is

- a) Partially eclipsed b) Eclipsed c) *gauche* d) Staggered



851. Eclipsed and staggered forms of *n*-butane are called a pair of :

- a) Diastereomers b) Conformers c) Isomers d) Enantiomers

852. Arrange the following in order of increasing dipole moment (I) Toluene (II) *m*-dichlorobenzene (III) *o*-dichlorobenzene (IV) *p*-dichlorobenzene :

- a) I < IV < II < III b) IV < I < II < III c) IV < I < III < II d) IV < II < I < III

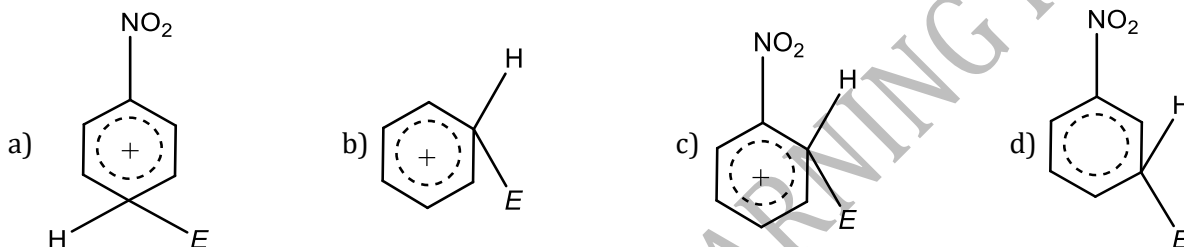
853. In butane, which of the following forms has the lowest energy?

- a) Gauche form b) Eclipsed form c) Staggered form d) None of these

854. Molecular mass of a volatile substances may be obtained by

- a) Beilstein method b) Lassaigne method
c) Victor Mayer's method d) Leibig's method

855. The electrophile, E^{\oplus} attacks the benzene ring to generate the intermediate σ -complex. Of the following, which σ -complex is of lowest energy?



856. Which is not deflected by a non-uniform electrostatic field?

- a) Water b) Chloroform c) Nitrobenzene d) Hexane

857. The reaction $\text{C}_2\text{H}_5\text{I} + \text{KOH} \rightarrow \text{C}_2\text{H}_5\text{OH} + \text{KI}$ is called

- a) Hydroxylation substitution b) Electrophilic substitution
c) Nucleophilic substitution d) dehydroiodination

858. Correct order of nucleophilicity is

- a) $\text{I}^- > \text{Br}^- > \text{Cl}^- > \text{F}^-$ b) $\text{F}^- > \text{Cl}^- > \text{Br}^- > \text{I}^-$
c) $\text{Cl}^- > \text{F}^- > \text{Br}^- > \text{I}^-$ d) $\text{I}^- > \text{Cl}^- > \text{Br}^- > \text{F}^-$

859. Due to the presence of an unpaired electron free radicals are

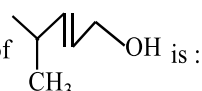
- a) Cations b) Anions c) Chemically inactive d) Chemically reactive

860. Which of the following will have *meso* isomers also?

- a) 2-hydroxy propanoic acid
b) 2,3-dichlorobutane
c) 2,3-dichloropentane
d) 2-chlorobutane

861. The addition of HBr on butene-2 in presence of peroxide follow the:

- a) Electrophilic addition
b) Free radical addition
c) Nucleophilic addition
d) None of these

862. IUPAC name of  is :

- a) 5-methylhexanol b) 2-methylhexanol c) 2-methylhex-3-enol d) 4-methylpent-2-enol

863. In which of the compounds given below there is more than one kind of hybridization (sp , sp^2 , sp^3) for carbon?

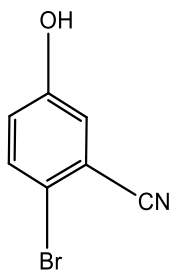
- (I) $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_3$ (II) $\text{CH}_3\text{CH}=\text{CH}-\text{CH}_3$
(III) $\text{CH}_2=\text{CH}-\text{CH}=\text{CH}_2$ (IV) $\text{H}-\text{C}\equiv\text{C}-\text{H}$

- a) (II) and (IV) b) (I) and (IV) c) (II) and (III) d) (II)

864. Which represents nucleophilic aromatic substitution reaction?

- a) Reaction of benzene with Cl_2 in sunlight b) Benzyl bromide hydrolysis
c) Reaction of NaOH with dinitrofluorobenzene d) Sulphonation of benzene

865. The IUPAC name of the following compound, is

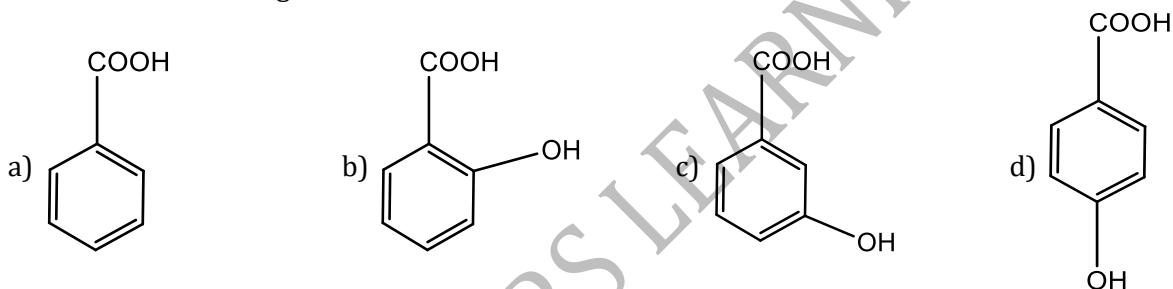


- a) 4-bromo-3-cynophenoal b) 2-bromo-5-hydroxybenzonitrile
c) 2-cyano-4-hydroxybromobenzene d) 6-bromo-3-hydroxybenzonitrile

866. Ethoxy ethane and methoxy propane are :

- a) Geometrical isomers
b) Optical isomers
c) Functional group isomers
d) Metamers

867. Which of the following aromatic acid is most acidic?



868. The hybridization of carbon in diamond, graphite and acetylene is in the order:

- a) sp^3, sp^2, sp b) sp^2, sp^3, sp c) sp, sp^2, sp^3 d) sp^2, sp, sp^3

869. Which is optically active?

- a) Isobutyric acid
b) β -chloropropionic acid
c) Propionic acid
d) α -chloropropionic acid

870. Which of the following statement is wrong?

- a) Using Lassaigne's test nitrogen and sulphur present in organic compound can be tested
b) Using Beilstein's test the presence of halogen in a compound can be tested
c) In Lassaigne's filtrate the nitrogen present in a organic compound is converted into NaCN
d) In the estimation of carbon, an organic compound is heated with CaO in a combustion tube

871. The reaction, $\text{CH}_2 = \text{CHCHO} \xrightarrow{\text{HX}}$ gives :

- a) CH_3CHXCHO b) CH_2XCHCHO c) $\text{CH}_2 = \text{CHCHX}_2$ d) None of these

872. What kind of isomerism is possible for 1-chloro-2-nitroethene?

- a) Functional group isomerism b) Position isomerism
c) E/Z isomerism d) Optical isomerism

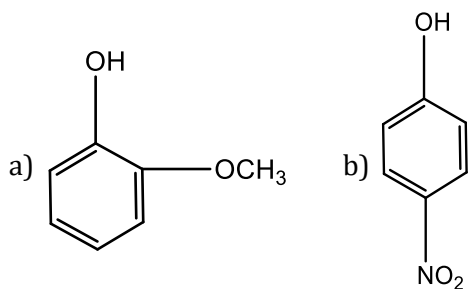
873. Acetonitrile is

- a) CH_3CN b) CH_3COCN c) $\text{C}_2\text{H}_5\text{CN}$ d) $\text{C}_6\text{H}_5\text{CN}$

874. Formation of cyanohydrin from a ketone is an example of

- a) Electrophilic addition b) Nucleophilic addition
c) Electrophilic substitution d) Nucleophilic substitution

875. An organic compound which produces a bluish green coloured flame on heating in presence of copper is
 a) Chlorobenzene b) Benzaldehyde c) Aniline d) Benzoic acid
876. The compound abd C—C abd will exist in :
 a) 3 forms b) 4 forms c) 5 forms d) 2 forms
877. Which of the following compounds has the maximum number of π -bonds?
 a) $\text{HC} \equiv \text{C} - \text{CH} = \text{CH}_2$ b) $\text{CH}_2 = \text{CH} - \text{CH} = \text{CH}_2$
 c) $\text{CH}_3\text{CH}_2\text{COCH}_3$ d) $\text{C}_6\text{H}_5 - \text{COOH}$
878. The C – H bond distance is longest in
 a) C_2H_2 b) C_2H_4 c) C_2H_6 d) $\text{C}_2\text{H}_2\text{Br}_2$
879. The yield in organic reactions is generally poor because the reactions are :
 a) Very fast
 b) Non-ionic
 c) Between covalent compounds
 d) Accompanied by side reactions
880. Which of the following resonating structures of 1-methoxy-1, 3-butadiene is least stable?
 a) $\ominus \text{CH}_2 - \text{CH} = \text{CH} - \text{CH} = \overset{\oplus}{\text{O}} - \text{CH}_3$ b) $\text{CH}_2 = \text{CH}_2 - \overset{\ominus}{\text{C}}\text{H} - \overset{\oplus}{\text{C}}\text{H} = \text{O} - \text{CH}_3$
 c) $\overset{\ominus}{\text{C}}\text{H}_2 - \overset{\oplus}{\text{C}}\text{H} - \text{CH} = \text{CH} - \text{O} - \text{CH}_3$ d) $\text{CH}_2 = \text{CH} - \overset{\ominus}{\text{C}}\text{H} - \overset{\oplus}{\text{C}}\text{H} - \text{O} - \text{CH}_3$
881. A student named the compound as 1,4-butadiene :
 a) The name is correct
 b) He committed an error in the selection of carbon chain
 c) He committed an error in position of double bond
 d) Unpredictable
882. The correct IUPAC name of $(\text{C}_2\text{H}_5)_4\text{C}$ is :
 a) Tetraethyl methane b) 2-ethylpentane c) 3,3-diethylpentane d) None of these
883. The number of different substitution products possible when ethane is allowed to react with bromine in sunlight are :
 a) 9 b) 6 c) 8 d) 5
884. Which of the following structures are superimposable?
 (1) $\begin{array}{c} \text{H} \\ | \\ \text{Br} - \text{C} - \text{Me} \\ | \\ \text{HO} - \text{C} - \text{Et} \\ | \\ \text{Me} \end{array}$ (2) $\begin{array}{c} \text{Br} \\ | \\ \text{H} - \text{C} - \text{Me} \\ | \\ \text{Et} - \text{C} - \text{OH} \\ | \\ \text{Me} \end{array}$
 (3) $\begin{array}{c} \text{Br} \\ | \\ \text{Me} - \text{C} - \text{H} \\ | \\ \text{Et} - \text{C} - \text{Me} \\ | \\ \text{OH} \end{array}$ (4) $\begin{array}{c} \text{Me} \\ | \\ \text{Br} - \text{C} - \text{H} \\ | \\ \text{HO} - \text{C} - \text{Et} \\ | \\ \text{Me} \end{array}$
- a) 1 and 2 b) 2 and 3 c) 1 and 4 d) 1 and 3
885. Phenol is more acidic than



d) Both (a) and (c)

c) C_2H_2

886. During the fusion of an organic compound with sodium metal, nitrogen of the compound is converted into

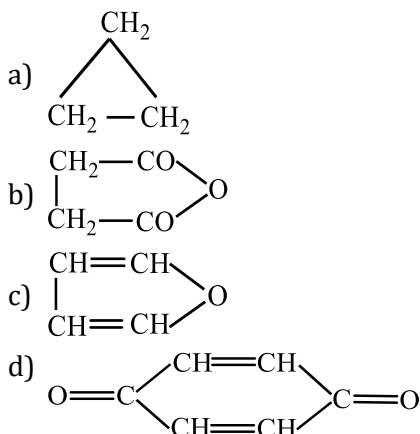
a) $NaNO_2$

b) $NaNH_2$

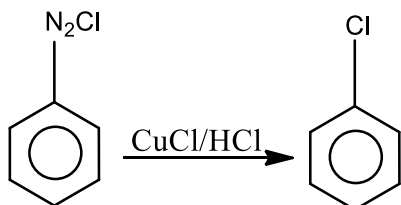
c) $NaCN$

d) $NaNC$

887. The structure representing a heterocyclic compound is :



888. Following reaction is,



a) S_N

b) S_E

c) EI

d) $EI-CB$

889. Which of the following reactions is an example of nucleophilic substitution reaction?

a) $RX + Mg \rightarrow RMgX$

b) $RX + KOH \rightarrow ROH + KX$

c) $2RX + 2Na \rightarrow R-R + 2NaX$

d) $RX + H_2 \rightarrow RH + HX$

890. How many structural isomers are possible for C_4H_9Cl ?

a) 2

b) 4

c) 8

d) 10

891. In which of the following species the central carbon atom is negatively charged?

a) Carbonium ion

b) Carbanion

c) Carbocation

d) Free radicals

892. Select the molecule having only one π -bond :

a) $CH \equiv CH$

b) $CH_2 = CH - CHO$

c) $CH_3 - CH = CH_2$

d) $CH_3 - CH = CHCOOH$

893. Optically active compound among the following is :

a) 2-ethylbutanol-1

b) *n*-butanol

c) 2,2-dimethylbutanol

d) 2-methylbutanol-1

894. Which of the following compounds will be most reactive towards nucleophilic addition reaction?

a) $CH_3COCH_2CH_2CH_2CH_3$

b) $CH_3CH_2COCH_2CH_2CH_3$

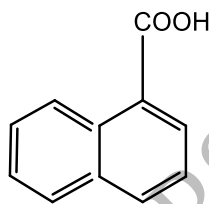
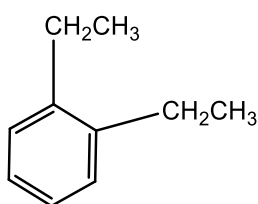
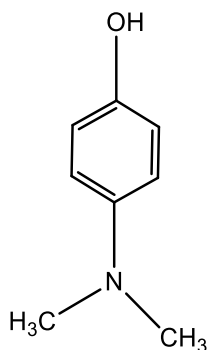
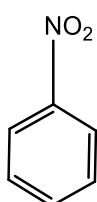
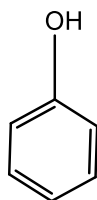
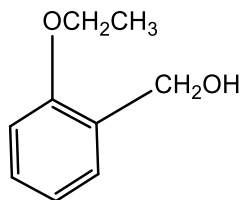
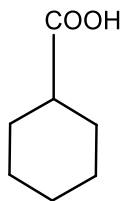
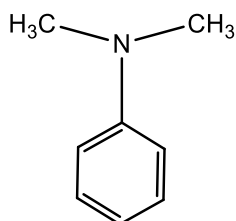
c) $CH_3CH_2CH_2CH_2CH_2CHO$

d) $CH_3 - CH_2 - CO - CH - CH_3$

$\quad \quad \quad |$
 $\quad \quad \quad CH_3$

895. Lactic acid, $CH_3CH(OH)COOH$ molecule shows :

- a) Geometrical isomerism
 b) Metamerism
 c) Optical isomerism
 d) Tautomerism
896. *n*-pentane and neopentane are :
 a) Functional isomers b) Geometrical isomers c) Chain isomers d) Position isomers
897. The IUPAC name of acryldehyde is
 a) Prop-2-en-1-al b) Propenylaldehyde c) But-2-en-1-al d) Propenal
898. Due to presence of an unpaired electron, free radicals are
 a) Cations b) Anions c) Chemically inactive d) Chemically reactive
899. 2-methylpent-3-ene is a chiral because it has :
 a) A centre of symmetry
 b) A plane of symmetry
 c) Symmetry at C₂ carbon
 d) Both centre and a plane of symmetry
900. Which of the following molecules contain asymmetric carbon atom?
 a) CH₃CHClCOOH b) CH₃CH₂COOH c) ClCH₂.CH₂COOH d) Cl₂CHCOOH
901. Cyclobutane and butene-1 are :
 a) Chain isomers b) Position isomers c) Ring-chain isomers d) Metamers
902. Which of the following is not true for carbanions?
 a) The carbon carrying the charge has eight valence electrons
 b) They are formed by heterolytic fission
 c) They are paramagnetic
 d) The carbon carrying the charge is sp³ hybridised
903. Which of the following structures permits *cis-trans* isomerism?
 a) X₂C = CY₂ b) XYC = CZ₂ c) X₂C = CXY d) XYC = CXY
904. Which one of the following compound will show optical isomerism?
 a) (CH₃)₂ - CH - CH₂ - CH₃ b) CH₃ - CHOH - CH₃
 c) CH₃ - CHCl - CH₂ - CH₃ d) CH₃ - CCl₂ - CH₂ - CH₃
905. The Kolbe's electrolysis proceeds *via*
 a) Nucleophilic substitution mechanism b) Electrophilic addition mechanism
 c) Free radical mechanism d) Electrophilic substitution reaction
906. Which of the following statements is not correct?
 a) Primary carbocation are more stable than secondary ones
 b) Secondary free radicals are more stable than primary free radicals
 c) Tertiary free radicals are more stable than secondary ones
 d) Tertiary carbonium ions are more stable than primary ones
907. Adsorbent is made of ... in TLC
 a) Silica gel b) Alumina c) Both (a) and (b) d) None of these
908. Amongst the following, the total number of compounds soluble in aqueous NaOH is



a) 1

b) 2

c) 3

d) 4

909. The ammonia evolved from the treatment of 0.30 g of an organic compound for the estimation of nitrogen was passed in 100 mL of 0.1 M sulphuric acid. The excess of acid required 20 mL of 0.5 M sodium hydroxide solution for complete neutralization. the organic compound is

a) acetamide

b) benzamide

c) urea

d) thiourea

910. The structure remaining after one H is removed from hydrocarbon is :

a) Alkyl group

b) Alkenyl group

c) Alkynyl group

d) All of these

911. C_6H_{12} on addition of HBr in presence and in absence of peroxide gives some product.

It is :

a) Hexene-3

b) 2,3-dimethyl butane-2

c) Symmetrical alkene

d) All of these

912. $CH_3-CH-CH_2-CH_2-CH_3$
 $\quad \quad |$
 $\quad \quad OC_2H_5$

the IUPAC name is

a) 2-ethoxy pentane

b) 4-ethoxy pentane

c) Pentyl-ethyl ether

d) 2-pentoxy ethane

913. A solution of D(+)-2-chloro-2-phenylethane in toluene racemises slowly in the presence of small amount of $SbCl_5$ due to the formation of

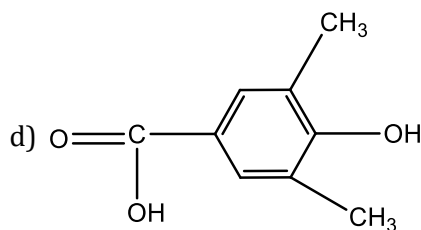
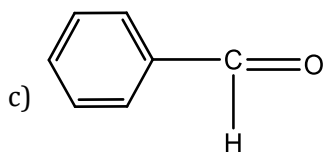
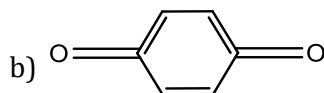
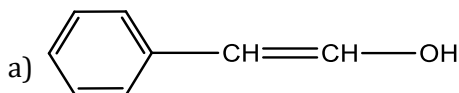
a) Carbanion

b) Carbene

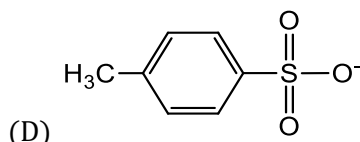
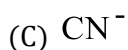
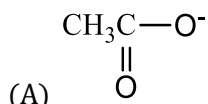
c) Free radical

d) Carbocation

914. Tautomerism is exhibited by



915. The decreasing order of nucleophilicity among the nucleophiles



a) (C), (B), (A), (D)

b) (B), (C), (A), (D)

c) (D), (C), (B), (A)

d) (A), (B), (C), (D)

916. Which of the following statements is incorrect?

a) $\text{S}_\text{N}2$ reaction proceeds with inversion

b) $\text{S}_\text{N}1$ reaction proceeds with racemisation

c) $\text{S}_\text{N}2$ reaction involves transition state

d) In transition state, one end carries δ^+ and another end carries δ^- charge

917. The hybridization of carbon atoms in C – C single bond of $\text{HC} \equiv \text{C} - \text{CH} = \text{CH}_2$ is

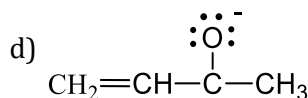
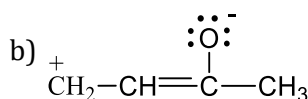
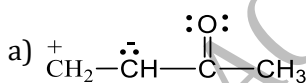
a) $sp^3 - sp$

b) $sp^3 - sp^3$

c) $sp^2 - sp^3$

d) $sp - sp^2$

918. One of the stable resonating forms of methyl vinyl ketone is



919. 5.6 g of an organic compound on burning with excess of oxygen gave 17.6 g of CO_2 and 7.2 g of H_2O . The organic compound is

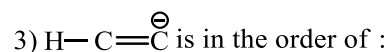
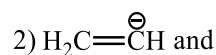
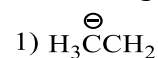
a) C_6H_6

b) C_4H_8

c) C_3H_8

d) CH_3COOH

920. Base strength of,



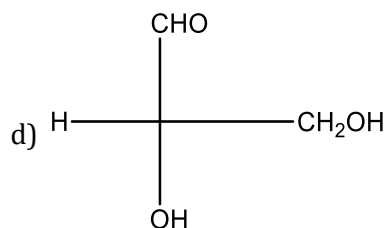
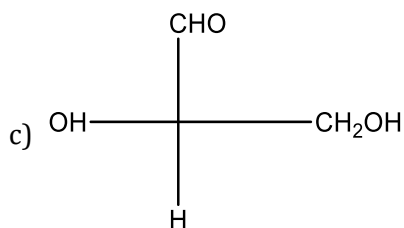
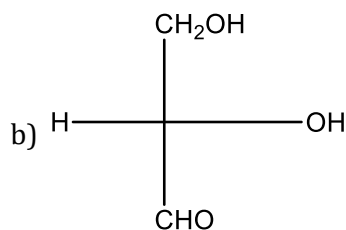
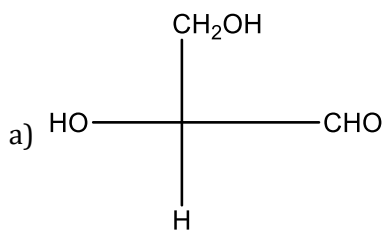
a) (3) > (2) > (1)

b) (1) > (3) > (2)

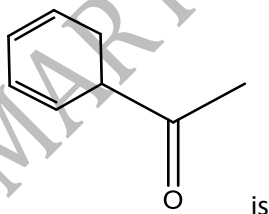
c) (1) > (2) > (3)

d) (2) > (1) > (3)

921. Which of the following Fischer's projection formula is identical to D-glyceraldehyde?

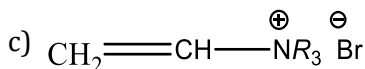
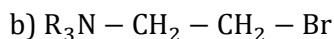
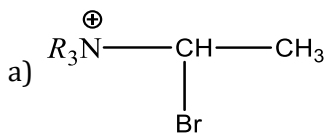


922. 1.2g of organic compound of Kjeldahlization liberates ammonia which consumes 30 cm^3 of 1N HCl. The percentage of nitrogen in the organic compound is
 a) 30 b) 35 c) 46.67 d) 20.8
923. Among the following the dissociation constant is highest for
 a) $\text{C}_6\text{H}_5\text{OH}$ b) $\text{C}_6\text{H}_5\text{CH}_2\text{OH}$ c) $\text{CH}_3 - \text{C} \equiv \text{CH}$ d) $\text{CH}_3\text{NH}_3^+\text{Cl}^-$
924. How much of sulphur is present in an organic compound, if 0.53g of the compound gave 1.158g of BaSO_4 on analysis?
 a) 10% b) 15% c) 20% d) 30%
925. Which of the following is a dynamic isomerism?
 a) Metamerism b) Geometrical isomerism
 c) Tautomerism d) Coordinate isomerism
926. Which among the following statements is correct with respect to the optical isomers?
 a) Enantiomers are non-superimposable mirror images
 b) Diastereomers are superimposable mirror images
 c) Enantiomers are superimposable mirror images
 d) *Meso* forms have no plane of symmetry
927. The stability order for carbocations given below is :
 (I) $\text{R}-\overset{+}{\text{C}}\text{H}_2$ (II) $\text{R}-\overset{+}{\text{C}}=\text{CH}_2$ (III) $\text{R}-\overset{+}{\text{C}}\text{H}-\text{CH}_3$
 a) I < II < III b) III < II < I c) III < I < II d) II < I < III
928. Duma's method involves the determination of nitrogen content in the organic compound in the form of
 a) NH_3 b) N_2
 c) NaCN d) $(\text{NH}_4)_2\text{SO}_4$
929. The IUPAC name of



- a) 1-cyclohexa-2,4-dienylethanone b) 3-cyclohexa-2,4-dienylethanone
 c) 1-cyclohexa-3,5-dienylethanone d) 3-cyclohexa-3,5-dienylethanone
930. In the nucleophilic substitution reactions ($\text{S}_{\text{N}}2$ or $\text{S}_{\text{N}}1$), the reactivity of alkyl halides follows the sequence
 a) $\text{R-I} > \text{R-Br} > \text{R-Cl} > \text{R-F}$ b) $\text{R-Cl} > \text{R-F} > \text{R-Br} > \text{R-I}$
 c) $\text{R-F} > \text{R-Cl} > \text{R-Br} > \text{R-I}$ d) $\text{R-I} > \text{R-F} > \text{R-Cl} > \text{R-Br}$
931.
$$\text{R}_3\text{N}^{\oplus} - \text{CH}=\text{CH}_2 \xrightarrow{\text{HBr}} \text{product.}$$

Predominant product is



d) No reaction

932. *n*-pentane and 2-methyl butane are a pair of

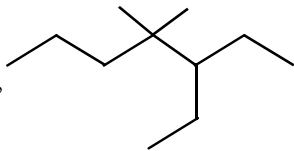
a) Enantiomers

b) Stereoisomers

c) Diastereomers

d) Constitutional isomers

933.

IUPAC name of compound,  is :

a) 3-ethyl-4,4-dimethyl heptane

b) 1,1-diethyl-2,2-dimethyl pentane

c) 4,4-dimethyl-5,5-diethyl pentane

d) 5,5-diethyl-4,4-dimethyl pentane

934. IUPAC name of, $(\text{C}_2\text{H}_5)_2\text{CHCH}_2\text{OH}$ is :

a) 2-ethylbutanol-1

b) 2-methylpentanol-1

c) 2-ethylpentanol-1

d) 3-ethylbutanol-1

935. Amongst the following the compound that can most readily get sulphonated is

a) Benzene

b) Toluene

c) Nitrobenzene

d) Chlorobenzene

936. In E2 elimination, some compounds follow Hofmann's rule which means:

a) The double bond goes to the most substituted carbon

b) The compound is resistant to elimination

c) No double bond is formed

d) The double bond goes mainly towards the least substituted carbon

937. How many asymmetric carbon atoms are present in

(i) 1,2-dimethylcyclohexane

(ii) 3-methylcyclopentane and

(iii) 3-methylcyclohexane?

a) Two, one, one

b) One, one, one

c) Two, none, two

d) Two, none One

938. Which of the following is a chiral compound?

a) Hexane

b) *n*-butane

c) Methane

d) 2,3,4-trimethyl hexane

939. How many structures can compound with molecular formula $\text{C}_7\text{H}_9\text{N}$ have?

a) 5

b) 4

c) 3

d) 2

940. The maximum number of possible optical isomers in 1-bromo-2-methyl cyclobutane is

a) 4

b) 2

c) 8

d) 16

941. Which of the following types of reaction occurs when a substituent has got a double bond with evenly distributed π electron cloud?

a) Electrophilic addition

b) Nucleophilic addition

c) Any of the (a) and (b)

d) None of the above

942. Vinyl alcohol and acetaldehyde are :

a) Geometrical isomers

b) Keto-enol tautomers

c) Chain isomers

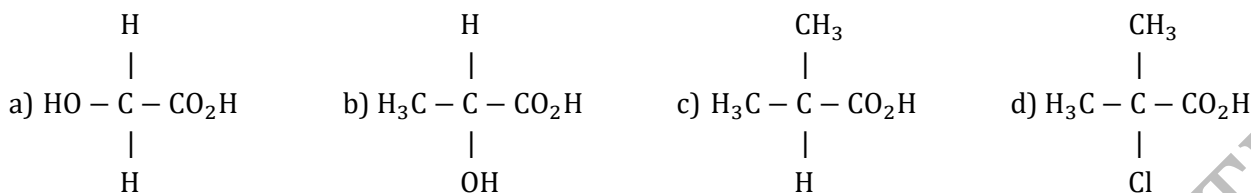
d) None of these

943. 0.25 g of an organic compound on Kjeldahl's analysis gave enough ammonia to just neutralise 10cm^3 of 0.5M H_2SO_4 . The percentage of nitrogen in the compound is

a) 28 b) 56 c) 14 d) 112
 944. Stereoisomers (geometrical or opticals) which are neither superimposable nor mirror image to each other are called :

- a) Enantiomers b) Mesomers c) Tautomers d) Diastereomers

945. Which one of the following will show optical isomerism?



946. The ion formed by the reaction of HNO₂ and H₂SO₄ is

- a) Nitronium ion b) Nitrosonium ion c) Nitrite ion d) Nitrate ion

947. Chloroacetic acid is a stronger acid than acetic acid. This can be explained using

- a) -M effect b) -I effect c) +M effect d) +I effect

948. The basicity of aniline is less than that of cyclohexylamine. This is due to

- a) +R effect of -NH₂ group b) -I effect of -NH₂ group
 c) -R effect of -NH₂ group d) Hyperconjugation effect

949. The compound is an example of :



- a) Aromatic compound
 b) Heterocyclic compound
 c) Annulene
 d) Xanthates

950. Dehydration of alcohol usually goes by

- a) E1 mechanism b) E2 mechanism c) E1 cb mechanism d) S_N2 mechanism

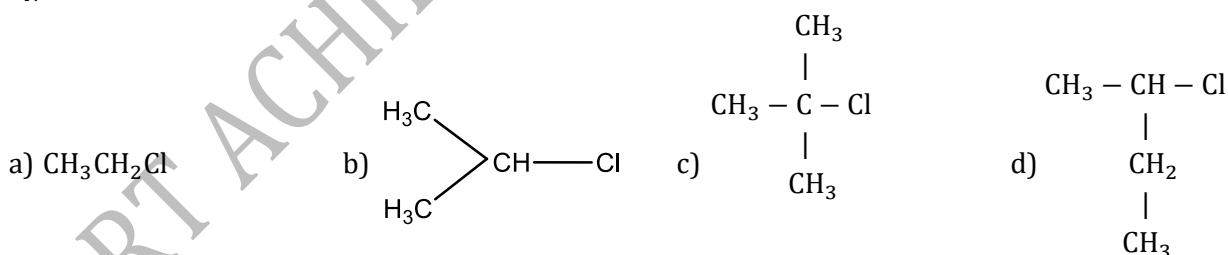
951. Geometrical isomerism is possible in

- a) Acetone-oxime b) Isobutene c) Acetophenone-oxime d) Benzophenone-oxime

952. Ethers are isomeric with

- a) Aldehydes b) Ketones
 c) Both aldehydes and ketones d) Alcohols

953. S_N1 reaction is fastest in



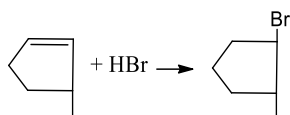
954. Vinyl chloride undergoes

- a) Only addition reactions b) Only elimination reactions
 c) Both (a) and (b) d) Substitution reactions

955. Fischer projection indicates :

- a) Horizontal substituents above the plane
 b) Vertical substituents above the plane
 c) Both horizontal and vertical substituents below the plane
 d) Both horizontal and vertical substituents above the plane

956. The reaction,



Is an example of

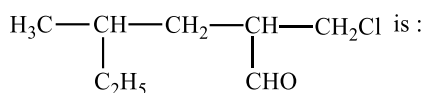
- a) Nucleophilic substitution
 b) Electrophilic addition
 c) Elimination reaction
 d) Nucleophilic addition
957. Acetone and propen-2-ol are :
 a) Positional isomers b) Keto-enol tautomers c) Geometrical isomers d) Chain isomers
958. The number of stereoisomers obtained by bromination of *trans* - 2 -butene is?
 a) 1 b) 2 c) 3 d) 4
959. The compound which forms one monochloro product when treated with chlorine is :
 a) *n*-pentane b) Isopentane c) *neo*-pentane d) None of these
960. Reactivity towards nucleophilic addition reaction of
 (I)HCHO (II)CH₃CHO (III)CH₃COCH₃ is
 a) II>III>I b) III>II>I c) I>II>III d) I>II<III
961. Maleic acid and fumaric acid are
 a) Position isomers b) Geometric isomers c) Enantiomers d) Functional isomers
962. The ease of nitration of the following three hydrocarbons follows the order
- I

II

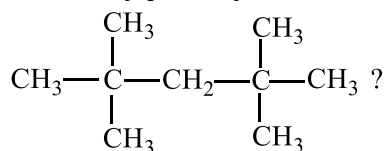
III
- a) II=III>I b) II>III>I c) III>II>I d) I=III>II
963. Which represents the condensed formula for pentanes?
 a) CH₃(CH₂)₃CH₃ b) (CH₃)₃CCH₃ c) (CH₃)₂CHCH₂CH₃ d) All of these
964. Which of the substance is purified by sublimation?
 a) Benzoic acid b) Camphor c) Naphthalene d) All of these
965. The halogen compound which most readily undergoes nucleophilic substitutions is
 a) CH₂ = CHCl b) CH₃CH = CHCl
 c) CH₂ = CHC(Cl) = CH₂ d) CH₂ = CHCH₂Cl
966. Which of the following order is correct regarding the acidity of carboxylic acids?
 a) Cl₃CCOOH > Cl₂CHCOOH > ClCH₂COOH b) Cl₃CCOOH > Cl₂CHCOOH < ClCH₂COOH
 c) Cl₃CCOOH < Cl₂CHCOOH > ClCH₂COOH d) Cl₃CCOOH < Cl₂CHCOOH < ClCH₂COOH
967. An S_N2 reaction at an asymmetric carbon of a compound always gives
 a) A mixture of diastereomers b) A single stereoisomer
 c) An enantiomer of the substrate d) A product with opposite optical rotation
968. The IUPAC name of the compound, CH₃CH = CHC ≡ CH is :
 a) Pent-4-yn-2-ene b) Pent-3-en-1-yne c) Pent-2-en-4-yne d) Pent-1-yn-3-ene
969. Reaction of methyl bromide with aqueous sodium hydroxide involves
 a) Racemisation b) S_N1 mechanism
 c) Retention of configuration d) S_N2 mechanism
970. An organic compound X (mol. formula C₆H₅O₂N) has six carbons in a ring system, three double bonds and also a nitro group as substituent. X is :
 a) Homocyclic but not aromatic
 b) Aromatic but not homocyclic
 c) Homocyclic and aromatic

- d) heterocyclic
971. The compounds CH_3NH_2 and $\text{CH}_3\text{CH}_2\text{NH}_2$ are :
 a) Isomers b) Isobars c) Homologous d) Allotropes
972. The following compound will undergo electrophilic substitution more readily than benzene
 a) Nitrobenzene b) Benzoic acid c) Benzaldehyde d) Phenol
973. Which of the following elements can't be detected by direct tests?
 a) N b) O c) S d) Br

974. IUPAC name of,

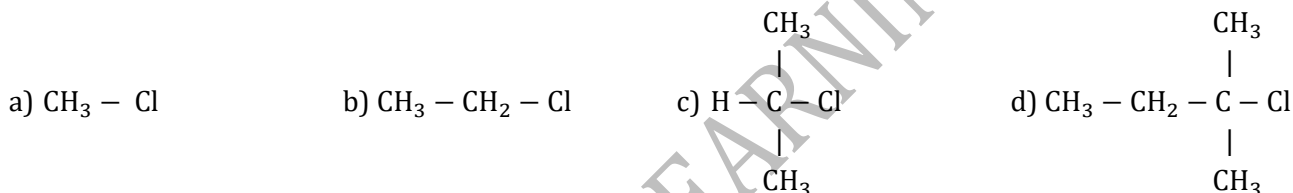


- a) 2-chloromethyl-4-methyl-hexanal
 b) 1-chloro-4-ethyl-2-pentanal
 c) 1-chloro-4-methyl-2-hexanal
 d) 1-chloro-2-aldo-4-methyl hexane
975. Position isomerism is shown by :
 a) *o*-nitrophenol and *p*-nitrophenol
 b) Dimethyl ether and ethanol
 c) Pentan-2-one and pentan-3-one
 d) Acetaldehyde and acetone
976. Formulae of phenyl carbinol and chloral are respectively :
 a) $\text{C}_6\text{H}_5\text{CH}_2\text{CH}_2\text{OH}$ and CHCl_2CHO
 b) $\text{C}_6\text{H}_5\text{CH}_2\text{OH}$ and CCl_3CHO
 c) $\text{C}_6\text{H}_5\text{OH}$ and $\text{CH}_2\text{Cl}\text{CHO}$
 d) $\text{C}_6\text{H}_5\text{CHO}$ and CHCl_2CHO
977. How many primary carbon atoms are there in the compound,

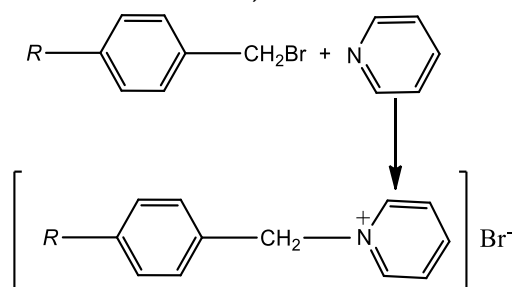


- a) 6 b) 2 c) 4 d) 3
978. IUPAC name of,
 $\text{OHC}-\text{CH}=\text{CH}-\underset{\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_3}{\text{CH}}-\text{CH}=\text{CH}_2$ is :
 a) 4-butyl-2,5-hexadien-1-al
 b) 5-vinyloct-3-en-1-al
 c) 5-vinyloct-5-en-8-al
 d) 3-butyl-1,4-hexadien-6-al
979. The molecular formula of a saturated compound is $\text{C}_2\text{H}_4\text{Br}_2$.
 This formula permits the existence of :
 a) Functional isomers b) Optical isomers c) Positional isomers d) *cis* – *trans* isomers
980. Which of the following solvents are aprotic?
 (A) NH_3 (B) SO_2
 (C) CH_3CN (D) $\text{CH}_3\text{CO}_2\text{H}$
 a) A,B,C b) A,C,D c) B,C d) A,C
981. The reaction of sodium ethoxide with iodoethane to form diethyl is termed as
 a) Electrophilic substitution b) Nucleophilic substitution
 c) Electrophilic addition d) Radical substitution
982. The sodium extract of an organic compound on acidification with acetic acid and addition of lead acetate solution gives a black precipitate. The organic compound contains

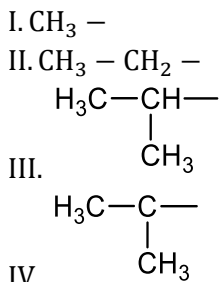
- a) Nitrogen b) Halogen c) Sulphur d) Phosphorus
983. The IUPAC name of the compound CH_3CONHBr is
 a) 1-bromoacetamide b) ethanoylbromide c) N-bromoethanamide d) None of these
984. The silver salt of a monobasic acid on ignition gave 60% of Ag. The molecular weight of the acid is
 a) 37 b) 57 c) 73 d) 88
985. The IUPAC name of compound,
 $\text{C}_2\text{H}_5 - \text{C} - \text{CH}_2\text{OH}$ is
 $\begin{array}{c} \parallel \\ \text{CH}_2 \end{array}$
 a) 2-ethylprop-2-en-1-ol b) 2-hydroxymethylbutan -1-ol
 c) 2-methylenebutan-1-ol d) 2-ethyl-3-hydroxyprop-1-ene
986. How many optically active stereoisomers are possible for butane-2, 3-diol?
 a) 0 b) 1 c) 2 d) 3
987. Removal of a hydride ion from a methane molecule will give a:
 a) Methyl radical b) Carbonium ion c) Carbanion d) Methyl group
988. Which of the following will have a *meso*-isomer also?
 a) 2-chlorobutane b) 2, 3-dichlorobutane
 c) 2, 3-dichloropentane d) 2-hydroxypropanoic acid
989. Which chlorine atom is more electronegative in the following?



990. The resonating structures :
 a) Differ only in the arrangement of electrons
 b) Differ in number of paired and unpaired electrons
 c) Differ largely in their energy contents
 d) Do not lie in the same plane
991. The optical isomers, which are not enantiomers, are called
 a) Conformer b) Diastereomer c) Mirror images d) None of these
992. α -D-(+)-glucose and β -D-(+)-glucose are :
 a) Enantiomers
 b) Conformers
 c) Epimers
 d) Anomers
993. Which of the following orders is correct regarding the acidity of carboxylic group?
 a) $\text{CH}_3\text{CH}_2\text{CH}(\text{Cl})\text{COOH} > \text{CH}_3\text{CH}(\text{Cl})\text{CH}_2\text{COOH} > \text{ClCH}_2\text{CH}_2\text{CH}_2\text{COOH}$
 b) $\text{CH}_3\text{CH}_2\text{CH}(\text{Cl})\text{COOH} < \text{CH}_3\text{CH}(\text{Cl})\text{CH}_2\text{COOH} < \text{ClCH}_2\text{CH}_2\text{CH}_2\text{COOH}$
 c) $\text{CH}_3\text{CH}_2\text{CH}(\text{Cl})\text{COOH} > \text{CH}_3\text{CH}(\text{Cl})\text{CH}_2\text{COOH} < \text{ClCH}_2\text{CH}_2\text{CH}_2\text{COOH}$
 d) $\text{CH}_3\text{CH}_2\text{CH}(\text{Cl})\text{COOH} < \text{CH}_3\text{CH}(\text{Cl})\text{CH}_2\text{COOH} > \text{ClCH}_2\text{CH}_2\text{CH}_2\text{COOH}$
994. The rate of the reaction,



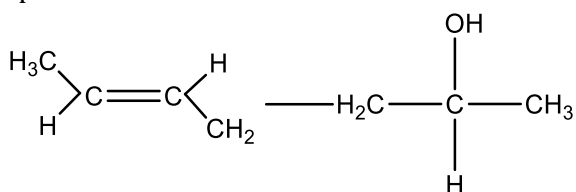
is influenced by the hyper conjugation effect of group *R*. If *R* sequentially is



the increasing order of speed of the above reaction is

- a) IV, III, II, I
 b) I, II, III, IV
 c) I, IV, III, II
 d) III, II, I, IV

995. The compound, whose stereo-chemical formula is written below, exhibits x geometrical isomers and y optical isomers



The values of x and y are

- a) 4 and 4 b) 2 and 2 c) 2 and 4 d) 4 and 2

996. Geometrical isomerism is shown by

- a) $-C - C -$ b) $>C=C<$ c) $-C \equiv C -$ d) None of these

997. Which one of the following is *s*-butyl phenylvinyl methane?



998. Arrange the carbanions,

$(\text{CH}_3)_3\bar{\text{C}}$, $\bar{\text{C}}\text{Cl}_3$, $(\text{CH}_3)_2\bar{\text{C}}\text{H}$, $\text{C}_6\text{H}_5\bar{\text{C}}\text{H}_2$, in order of their decreasing stability

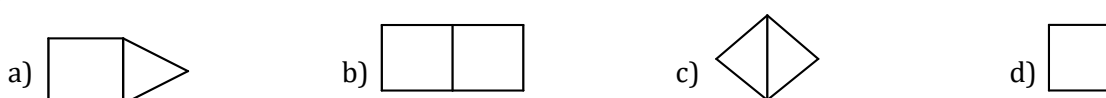
- a) $\text{C}_6\text{H}_5\bar{\text{C}}\text{H}_2 > \bar{\text{C}}\text{Cl}_3 > (\text{CH}_3)_2\bar{\text{C}}\text{H} > (\text{CH}_3)_3\bar{\text{C}}$ b) $(\text{CH}_3)_2\bar{\text{C}}\text{H} > \bar{\text{C}}\text{Cl}_3 > \text{C}_6\text{H}_5\bar{\text{C}}\text{H}_2 > (\text{CH}_3)_3\bar{\text{C}}$
 c) $\bar{\text{C}}\text{Cl}_3 > \text{C}_6\text{H}_5\bar{\text{C}}\text{H}_2 > (\text{CH}_3)_2\bar{\text{C}}\text{H} > (\text{CH}_3)_3\bar{\text{C}}$ d) $(\text{CH}_3)_3\bar{\text{C}} > (\text{CH}_3)_2\bar{\text{C}}\text{H} > \bar{\text{C}}\text{H}_2 > \bar{\text{C}}\text{Cl}_3$

999. $\text{RX} + \text{I}^- \rightarrow \text{R}-\text{I} + \text{X}^-$ is an example of ... reaction.

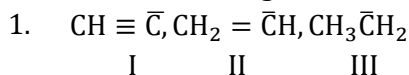
- a) Nucleophilic addition b) Nucleophilic substitution
 c) Electrophilic addition d) Elimination

100 Bicyclo (1,1,0) butane is

0.



100 The basic strength of



Will be in order

I II III

a) I < II < III

b) II < III < I

c) III < II < I

d) III < I < II

100 Which of the following is most reactive towards elimination reaction?

2.

a) RCOO^-

b) CN^-

c) NO_3^-

d) RO^-

100 IUPAC name of $\text{CH}_3\text{—CH}_2\text{—CH—NH}_2$ is :

3.



a) 1-methyl-1-aminopropane

b) 2-aminobutane

c) 2-methyl-3-aminopropane

d) None of the above

100 The number of isomeric hexanes is

4.

a) 5

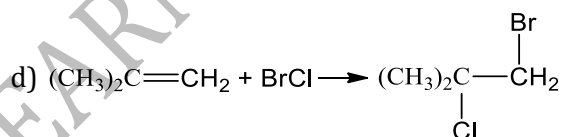
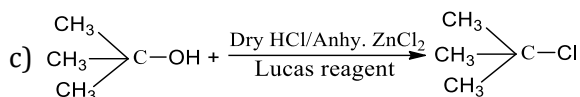
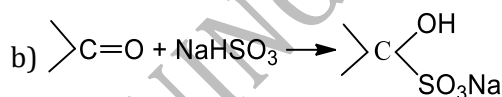
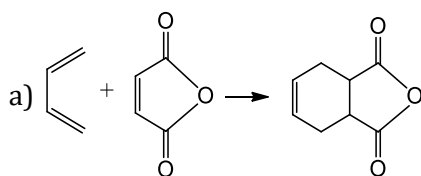
b) 2

c) 3

d) 4

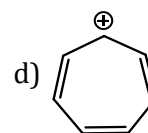
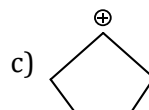
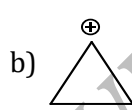
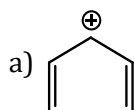
100 The substitution reaction among the following is

5.



100 The most stable carbocation is

6.



100 Among the following alkenes (I) 1-butene, (II) *cis*-2-butene, (III) *trans*-2-butene the decreasing order of stability is :

7.

a) III > II > I

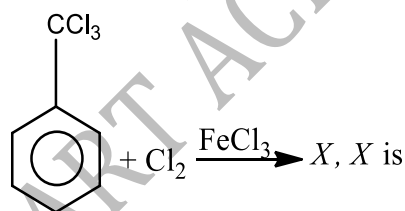
b) III > I > II

c) I > II > III

d) II > I > III

100 For the reaction,

8.



a) Chloro benzene and carbon tetrachloride

c) *ortho, para* chloro benzotrichloride

b) *meta* chloro benzotrichloride

d) None of the above

100 Which of the following statements is not correct?

9.

a) A >C=C< group is made up of 4σ -bond and 2π -bonds

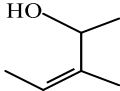
b) A σ -bond is stronger than π -bond

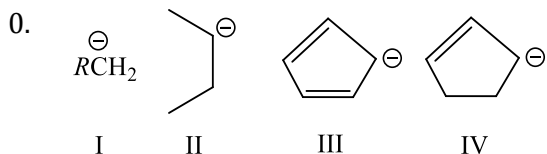
c) A σ -bond can exist independently of π -bond

d) A double bond is stronger than a single bond

101 The number of sp^3 - hybrid carbons in 2-butyne is :

0.

- a) Pi-electrons b) Sigma electrons c) Protons d) None of these
- 102 The IUPAC name of the compound,
9.  is :
- a) 1,2-dimethyl-2-butenol
b) 3-methylpent-3-en-2-ol
c) 3,4-dimethyl-2-buten-4-ol
d) 2,3-dimethyl-3-pentenol
- 103 Which of the following species is paramagnetic in nature?
0. a) Carbonium ion b) Free radical c) Carbene d) Nitrene
- 103 Isobutyl chloride is :
1. a) $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{Cl}$ b) $(\text{CH}_3)_2\text{CHCH}_2\text{Cl}$ c) $\text{CH}_3\text{CH}_2\text{CHClCH}_3$ d) $(\text{CH}_3)_3\text{C}-\text{Cl}$
- 103 How many isomers will C_3H_6 have?
2. a) 1 b) 2 c) Zero d) 4
- 103 Which one of the following compounds is capable of existing in a *meso* form?
3. a) 3, 3-dibromopentane b) 4-bromo-2-pentanol
c) 3-bromo-2-pentanol d) 2, 3-dibromopentane
- 103 Geometrical isomerism is caused :
4. a) By restricted rotation around $\text{C}=\text{C}$ bond
b) By the presence of one asymmetric carbon atom
c) Due to different groups attached to the same functional group
d) By swing of hydrogen atom between two polyvalent atoms
- 103 Lassaigne's test is used for the detection of
5. a) Carbon only b) Hydrogen only
c) Oxygen only d) Nitrogen, sulphur and halogens
- 103 Which of the following is arranged according to the nature indicated?
6. a) Electrophile
b) Electrophile
c) Electrophile - CH_3OH , N_3^- . Nucleophile - NO_2^+ , Br^+
d) Electrophile - Br^+ , N_3^- , Nucleophile - CH_3OH ,
- 103 The number of possible alkynes with molecular formula C_5H_8 is
7. a) 3 b) 4 c) 5 d) 6
- 103 Example of geometrical isomerism is
8. a) 2-butanol b) 2-butene c) Butanal d) 2-butyne
- 103 Which of the following is an example of elimination reaction?
9. a) Chlorination of methane
b) Dehydration of ethanol
c) Nitration of benzene
d) Hydroxylation of ethylene
- 104 The order of stability of the following carbanion is



- a) I>II>III>IV b) I>III>II>IV c) IV>III>II>I d) III>IV>I>II

104 Which nomenclature in IUPAC is not correct?

1. a) Pentyne-3 b) Pentyne-2 c) Hexyne-3 d) None of these

104 The C—C bond angle in cyclopropane is :

2. a) 60° b) 120° c) 109°28' d) 180°

104 Absolute alcohol cannot be obtained by simple fractional distillation because

3. a) Pure C₂H₅OH is unstable
b) C₂H₅OH forms hydrogen bonds with water
c) Boiling point of C₂H₅OH is very close to that of water
d) Constant boiling azeotropic mixture is formed with water

104 Racemic compound has

4. a) Equimolar mixture of enantiomers b) 1:1 mixture of enantiomer and diastereomer
c) 1:1 mixture of diastereomers d) 1:2 mixture of enantiomers

104 In case of a homologous series each member differs from the preceding or the succeeding member by :

5. a) a CH₂ group b) a CH₃ group c) Two hydrogen atoms d) Four hydrogen atoms

104 Vacuum distillation is used to purify liquids which

6. a) Are highly volatile b) Are explosive in nature
c) Decompose below their boiling points d) Have high boiling point

104 The number of isomeric structures for C₂H₇N would be :

7. a) 4 b) 3 c) 2 d) 1

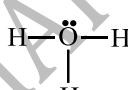
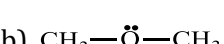
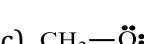

104 The IUPAC name of CH₃—CH₂—CHO

8. a) Propanal-1 b) 2-methylbutanal c) Butanal-1 d) Pentanal-1

104 Which of the following is the weakest base?

9. a) Ethyl amine b) Ammonia c) Dimethyl amine d) Methyl amine

105 The structure which has positive charge on the oxygen atom :

0. a)  b) CH₃——CH₃ c) CH₃— d) H——H

ORGANIC CHEMISTRY - SOME BASIC PRINCIPLES AND TECHNIQUES

CHEMISTRY

: ANSWER KEY :

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

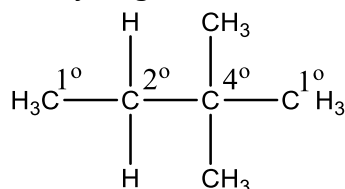
329) d	330) a	331) d	332) a	533) b	534) a	535) b	536) b
333) c	334) d	335) b	336) c	537) d	538) b	539) a	540) d
337) d	338) b	339) b	340) d	541) c	542) c	543) d	544) b
341) b	342) c	343) d	344) c	545) d	546) b	547) a	548) a
345) b	346) c	347) a	348) b	549) b	550) a	551) c	552) d
349) d	350) a	351) b	352) d	553) d	554) d	555) a	556) d
353) b	354) b	355) c	356) a	557) b	558) a	559) b	560) d
357) b	358) c	359) a	360) b	561) b	562) a	563) a	564) b
361) a	362) c	363) a	364) a	565) b	566) a	567) b	568) b
365) b	366) b	367) d	368) b	569) c	570) b	571) b	572) c
369) c	370) c	371) a	372) c	573) b	574) b	575) d	576) d
373) b	374) b	375) b	376) d	577) a	578) d	579) b	580) a
377) b	378) c	379) d	380) c	581) d	582) d	583) b	584) b
381) d	382) a	383) c	384) c	585) d	586) d	587) b	588) b
385) c	386) a	387) b	388) b	589) a	590) a	591) c	592) a
389) b	390) b	391) d	392) a	593) c	594) a	595) b	596) c
393) d	394) a	395) b	396) d	597) a	598) b	599) c	600) d
397) c	398) c	399) a	400) b	601) c	602) a	603) c	604) a
401) d	402) b	403) c	404) c	605) a	606) d	607) a	608) c
405) b	406) a	407) a	408) b	609) b	610) d	611) c	612) d
409) b	410) d	411) c	412) a	613) c	614) a	615) d	616) d
413) b	414) b	415) b	416) b	617) c	618) a	619) c	620) c
417) a	418) c	419) c	420) c	621) a	622) d	623) a	624) d
421) c	422) a	423) c	424) a	625) b	626) b	627) c	628) a
425) a	426) d	427) d	428) a	629) d	630) b	631) c	632) c
429) c	430) b	431) b	432) a	633) d	634) c	635) d	636) b
433) a	434) a	435) d	436) c	637) d	638) d	639) d	640) a
437) d	438) c	439) a	440) c	641) b	642) a	643) d	644) a
441) c	442) d	443) a	444) d	645) a	646) b	647) c	648) a
445) c	446) d	447) c	448) d	649) b	650) a	651) b	652) a
449) c	450) c	451) d	452) c	653) d	654) d	655) a	656) a
453) d	454) b	455) d	456) b	657) b	658) c	659) b	660) b
457) b	458) c	459) c	460) b	661) b	662) c	663) c	664) c
461) d	462) c	463) a	464) d	665) b	666) a	667) b	668) c
465) b	466) b	467) c	468) a	669) d	670) a	671) c	672) a
469) a	470) d	471) a	472) a	673) b	674) c	675) c	676) b
473) a	474) d	475) a	476) d	677) b	678) b	679) b	680) b
477) d	478) b	479) a	480) b	681) a	682) a	683) b	684) d
481) c	482) d	483) a	484) d	685) a	686) a	687) c	688) d
485) c	486) b	487) c	488) b	689) d	690) c	691) b	692) d
489) a	490) a	491) d	492) c	693) a	694) c	695) c	696) a
493) c	494) d	495) d	496) d	697) d	698) a	699) d	700) c
497) c	498) a	499) b	500) d	701) b	702) a	703) b	704) b
501) a	502) d	503) d	504) b	705) b	706) c	707) a	708) d
505) b	506) b	507) c	508) a	709) b	710) c	711) b	712) a
509) a	510) c	511) a	512) c	713) d	714) c	715) b	716) c
513) b	514) b	515) a	516) d	717) b	718) a	719) a	720) b
517) c	518) d	519) a	520) d	721) b	722) c	723) d	724) b
521) d	522) b	523) b	524) c	725) b	726) c	727) a	728) a
525) c	526) a	527) d	528) d	729) b	730) b	731) a	732) a
529) a	530) c	531) b	532) a	733) a	734) b	735) a	736) d

737) a	738) a	739) a	740) d	897) a	898) d	899) c	900) a
741) c	742) c	743) b	744) c	901) c	902) c	903) d	904) c
745) c	746) a	747) b	748) a	905) c	906) a	907) c	908) d
749) c	750) a	751) d	752) a	909) c	910) d	911) d	912) a
753) b	754) d	755) c	756) b	913) d	914) a	915) b	916) d
757) a	758) b	759) c	760) a	917) d	918) b	919) b	920) c
761) a	762) a	763) c	764) d	921) b	922) b	923) c	924) d
765) b	766) b	767) c	768) b	925) c	926) a	927) a	928) b
769) b	770) a	771) c	772) c	929) a	930) a	931) b	932) d
773) b	774) a	775) b	776) c	933) a	934) a	935) b	936) d
777) d	778) a	779) c	780) c	937) a	938) d	939) a	940) a
781) b	782) a	783) a	784) c	941) a	942) b	943) b	944) d
785) c	786) c	787) d	788) a	945) b	946) b	947) b	948) a
789) b	790) d	791) a	792) b	949) c	950) a	951) c	952) d
793) c	794) a	795) a	796) a	953) c	954) c	955) a	956) b
797) d	798) d	799) a	800) c	957) b	958) a	959) c	960) c
801) c	802) b	803) d	804) d	961) b	962) b	963) d	964) d
805) c	806) d	807) c	808) d	965) d	966) a	967) b	968) b
809) c	810) a	811) c	812) c	969) d	970) c	971) c	972) d
813) d	814) c	815) a	816) a	973) b	974) a	975) a	976) b
817) d	818) a	819) d	820) b	977) a	978) a	979) c	980) a
821) b	822) b	823) d	824) d	981) b	982) c	983) c	984) c
825) b	826) d	827) c	828) c	985) a	986) d	987) b	988) b
829) b	830) d	831) c	832) d	989) d	990) a	991) b	992) d
833) b	834) c	835) b	836) b	993) a	994) a	995) b	996) b
837) d	838) c	839) c	840) c	997) c	998) c	999) b	1000) c
841) c	842) c	843) b	844) a	1001) a	1002) d	1003) b	1004) a
845) c	846) c	847) c	848) a	1005) c	1006) d	1007) a	1008) b
849) c	850) a	851) b	852) b	1009) a	1010) c	1011) c	1012) d
853) c	854) c	855) b	856) d	1013) b	1014) c	1015) b	1016) a
857) c	858) a	859) d	860) b	1017) b	1018) c	1019) d	1020) c
861) b	862) d	863) d	864) c	1021) a	1022) c	1023) c	1024) c
865) b	866) d	867) b	868) a	1025) a	1026) d	1027) b	1028) a
869) d	870) d	871) b	872) c	1029) b	1030) b	1031) b	1032) b
873) a	874) b	875) d	876) a	1033) c	1034) a	1035) d	1036) a
877) d	878) c	879) d	880) c	1037) a	1038) b	1039) b	1040) d
881) c	882) c	883) a	884) d	1041) a	1042) a	1043) d	1044) a
885) d	886) c	887) c	888) a	1045) a	1046) c	1047) c	1048) a
889) b	890) b	891) b	892) c	1049) b	1050) a		
893) d	894) c	895) c	896) c				

N C - O
Bond energy (in kcal mol⁻¹) 97 83 73
86

16 (d)

1° carbon is attached to one carbon atom.
2° carbon is attached to two carbon atoms.
3° carbon is attached to three carbon atoms.
The hydrogen attached to 2° carbon atom are 2°.



∴ It has one 2° carbon atom and two 2° hydrogen atoms.

17 (d)

-do-

18 (b)

Non-staggered means eclipsed form.

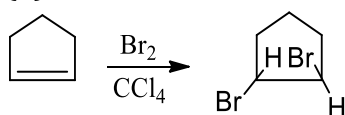
19 (c)

Carbanion is electron rich species. Stability of carbanion increases with increase in s-character of hybrid orbitals of carbon bearing the charge.

∴ $sp^3 < sp^2 < sp$

(25% s-character) (33% s-character) (50% s-character)

20 (b)



It is example of addition reaction

21 (a)

It is a fact.

22 (c)

It is the latest modified definition of organic chemistry.

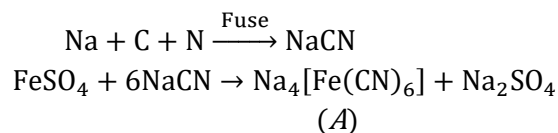
23 (b)

In the lassaigne test, if organic compound consists of both N and S, then a red colour is obtained on adding aqueous

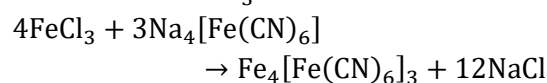
$$\begin{array}{c}
 \text{S} \\
 || \\
 \text{FeCl}_3 \text{ To sodium extract. } \text{NH}_2 - \text{C} - \text{NH}_2 \text{ contains} \\
 \text{both N and S hence, it will give red colour in} \\
 \text{Lassaigne test} \\
 \text{NaCNS} + \text{FeCl}_3 \rightarrow [\text{Fe}(\text{SCN})]\text{Cl}_2 + \text{NaCl} \\
 \text{Blood red colour}
 \end{array}$$

24 (a)

If nitrogen is present in organic compound then sodium extract contains NaCN.



A changes to Prussian blue $\text{Fe}_4[\text{Fe}(\text{CN})_6]_3$ on reaction with FeCl_3 .



25 (b)

Follow IUPAC rules.

27 (b)

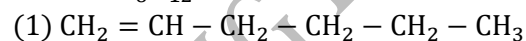
It is the definition of asymmetric synthesis.

28 (a)

(i) has sp^3 ; (ii) has sp^2, sp^3 ; (iii) has sp^2, sp ; (iv)

31 (d)

The number of isomeric alkenes with molecular formula C_6H_{12} are 13.



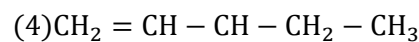
(cis and trans)



(cis and trans)

CH_3

|



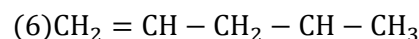
CH_3

|



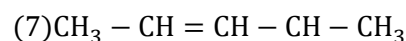
CH_3

|



CH_3

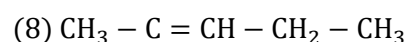
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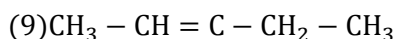


(cis and trans)

CH_3

|





(cis and trans)

32 (c)

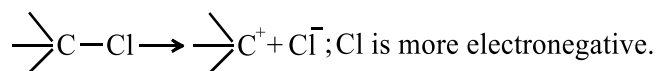
It is 3-methyl butan-2-ol.

33 (c)

This statement is not true now.

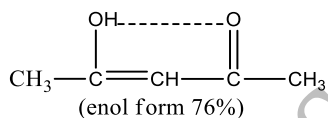
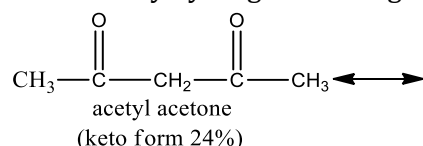
36 (d)

Heterolysis involves the bond fission in a manner when either of the two atoms involved in bond fission retains the shared pair of electron, producing +ve and -ve ions, e.g.



37 (b)

Keto and enol forms are inter convertible. The enol content will be maximum when enol form is stabilised by hydrogen bonding.



In acetyl acetone, the enol form is stabilised by H-bonding, hence it has more enol content than other.

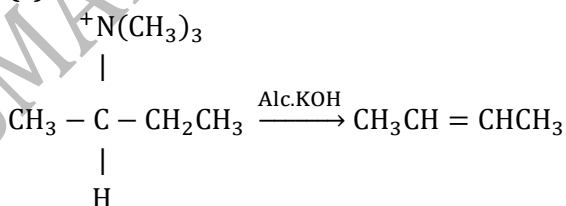
38 (b)

Compounds having bivalent functional group (like $\text{C}=\text{O}$, $-\text{O}-$, $-\text{S}-$ etc) with atleast 4 carbon atoms (in case of ether and thioether) or atleast 5 carbon atoms (in case of ketones) exhibit metamerism. Hence, $\text{C}_2\text{H}_5 - \text{S} - \text{C}_2\text{H}_5$ will show metamerism.

39 (a)

Follow IUPAC rules.

40 (c)



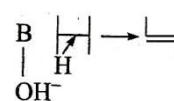
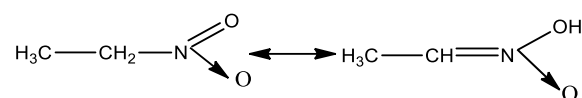
is an example of elimination reaction

41 (b)

The dehydrohalogenation in presence of OH^- is correctly represented by

34 (c)

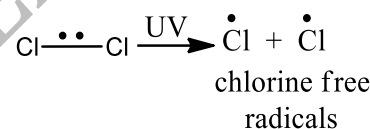
Nitroalkanes exhibit tautomerism. In it, α -H-atom is labile and form nitrolic acid.



In this mechanism the base OH^- removes a proton from the β carbon.

43 (a)

Covalent bonds are cleaved in homolytic way in presence of UV light. It results in formation of free radical.



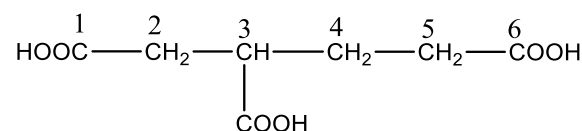
45 (b)

One asymmetric carbon atom is present.

46 (b)

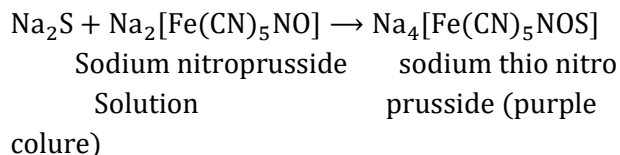
Both alkene and cyclo alkane have general formula C_nH_{2n} .

47 (b)



IUPAC name of the above compound is 3-carboxyhexane-1, 6-dioic acid.

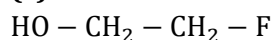
48 (d)

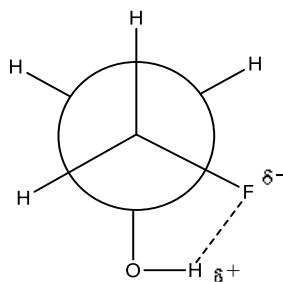


49 (d)

Greater the difference in electronegativity of bonded atoms easier will be heterolytic cleavage

50 (c)

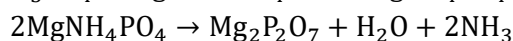
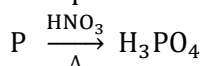




Gauche conformation is comparatively more stable due to hydrogen linkage in between F and H (at O-atom), hence order is *Eclipse*, *Anti* (staggered), *Gauche*.

51 (d)

Phosphorous is estimated as $Mg_2P_2O_7$



$$\% \text{ of P} = \frac{62 \times \text{wt. of } Mg_2P_2O_7 \times 100}{222 \times w}$$

52 (c)

$$n = 2 \text{ and } a = 2^n = 2^2 = 4.$$

54 (c)

Among carbonyl compounds, reactivity decrease with increase in alkyl groups as alkyl groups (+I effects) decrease positive character on C-atom. Thus, the correct order of reactivity is $HCHO > CH_3CHO > C_6H_5CHO$

55 (d)

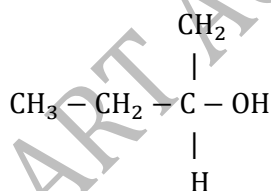
Primary and secondary alkyl halides gives S_N2 reaction

56 (c)

Follow IUPAC rules.

57 (d)

2-butanol is optically active as it contains a chiral carbon atom.



58 (d)

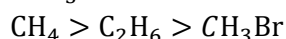
$$a = 2^n; n = 3.$$

59 (a)

It is Markownikoff's rule.

61 (b)

The order of homolytic bond dissociation energies of CH_4 , C_2H_6 and CH_3Br is as



$$\Delta H \text{ (kcal/mol)} \quad 105 \quad 100 \quad 70$$

63 (d)

Each *d* form has its *l* form and the pair is known as enantiomer.

64 (b)

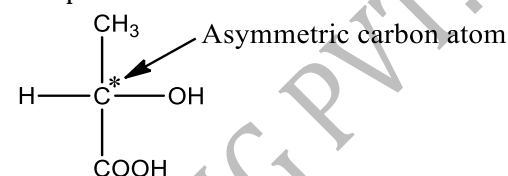
Carboxylic acid and esters show functional group isomerism. When two compounds have same molecular formula but different functional groups, then functional isomerism arises.

e.g.,



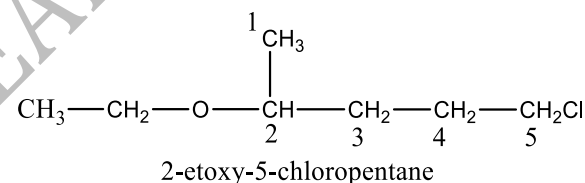
65 (a)

One asymmetric carbon atom is present in a lactic acid molecule. Hence, it is an optically active compound.



66 (a)

According to IUPAC system, ethers are named as alkoxy alkanes. The larger alkyl group forms the parent chain while the lower alkyl group is taken as ethereal oxygen and forms a part of the alkoxy group.



67 (d)

Follow IUPAC rules.

68 (c)

It is a fact.

69 (c)

A liquid, which decomposes at its normal boiling point can be purified by vacuum distillation.

71 (b)

Stability of carbanion is not governed by hyperconjugation. Its stability depends on the +I or -I group

72 (c)

Let unreacted $0.1M (= 0.2N)H_2SO_4 = V' \text{ mL}$

$\therefore 20 \text{ mL of } 0.5M \text{ NaOH}$

$$= V' \text{ mL of } 0.2N \text{ } H_2SO_4$$

$$\therefore 20 \times 0.5 = V' \times 0.2$$

$$\therefore V' = 50 \text{ mL}$$

Used $H_2SO_4 = 100 - 50 = 50 \text{ mL}$

$$\% \text{ Nitrogen} = \frac{1.4 \text{ N V}}{w}$$

where, N = normality of H_2SO_4

V = volume of H_2SO_4 used

$$\therefore \% \text{ nitrogen} = \frac{1.4 \times 0.2 \times 50}{0.30}$$

$$= 46.67\%$$

% of nitrogen in

$$(a) \text{CH}_3\text{CONH}_2 = \frac{14 \times 100}{59} = 23.73\%$$

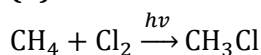
$$(b) \text{C}_6\text{H}_5\text{CONH}_2 = \frac{14 \times 100}{122} = 11.48\%$$

$$(c) \text{NH}_2\text{CONH}_2 = \frac{28 \times 100}{60} = 46.67\%$$

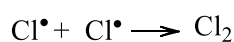
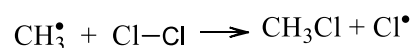
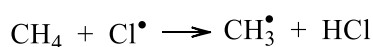
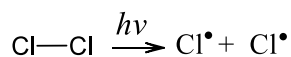
$$(d) \text{NH}_2\text{CSNH}_2 = \frac{28 \times 100}{76} = 36.84\%$$

Therefore, the organic compound is urea.

73 (d)



This is an example of free radical substitution reaction



74 (c)

Glucose has four dissimilar asymmetric carbon atoms; $a = 2^4$.

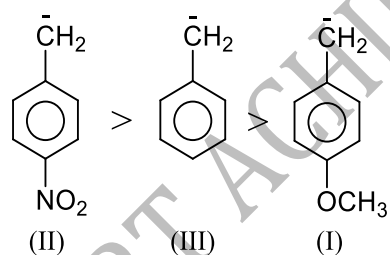
75 (d)

The elimination takes place according to Saytzeff rule. The most substituted alkene (butane-2) is called Saytzeff product whereas less substituted alkene (butane-1) is called Hofmann product

76 (c)

$-\text{NO}_2$ group shows $-M$ effect while $\text{CH}_3\text{O}-$ group shows $+M$ effect. ($-M$ effect stabilizes an anion)

Hence, the order of stability is



77 (b)

The former possesses 12 α -H atom whereas, later possesses six α -H atom. More is the no. of α -H atom, more is delocalisation and more is stability.

78 (d)

H_2O , ROH, R - COOH etc are protic solvents because they are polar in nature and contain a hydrogen directly bonded to oxygen while other are aprotic solvents as they do not have a hydrogen bonded directly to oxygen. They are especially favourable for S_N1 reactions. While aprotic solvents cannot have hydrogen bond to the nucleophile because they does not have

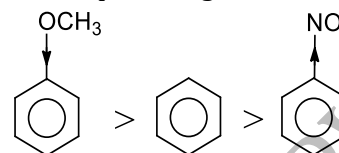
hydrogen bonded to nitrogen or oxygen. They are favourable for S_N2 reactions.

79 (b)

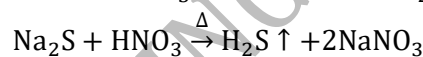
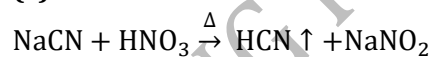
Follow mechanism of addition reactions.

80 (c)

Methoxy group is electron releasing group it increases electron density of benzene nucleus - NO_2 group is electron withdrawing group, it decreases the electron density of benzene nucleus. Thus, the order of reaction with electrophilic reagent is



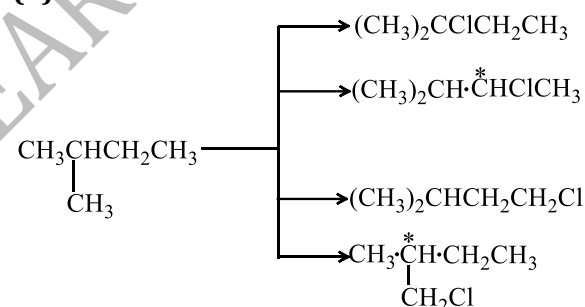
81 (c)



82 (d)

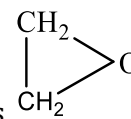
The central carbon in I and II is asymmetric.

83 (b)



Thus, out of four isomers only two have chiral carbon. Each have two isomers.

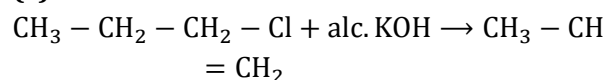
85 (a)



The structural formula of epoxide is

It consists three membered ring with two carbon and one oxygen.

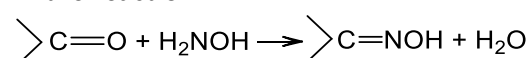
86 (c)



It is an example of elimination reaction

87 (d)

In the reaction



Both addition and elimination takes place simultaneously. Thus, the reaction is addition elimination

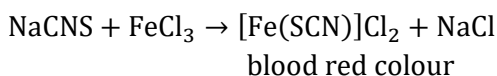
88 (d)

Resolution of racemic mixture involves the

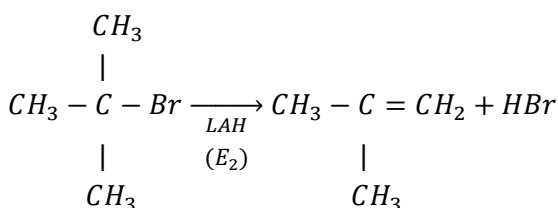
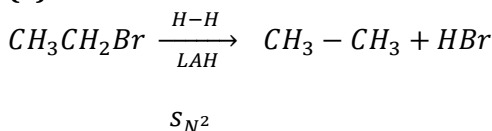
formation of distereoisomers.

89 (b)

When N and S both are present in the organic compound, then a red colour complex ion of $[\text{Fe}(\text{CNS})]^{2+}$ is formed on adding FeCl_3 to sodium extract



90 (a)

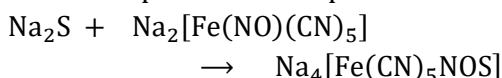


91 (a)

Count σ and π -bonds.

92 (d)

The formation of sodium thionitroprusside (blue) shows the presence of sulphur.

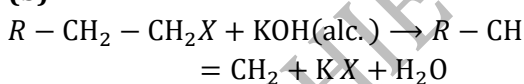


Sodium sodium nitroprusside sodium thionitroprusside purple extract

93 (a)

It is a fact.

94 (b)



Alkyl halide undergo β -elimination to form alkene.

95 (d)

The rate of reaction follows the order : $\text{RI} > \text{RBr} > \text{RCl} > \text{RF}$; whether it obeys $\text{S}_{\text{N}}1$ or $\text{S}_{\text{N}}2$ mechanism due to steric hindrance of alkyl group.

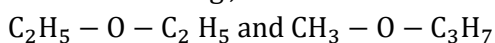
96 (c)

Only this is optically active due to central carbon being asymmetric.

97 (a)

Ethers show metamerism. Metamerism arises when a polyvalent functional group

(e.g., —O— , $>\text{C}=\text{O}$ etc.) is attached to different alkyl groups but the molecular formula remains same e.g.,



98 (c)

Carbanion is electron rich species. Stability of carbanion increases with increase in s -character of hybrid orbitals of carbon bearing the charge.

$\therefore sp^3 < sp^2 < sp$
(25% s -character) (33% s -character) (50% s -character)

99 (c)

The Z repels electrons and thus, electron density increases on R_3C part.

100 (d)

\therefore $-\text{COOH}$ group is a deactivating group
 \therefore Benzoic acid is less reactive towards electrophilic substitution.

So, benzoic acid $>$ phenol $>$ n -propyl benzene is not arranged correctly.

101 (c)

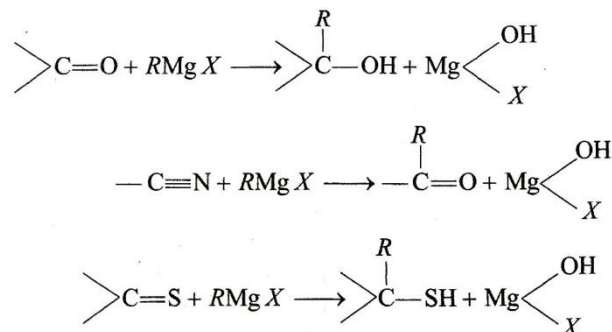
Aqueous solution of NaHCO_3 can be used to separate benzoic acid from its mixture with camphor. Benzoic acid forms water soluble sodium benzoate with NaHCO_3 .

102 (d)

Each π -electron is delocalised over six carbon atoms in ring.

103 (d)

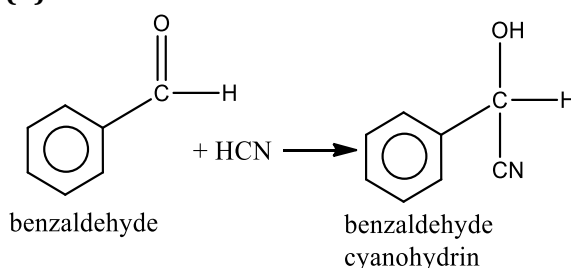
Grignard reagent reacts with $>\text{C}=\text{O}$, $-\text{C}\equiv\text{N}$, $>\text{C}=\text{S}$ as follows



104 (a)

Benzene is the most stable and we know that resonance energy is a direct measure of the stability of a molecule

105 (d)



It is an example of nucleophilic addition reaction.

107 (c)

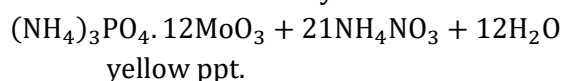
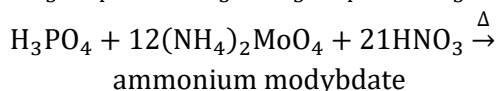
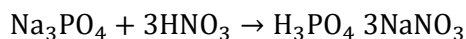


$\text{H}_3\text{C}-\text{C}-\text{Br}$ and $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{Br}$ are chain as well as position isomers.



108 (b)

Detection of phosphorus in the organic compound can be done by its conversion into phosphate. The ammonium molybdate is used to identify phosphate ion



109 (b)

Homolytic bond fission is one in which each entity involved in bond formation retains its electron involved in shared pair of electron to form free radicals.

110 (c)

CH_3CN has sp^3 and sp -hybridised carbon atom.

111 (c)

CH_3OCH_3 , Methoxy methane (alcohol) ($\text{C}_2\text{H}_6\text{O}$)	$\text{C}_2\text{H}_5\text{OH}$ Ethanol (ether) functional group ($\text{C}_2\text{H}_6\text{O}$) molecular formula
---	--

In methoxy methane and ethanol both molecular formula is same but functional groups are different, so they are functional isomers.

112 (b)

The main conditions for exhibiting geometrical isomerism are

- (i) Presence of double bond.
- (ii) Presence of different groups on same double bonded carbon.
- (iii) Presence of at least one similar group on adjacent double bonded carbon atoms.

C_3H_6 ($\text{H}_3\overset{3}{\text{C}}-\overset{2}{\text{CH}}=\overset{1}{\text{CH}_2}$) does not exhibit geometric isomerism due to presence of same group on double bonded carbon atom (C_1).

113 (a)

Follow mechanism of addition reaction.

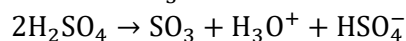
114 (c)

Vicinal or alkylene dihalides.

115 (d)

The electrophile involved in the sulphonation of

benzene is SO_3 .



116 (b)

Number of meso structures in compound having odd number of chiral carbon atoms and

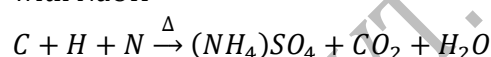
symmetrical molecule = $2^{\frac{(n-1)}{2}}$

Given, $n = 5$

\therefore Number of meso forms = $2^{\frac{5-1}{2}} = 2^2 = 4$

117 (d)

In Kjeldahl's method, the nitrogen is quantitatively converted into ammonia by heating with NaOH



(from organic compound)

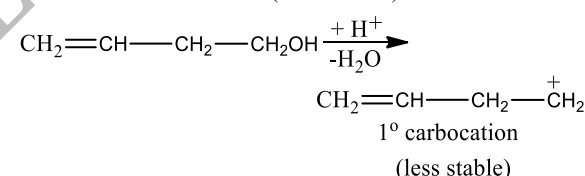
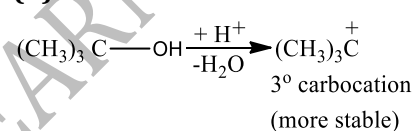


In Dumas method nitrogen present in organic compound is quantitatively converted into N_2 .

118 (c)

It is a fact.

119 (b)



Increasing order of stability of carbocation.

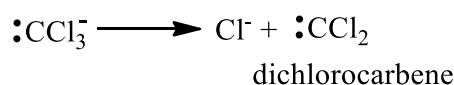
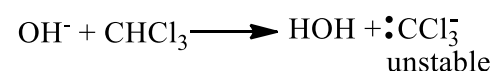
1° carbocation < 2° carbocation < 3° carbocation

120 (c)

Both geometrical and optical isomerism are included in stereoisomerism.

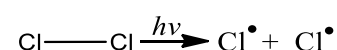
121 (a)

Phenol reacts with chloroform and NaOH to give *o*-hydroxy benzaldehyde or salicylaldehyde. In this reaction dichlorocarbene ($:\text{CCl}_2$) electrophile is generated. This reaction is called Reimer-Tiemann reaction.



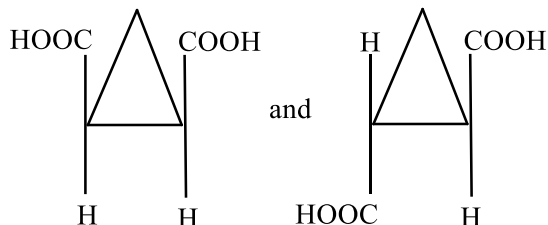
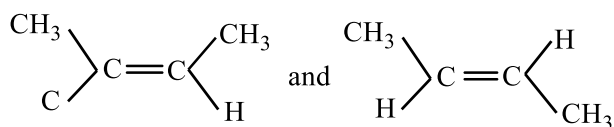
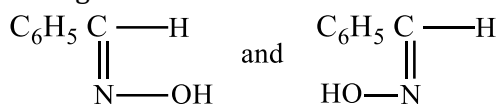
122 (b)

Homolytic fission is favoured by sunlight. In it, each bonded atom takes away its shared electrons and thus free radicals are produced.

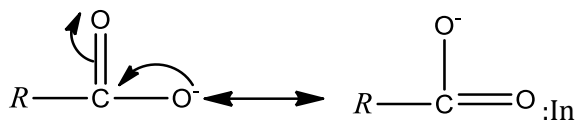


124 (d)

All show geometrical isomerism :



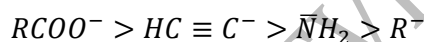
125 (d)



carboxylate ion, the negative charge is present on oxygen, a most electronegative element here, thus it is resonance stabilised.

$\text{HC} \equiv \text{C}^-$: Carbon is sp -hybridised so its electronegativity is increased higher relative to nitrogen.

$\bar{\text{N}}\text{H}_2$: Nitrogen is more electronegative than sp^3 -hybridised C-atom. From the above discussion, it is clear that the order of the stability of conjugated bases is as

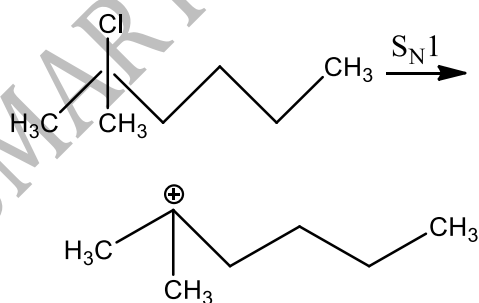


and higher is the stability of conjugated bases, lower will be basic character. Hence, the order of basic character is as



126 (b)

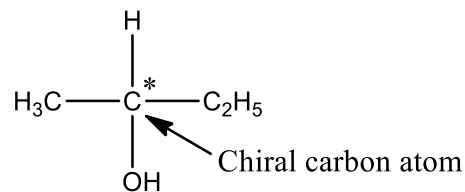
$\text{S}_{\text{N}}1$ Reaction is most favourable for tertiary substance.



3° carbocation
(most stable)

127 (d)

$\text{CH}_3\text{CHOHC}_2\text{H}_5$ is optically active because it has chiral C^* -atom



128 (d)

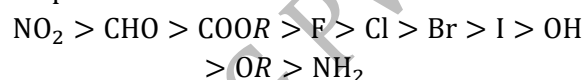
The closed ring cycloalkanes beyond five carbon atoms has puckered ring structure maintaining tetrahedral nature or stainless rings, e.g., cyclohexane has chair and boat form.

129 (d)

These are characteristics of $\text{S}_{\text{N}}1$ mechanism.

130 (c)

$-I$ power of groups in decreasing order with respect to the reference H

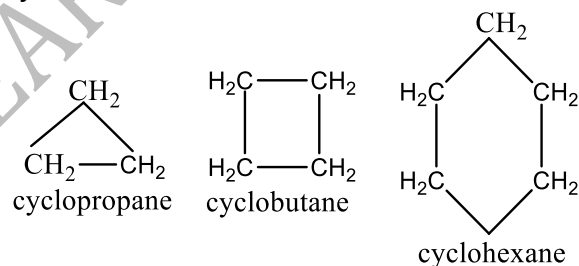


131 (d)

Asymmetry is present in all states.

132 (b)

The structure of cyclopropane, cyclobutane and cyclohexane are as



Hence, the common group in cyclopropane, cyclobutane and cyclohexane is $>\text{CH}_2$ group.

133 (d)

Draw all possible isomers.

135 (a)

$+I$ effect is shown by $-\text{CH}_3$ while $-I$ effect is shown by $-\text{Br}$, $-\text{Cl}$ and $-\text{NO}_2$.

136 (b)

It is a strong reducing agent.

137 (a)

$$\% \text{ of C} = \frac{12}{44} \times \frac{0.535}{0.765} \times 100 = 19.07$$

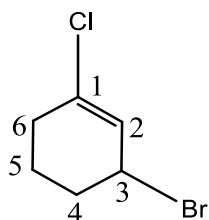
$$\% \text{ of H} = \frac{2}{18} \times \frac{0.138}{0.765} \times 100 = 2.004$$

Ratio of % of C:H=19:2 (approx.)

138 (d)

Benzene has planar structure.

139 (c)



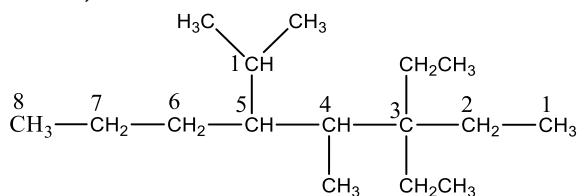
Unsaturation (double bond) is given priority over halogen, then lowest set of locants. So, the correct IUPAC name is 3-bromo-1-chlorocyclohexene.

140 (c)

Follow conformation; The conformers for *n*-butane are two gauche, two eclipsed and one anti.

142 (d)

Select longest possible carbon atom chain, number it and name compound according to IUPAC, rules.



3, 3-diethyl-4-methyl-5-(1'-methyl ethyl)-octane

143 (b)

Benzal is C_6H_5CH group.

144 (b)

A 2° carbon is one of which two valencies are attached to carbon atom.

145 (c)

Eclipsed conformation of butane contain angle and steric strain both. Follow conformation.

146 (c)

Weight of organic compound = 29.5mg



(remaining) $15 \times 0.1 M$

= 1.5 mmol

Total millimole of HCl = 2

Millimole used by $NH_3 = 2 - 1.5 = 0.5$

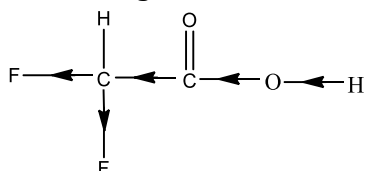
Weight of $NH_3 = 0.5 \times 17mg = 8.5mg$

Weight of nitrogen = $\frac{14}{17} \times 8.5mg = 7mg$

% Nitrogen = $\frac{7}{29.5} \times 1100 = 23.7\%$

147 (a)

Fluoro group causes negative inductive effect increasing ionisation, thus 0.1M difluoroacetic acid has highest electrical conductivity.

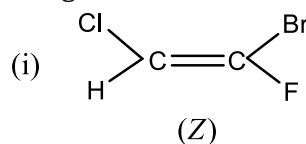


148 (c)

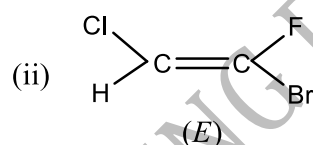
$-NO_2$ group shows $-M$ effect while CH_3O group shows $+M$ effect ($-M$ effect stabilises an anion)

149 (d)

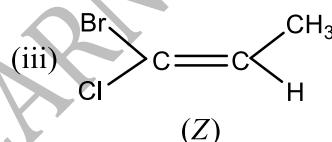
When the groups with higher priority (*i. e.*, with high atomic number) are present on same side of double bond, then the configuration is *Z* but when present on opposite side of double bond, the configuration is *E*.



(Priority : $Cl > H$ and $Br > F$)



(Priority : $Cl > H$ and $Br > F$)

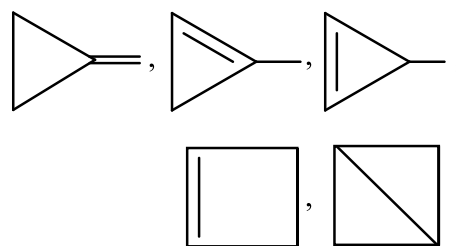


150 (c)

Nucleophiles are electron rich species and can donate lone pair of electron to carbocation or any $+ve$ centre.

152 (c)

C_4H_6 can have five cyclic isomers.

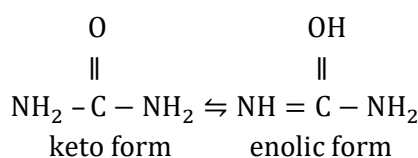


153 (b)

—do—

154 (d)

Urea shows tautomerism as

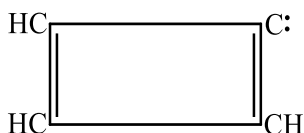


155 (d)

The conditions given are for C_6H_6 .

156 (c)

Count π -bonds. Delocalisation is not possible.



157 (a)

Pentene-2 exhibits *cis* and *trans*-isomerism.

159 (c)

The rule is valid for unsymmetrical alkene.

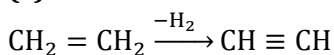
160 (c)

$(\text{CH}_3)_2\text{CHCH}_2\text{CH}_3$ is isopentane.

161 (a)

π -bond in molecule give rise to hindered rotation.

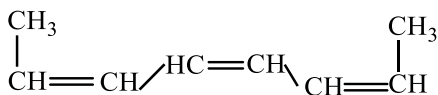
162 (c)



Conversion of ethylene into acetylene is a example of elimination reaction.

163 (d)

The two propenyl group attached to 1,2-position of carbon in *cis*-form.



164 (d)

Markownikoff's rule is obeyed during addition of unsymmetrical addendum on unsymmetrical alkene.

165 (a)

Benzene has 6 C—C and 6 C—H σ -bonds and 3 C=C π -bonds.

166 (b)

It is a fact.

167 (c)

Alkynes are linear due to sp - sp hybridized carbon.

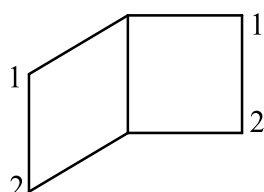
168 (a)

For keto-enol isomerism a compound should have at least one α -hydrogen atom with respect to ketone group or in other words for tautomerism presence of α -hydrogen atom is essential.



does not exhibited. tautomerism due to absence of α -hydrogen atom.

170 (d)



Hence, correct IUPAC name is bicyclo [2,2,0] hexane.

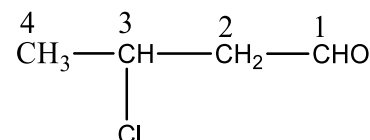
172 (d)

Chlorinolysis involves substitution reactions by chlorine.

173 (b)

$a = 2^{n-1}$; where n is no. of asymmetric carbon; when molecule possesses symmetry.

174 (c)



3-chlorobutanal

\therefore The order is priority is $-\text{CHO} > -\text{Cl}$.

175 (c)

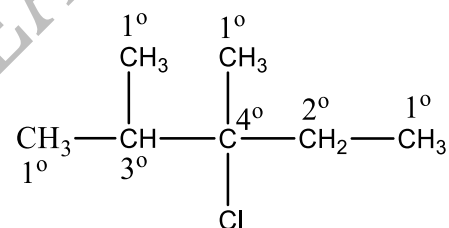
$$\% \text{C} = \frac{12}{44} \times \frac{12.517}{4.0} \times 100 = 85.7$$

$$\% \text{H} = \frac{2}{18} \times \frac{5.143}{4.0} \times 100 = 14.3$$

$$\text{The mole ratio of C to H is } \frac{85.7}{12} : \frac{14.3}{1} = 7.14 : 14.3 = 1 : 2 = \text{CH}_2$$

176 (b)

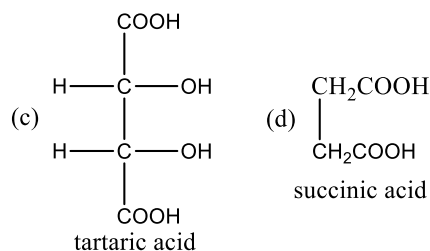
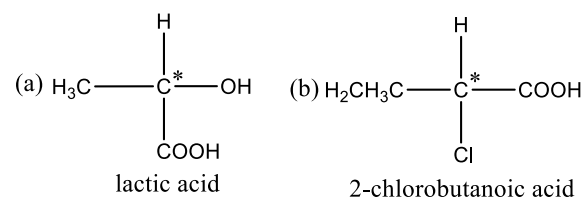
3-chloro-2,3-dimethyl pentane contains all the four 1° , 2° , 3° and 4° carbon atoms.



3-chloro-2-3-dimethyl pentane

178 (d)

The carbon, four valencies of which are satisfied by four different groups, is termed as chiral carbon atom. The structures of the given compounds are as

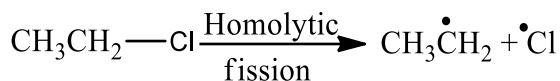


(where, $\text{C}^* =$ chiral carbon atom)

Hence, succinic acid does not contain any chiral carbon atom.

180 (a)

In homolysis, the covalent bond is broken in such a way that each resulting species known as free radical.

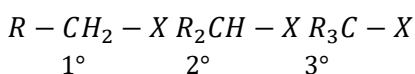


181 (b)

p-orbitals are at 90° to each other.

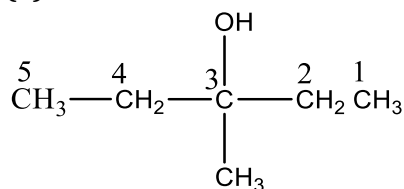
182 (b)

S_N2 reactions are greatly controlled by steric factor.



S_N2 reactivity decreases as bulkyness of alkyl group increases.

183 (a)

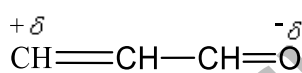


3-methyl pentane 3-ol

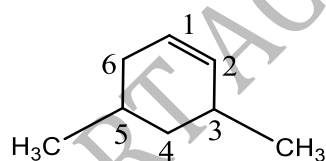
Hydroxy is used when -OH group is written in prefix. So, choice (b) and (c) are wrong.

184 (d)

Due to -R effect of -CHO group, oxygen carries -δ charge while the terminal carbon carries +δ, i.e.,



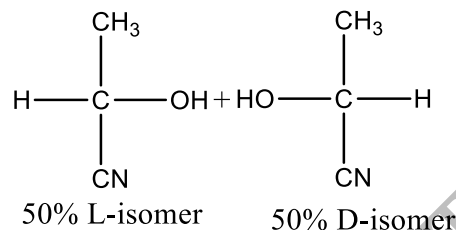
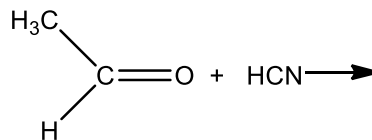
185 (a)



Its IUPAC name is 3,5-dimethylcyclohexene.

186 (a)

Lactic acid obtained in the given reaction is an optically active compound due to the presence of chiral C-atom. It exists as *d* and *l* forms whose ratio 1:1.



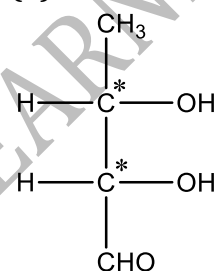
187 (c)

The mirror-image isomerism is a class of stereoisomerism and are included in optical isomerism.

188 (c)

CH_3^+ acts as an intermediate in the given reaction (Friedel Craft's alkylation). It is an example of electrophilic aromatic substitution. In this reaction CH_3^+ is electrophile.

189 (d)



Possible number of optical isomers = 2^n

$$= 2^2 = 4$$

190 (b)

C_6H_6 has 12σ and 3π-bonds.

191 (c)

For S_N2 mechanism, there should be least steric hinderance.

193 (c)

Rest all are polymerisation.

194 (a)

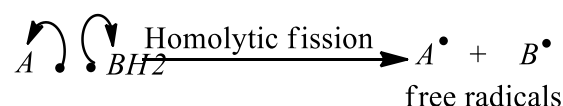
The increasing order of inductive effect is: -F < -COOH < -CN < -NO₂.

197 (b)

-COOH is on top in preference table.

200 (d)

In homolytic cleavage, covalent bond is cleaved in such a way that each atom takes its shared electrons with itself and free radicals are formed.



201 (d)

Fractional distillation is used for the separation of

crude petroleum into various fractions like coal-tar, crude alcohol and petroleum

202 (b)

Free radical has unpaired electron.

203 (a)

SO₃ can accept lone pair of electron in *d*-subshell.

204 (a)

From Kjeldahl's method,

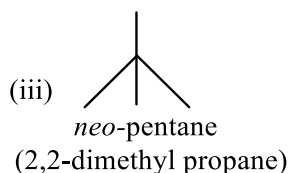
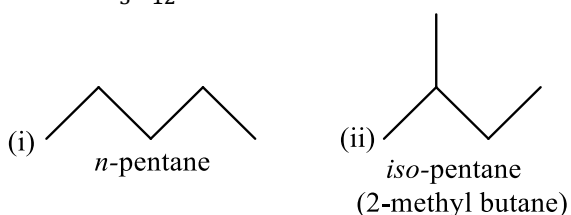
Percentage of nitrogen

$$= \frac{1.4 \times N \times V}{W} = \frac{1.4 \times 0.1 \times 30}{5}$$

$$= 0.84\%$$

205 (a)

The isomers alkanes having the molecular formula C₅H₁₂ are as

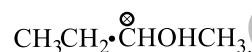


206 (b)

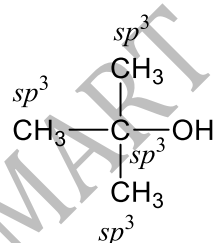
Just after few years when Wöhler prepared urea from KCNO and (NH₄)₂SO₄, Kolbe prepared acetic acid in laboratory from its element and gave final blow to Vital force theory.

207 (b)

Due to the presence of asymmetric carbon atom, e. g.,



208 (a)



All bonds are σ - bonds hence C uses only its sp^3 - hybrid orbitals. In all other compounds there is one C = O double bond, therefore, this carbon is sp^2 - hybridized

210 (a)

Follow Baeyer's strain theory for stability of cycloalkane.

211 (a)

— COOH is electron withdrawing group.

213 (d)

CHO

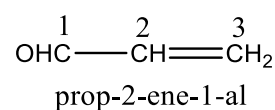
| is called glyoxal

CHO

214 (d)

IUPAC name of acraldehyde

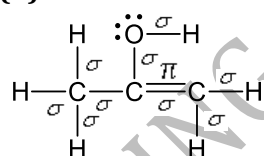
(CH₂ = CH. CHO) is:



216 (d)

These are characteristics known from mechanism of reaction.

217 (b)



enolic form of acetone

9 σ bonds, 1 π bond, 2 lone pairs

218 (c)

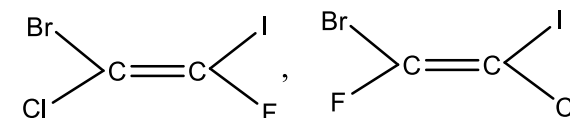
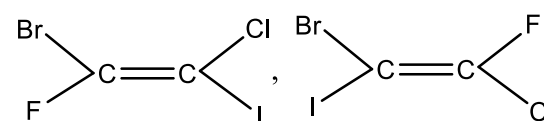
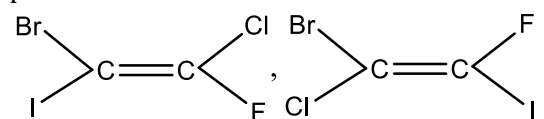
BrCH₂CH₂COOH is the weakest acid and have lowest dissociation constant because. I.E. of Br is lesser than F and is far away from — COOH group.

219 (a)

Follow IUPAC rules.

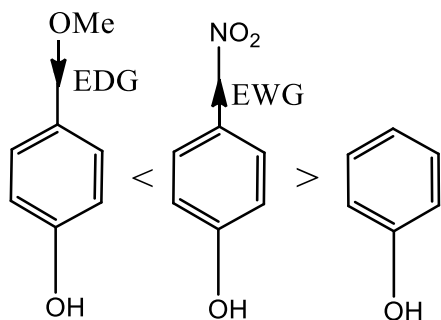
220 (d)

Molecular formula C₂BrClF₂ six isomers are possible.



221 (a)

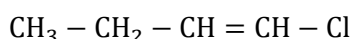
Nucleophilicities are those substances which can donate a pair of electrons. They can be neutral or negatively charged. The nucleophilic power depends on the tendency of species to donate the electrons. Due to the presence of +I effect it increases. Hence, higher the +I effect, higher the nucleophilic power. The +I effect of ethyl is greater than +I effect of methyl group



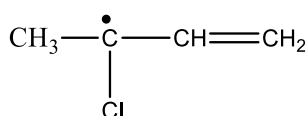
243 (b)

C₄H₇Cl is a monochloro derivative of C₄H₈ which itself exists in three isomeric forms.

(i) CH₃ - CH₂ - CH = CH₂: Its possible monochloro derivatives are



2 isomers *cis* and *trans* forms



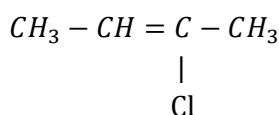
Optically active (exists in two forms)

ClCH₂ - CH₂ - CH = CH₂ (one form)



H₃C - CH₂ - C = CH₂ (one form)

(ii) CH₃ - CH = CH - CH₃: Its possible monochloro derivatives are



Exists in two geometrical forms

CH₃ - CH = CH - CH₂Cl

Exists in two geometrical forms

(iii) CH₃ - C = CH₂: Its possible monochloro derivatives are



CH₃ - C = CH - Cl, (Only one form)



ClCH₂ - C = CH₂ (only one form)



Thus, the total acyclic isomeric forms of C₄H₇Cl are 12.

244 (d)

It shows intramolecular H-bonding.

245 (d)

Diethyl ether is resistant to nucleophilic attack by hydroxyl ion.

246 (d)

C₆H₆ has more canonical forms.

247 (d)

Chemical methods are based upon the distinguishing chemical properties of one class of organic compounds from the other. for example camphor and benzoic acid

248 (c)

Fractional crystallation is used to purify organic solids which dissolve in a particular solvent. But their rate of solubility is different

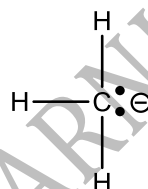
249 (d)

NH₄CNO is functional isomer of urea.

250 (b)

Carbanion (CH₃)[⊖]

Here, the carbon atom carries a negative charge with lone pair of electrons and has eight electrons in outermost orbit and complete its octet.



Reactions in which carbanions are formed as intermediate are said to proceed by a "Carbanion mechanism".

Carbanion is sp³ hybridised, three sp³ hybrid orbitals form covalent bonds with three atoms while the fourth sp³ hybrid orbital has a non-bonding pair of electrons. It is pyramidal in shape as similar to NH₃.

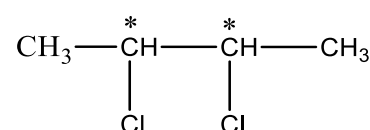
251 (a)

Ether group (—O—) has propyl and isopropyl group on its two sides.

252 (d)

Follow carbenes.

253 (c)



There are two chiral C-atoms (*) Thus, optical isomerism is possible.

254 (b)

Follow IUPAC rules.

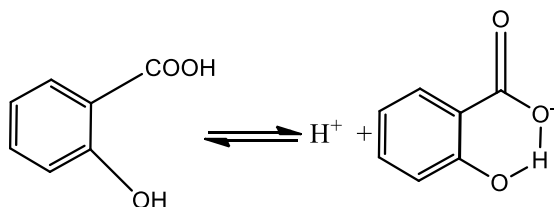
255 (d)

—do—

256 (c)

A monosubstituted benzoic acid is stronger than a monosubstituted phenol as former being a carboxylic acid. Among the given substituted

benzoic acid, *ortho* – hydroxy acid is strongest acid although – OH causes electron donation by resonance effect which tends to decrease acid strength. It is due to very high stabilisation of conjugate base by intramolecular H-bond which outweighs the electron donating resonance effect of – OH.

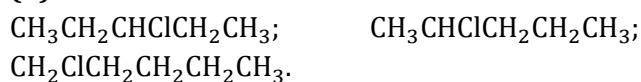


The overall order of acid-strength of given four acids is *ortho*-hydroxybenzoic acid ($pK_a = 2.98$) > Toluic acid ($pK_a = 4.37$) > *p* – hydroxybenzoic acid ($pK_a = 4.58$) > *p* – nitrophenol ($pK_a = 7.15$).

257 (b)

Electrophiles are electron pair acceptors.

258 (b)

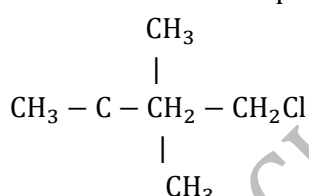


259 (b)

Benzene and all its derivatives along with heteroaromatics possess aromatic nature. Rest all possess aliphatic nature.

260 (d)

Neohexyl chloride is a primary halide as in it, Cl-atom is attached to a primary carbon.



261 (a)

Ethane, ethene and ethyne have sp^3 , sp^2 and sp -hybridization respectively.

262 (d)

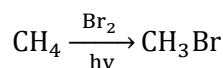
Carbon is asymmetric as all its valencies are attached to different groups.

264 (b)

Follow IUPAC rules.

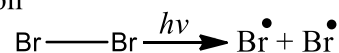
265 (d)

Bromination of alkanes in the presence of sunlight involves the formation of free radical, e.g.,

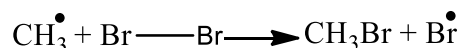
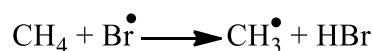


Mechanism

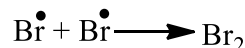
Initiation



Propagation



Termination



266 (d)

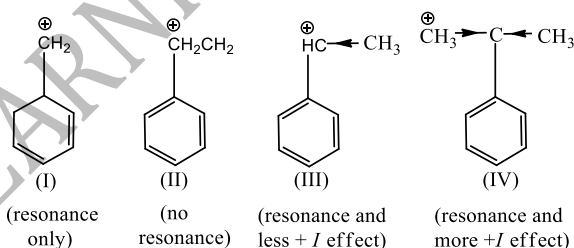
The two butene give different products on addition of Br_2 -*cis* butene gives racemic mixture whereas *trans* butene gives *meso* form of 2,3,3-dibromo butene.

267 (a)

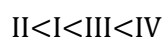
Lassaigne's test is used for the detection of halogens, nitrogen and sulphur.

268 (a)

Resonance and inductive effect decide stability of carbocations.



∴ Correct order of stability is



269 (c)

Atom	At mass (a)	% (b)	$\frac{b}{a}$	Ratio
X	10	50	$\frac{50}{10} = 5$	2
Y	20	50	$\frac{50}{20} = 2.5$	1

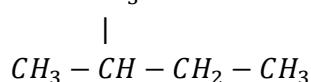
Hence, empirical formula = X_2Y

270 (c)

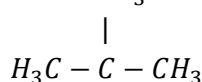
The compounds which differ in the nature of carbon chain are called chain isomers, e.g.,



n-pentane



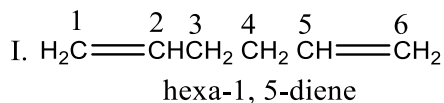
iso-pentane



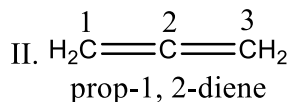
neo-pentane

272 (c)

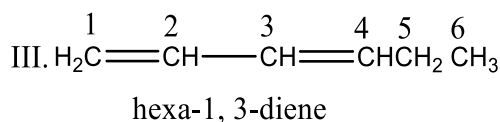
In conjugated diene alternate single and double bonds are present while in cumulative diene, double bonds are present at adjacent positions.



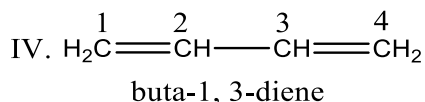
⇒ It is an isolated diene.



⇒ It is a cumulative diene.



⇒ It is a conjugated diene.

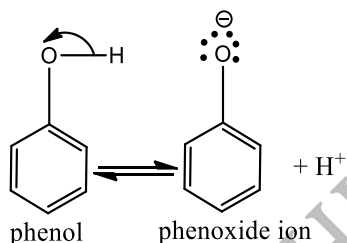


⇒ It is a conjugated diene.

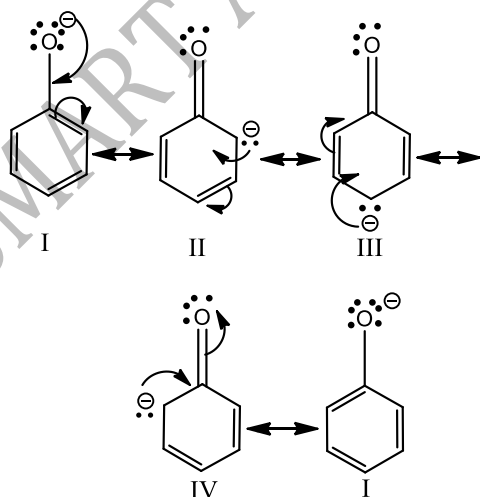
V. Prop -1, 2-diene is a cumulative diene. Hence, statement 3 and 5 are correct.

276 (b)

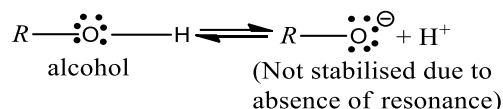
Phenols are much more acidic than alcohol due to the stabilisation of phenoxide ion resonance.



Phenoxide ion is stabilised due to following resonating structures.



While, in alcohols



ortho nitrophenol is most acidic because in -NO₂ electron attracting group is attached to *ortho* position which helps in stabilising the negative charge on the oxygen of phenoxide ion. Hence, due to this reason acidic character of phenol is increased, while on attachment of -CH₃ group (electron donating group) acidic strength of phenol is decreased in cresol due to the destabilisation of phenoxide ion.

277 (d)

$$\begin{aligned} \text{C: H: O} &= 6: 1: 8 \\ &= \frac{6}{15} \times 100: \frac{1}{15} \times 100: \frac{8}{15} \times 100 \\ &40: 6.67: 53.3 \\ &= \frac{40}{12}: \frac{6.67}{1}: \frac{53.3}{16} \\ &= 1: 2: 1 \text{ ie, } \text{CH}_2\text{O} \end{aligned}$$

278 (c)

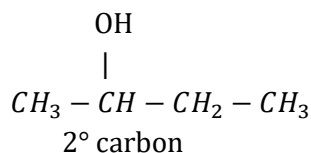
Alkanes never show functional isomerism, metamerism, tautomerism and geometrical isomerism.

279 (b)

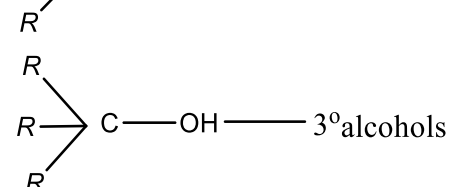
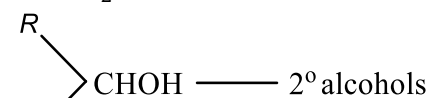
Draw all possible chain and position isomers.

280 (c)

2-butanol has following structure



R - CH₂OH - 1° alcohol



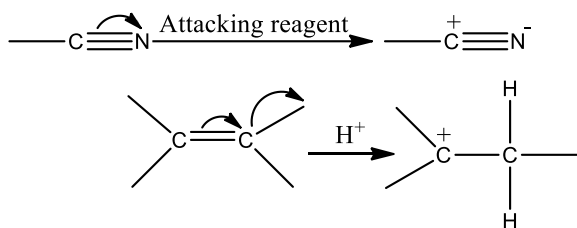
281 (a)

Stronger is acid, weaker is its conjugate base or weaker is nucleophilicity.

The acidic order HF > H₂O > NH₃ > CH₄.

282 (b)

Electromeric effect occurs only in the presence of attacking reagent. It operates in the molecules having multiple bonds. Since, it exists only on the demand of attacking reagent, it is a temporary effect. *e.g.*,



283 (b)

Leaving group ability depends upon basicity of group.

284 (d)

Read optical activity.

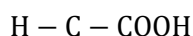
285 (c)

The compounds must fulfill two conditions to show geometrical isomerism.

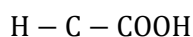
(i) The compound should have at least one C=C.

(ii) The two groups attached to same carbon must be different.

Out of given choices only (c) fulfill both conditions and shows geometrical isomerism.



||

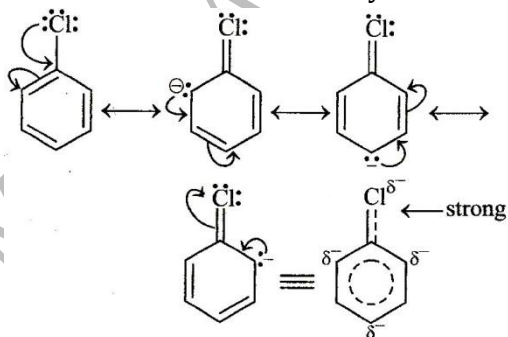


(c)

2-butene-1,4-dioic acid

286 (a)

C - Cl bond in aryl chloride is stable due to delocalisation of electron by resonance. Also C - Cl bond possess a double bond character like vinyl chloride, hence S_N reactions are not possible in chlorobenzene under ordinary conditions.



287 (b)

C - C, C = C and C \equiv C bond length are 1.54 Å, 1.34 Å and 1.20 Å respectively. In benzene C = C is 1.40 Å.

288 (c)

Definition of tautomerism.

289 (c)

The reactivity order is $3^\circ\text{H} > 2^\circ\text{H} > 1^\circ\text{H}$.

290 (a)

The +ve inductive effect of CH_3 group on carbanions intensifies negative charge on C^- centre and thus, 3° carbanion is more reactive.

291 (d)

Glycerine contains

$\alpha\text{CH}_2 - \text{OH} \leftarrow 1^\circ$ alcohol

|

$\beta\text{CH} - \text{OH} \leftarrow 2^\circ$ alcohol

|

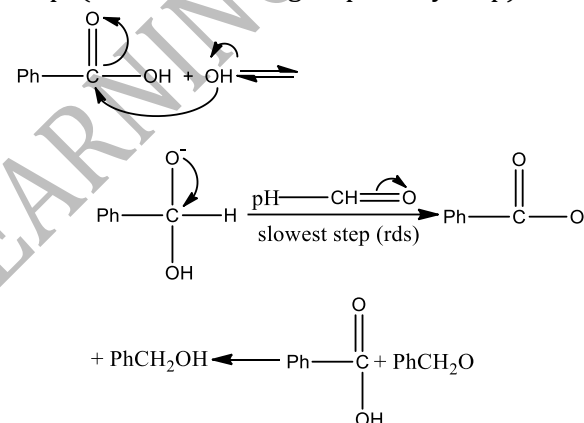
$\alpha\text{CH}_2 - \text{OH} \leftarrow 1^\circ$ alcohol

292 (a)

In rest all carbon chain is same.

293 (b)

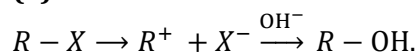
In Cannizzaro reaction the transfer of H^- to another carbonyl group is difficult and slowest step. (rate determining step or key step)



294 (b)

Anti conformation is the most stable form of *n*-butane (Bulky groups far apart).

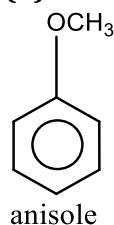
295 (a)



298 (a)

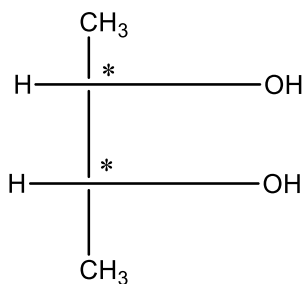
It has altogether different groups.

299 (b)



It is an ether and the name of ether is given as alkoxy alkane. So, its name is methoxy benzene.

300 (b)



butane-2-3-diol

Where C^* = asymmetric C atom

It is a symmetrical molecule, so the number of optically active stereomers = 2^{n-1}

(n = number of asymmetric C atom)

$$= 2^{2-1}$$

$$= 2^{-1} = 2$$

302 (d)

Wöhler prepared urea from KCNO and $(NH_4)_2SO_4$.

304 (a)

Electron donors having lone pair of electrons are nucleophile.

(i) BF_3 is not nucleophile because it does not have lone pair of electrons. It is infact Lewis acid because it accepts pair of electron

(ii) NH_3 , CN^- and OH^- all have lone pair of electrons, so they are nucleophiles.

305 (b)

Due to asymmetric carbon atom.

306 (b)

Aryl carbonium ions are more stable than alkyl carbonium ions. The order of stability of carbocation is

Triphenyl methyl > Diphenyl methyl >

Benzyl > Allyl > 3° > 2° > 1° > methyl carbocation.

308 (c)

Follow IUPAC rules.

310 (a)

The dispersal of the charge stabilises the carbocation. More the number of alkyl groups; the greater the dispersal of positive charge and therefore, more the stability of carbocation, thus $C_2H_5^+ > CH_3^+$, $O-CH_3$ is also an electron donating group, thus it will increase the stability of carbocation, hence, the correct order of stability is $C > B > A$.

311 (c)

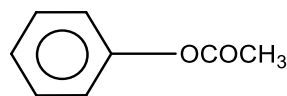
Chromatography method is used to separate sugars.

312 (c)

Only urea does not sublime while naphthalene, camphor and benzoic acid do

313 (c)

Esters are named by prefixing the name of the alkyl or aryl group (of OR' part) before the name of the parent acid and changing the suffix ic acid to ate. Hence, the structure of phenyl ehtanoate is



314 (b)

Inductive effect of groups is measured with respect to H.

315 (d)

Methyl halides are methylating agents.

316 (a)

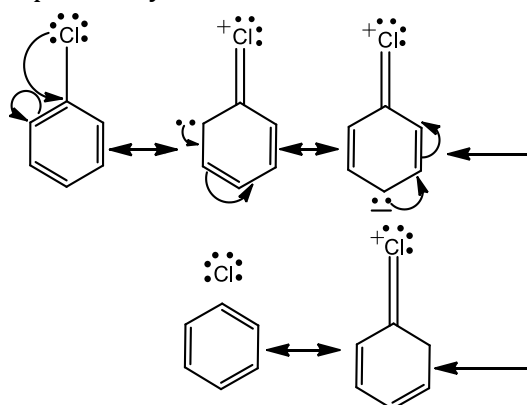
Nucleophiles are the species which have excess of electrons. Among the given species, the lone pair of nitrogen of pyrrole is involved in delocalisation of the ring, thus, are not available for donation. In aniline, the lone pair is involved in conjugation with the π -electrons of the ring while in pyridine, these are relatively free for donation. Thus, nitrogen of pyridine is most nucleophilic.



(phenyl and $-COCH_3$ both are electron withdrawing groups, thus decreases the nucleophilicity of nitrogen).

317 (c)

Chlorobenzene is *o*, *p* directing in electrophilic substitution reaction. The directing influence is explained by +M of Cl atom



+M effect of chlorine atom

318 (b)

Free radicals are electrons deficient compounds. Alkyl groups are electron donor groups and they increase the stability of free radicals.

\therefore More the number of alkyl groups, more will be stability of free radicals.

$\therefore 3^\circ > 2^\circ > 1^\circ$ is the correct order of stability of free

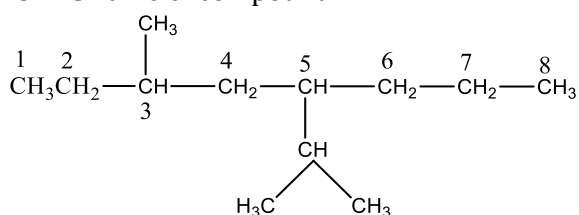
radicals.

319 (b)

This give rise to net resultant of four C – Cl vectors equal to zero.

320 (b)

IUPAC name of compound.



Straight chain which contains large number of side chains taken as parent chain and counting starts from that side where the side chain is nearest.

3-methyl-5(1-methyl ethyl) octane.

321 (a)

The isomerism which arises due to rotation about a C-C is called conformational isomerism and the isomers are called conformational isomers or rotational isomers or conformers.

322 (a)

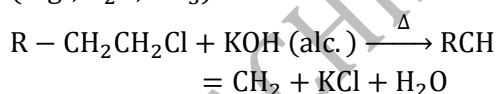
CH₃CH = CH₂CHOHCH₃ has one asymmetric carbon.

323 (b)

(i) In nucleophilic substitution reaction more powerful nucleophile replaces weaker nucleophile.

(ii) In rearrangement reaction atoms replace their position within molecule.

(iii) In elimination reaction small molecules (e. g., H₂O, NH₃) are lost.



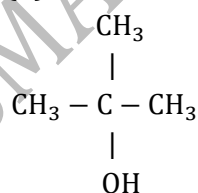
∴ KCl and H₂O molecules are lost during reaction.

∴ It is an elimination reaction.

324 (c)

CH₃COCH₃ is simplest ketone.

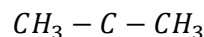
326 (d)



is the formula of tertiary butyl alcohol as in it - OH group is attached to tertiary carbon.

327 (b)

The neopentane:



IUPAC name: 2,2-dimethyl propane

328 (d)

Triple bond possesses maximum bond energy.

329 (d)

If molecule having asymmetric carbon atom and is not superimposable on its mirror image then it is chiral while if it is superimposable on its mirror image, it is achiral.

330 (a)

(a) When optically active acid reacts with racemic mixture of an alcohol, it forms two types of isomeric esters. In each, the configuration of the chiral centre of acid will remain the same. So, the mixture will be optically active.

331 (d)

Due to H⁻ shift from C₂ to C₃. Driving force is conjugation from oxygen. Also bulky gps hinders in hydride shift.

332 (a)

C₆H₆ has six delocalized π-electrons.

333 (c)

Due to same molecular formula.

334 (d)

Cis – trans isomers generally contain double bonded carbon atoms.

335 (b)

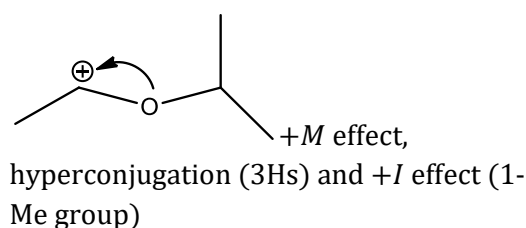
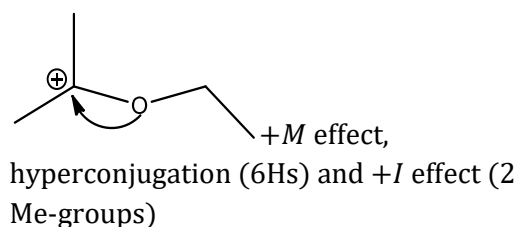
Due to the presence of lone pair on N atom.

336 (c)

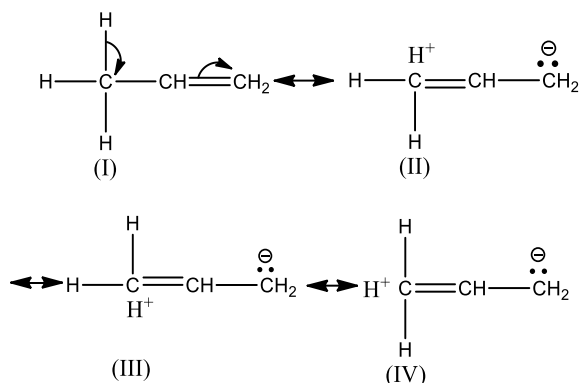
A molecule having doubly bonded carbon atoms shows geometrical isomerism only if both the doubly bonded carbon have altogether different group, i. e., baC ≡ Cab or abC = Cac or dcC = Cab.

337 (d)

I > III > II > IV

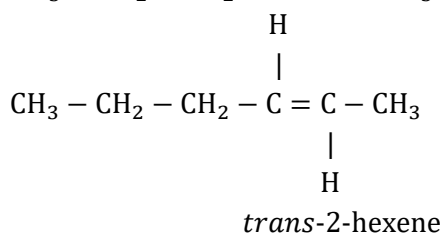
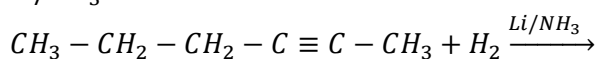


known as hyperconjugation.



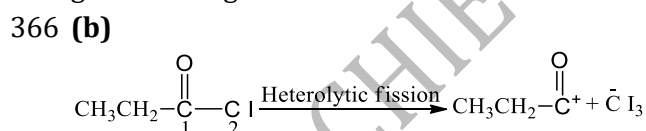
362 (c) sp^3 -hybridization with one position occupied by lone pair like NH_3 .

364 (a) 2-hexyne gives *trans*-2-hexene on treatment Li/NH_3

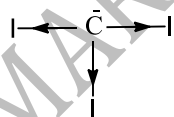


365 (b) Lassaigne's test is given by those nitrogenous compounds in which carbon is also present along with nitrogen.

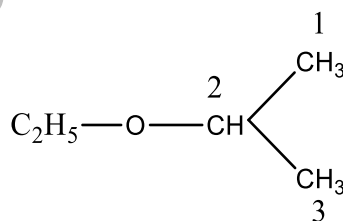
In $\text{NH}_2 \cdot \text{NH}_2 \cdot \text{HCl}$, carbon is absent, so it does not give Lassaigne's test.



$\bar{\text{C}}\text{I}_3$ is most stable carbanion because of $-I$ effect of I which disperses negative charge on $\bar{\text{C}}$. Center



367 (d)



2-ethoxy propane

The above compound is an ether and its name is

written as alkoxy alkane. Oxy is attached with the lower group. Hence, the IUPAC name of above compound is 2-ethoxy propane.

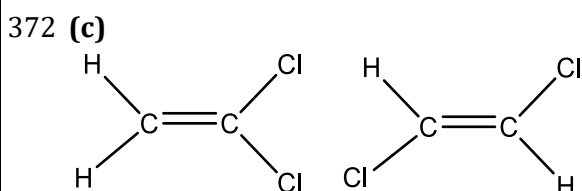
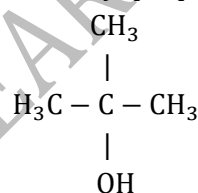
368 (b) In thin layer chromatography the relative adsorption of each component of the mixture is expressed in terms of retention factor (R_f)

$$R_f = \frac{\text{distance moved by the spot centre from base line}}{\text{distance moved by the solvent from the base line}}$$

369 (c) $(\text{CH}_3)_3\text{CBr} + \text{H}_2\text{O} \rightarrow (\text{CH}_3)_3\text{C} - \text{OH} + \text{HBr}$
 Br is substituted by $-\text{OH}^-$ (nucleophile)
 S_N1 (unimolecular nucleophilic substitution reaction)

370 (c) $\text{C}_6\text{H}_5\overset{+}{\text{C}}\text{HC}_6\text{H}_5$ is the most stable since the $+ve$ charge can be delocalized on both phenyl rings

371 (a) 2-methyl propane-2-ol is *tert*-butyl alcohol.



Since, in the above structures, position of Cl is different, these are position isomers, which is a type of structural isomerism.

374 (b) More directionally concentrated orbitals show more overlapping. Also more closer are shells to the nucleus more is overlapping.

375 (b) Removal of H from ketone gives resonance stabilized carbanion.

376 (d) $\text{CH}_3\text{CH}_2\text{X} \rightarrow \text{CH}_2 = \text{CH}_2 (sp^3 \text{ to } sp^2)$;
 $\text{CH}_2 = \text{CHX} \rightarrow \text{CH} \equiv \text{CH} (sp^2 \text{ to } sp)$;
 $\text{CH}_2\text{XCH}_2\text{CH}_2\text{X} \rightarrow \Delta$ (No change).

377 (b) Follow IUPAC rules.

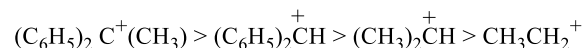
378 (c) It is a fact.

379 (d)

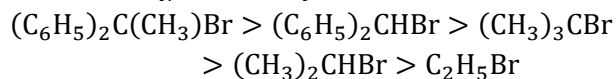
S_N1 (Unimolecular nucleophilic substitution reactions)

Rate \propto (substrate)

Rate determining step in the formation of carbocation depends on the stability of carbocation formed. The stability of carbocations follow the order

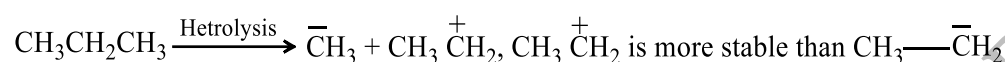


\therefore Order of S_N1 reactivity is



i. e., iii > ii > i > iv > v

380 (c)

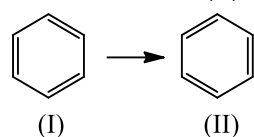


due to dispersal of +ve charge on ethylium ion on account of +ve inductive effect. Thus,

propane will not give $\overset{+}{C}H_3$ and $CH_3\overset{-}{C}H_2$.

381 (d)

Delocalised electrons are present in benzene, 1, 3-butadiene and 1,3,5-hexatriene



382 (a)

A characteristic of *dextrorotatory*.

383 (c)

It is a fact.

384 (c)

If a liquid decomposes at or below its boiling point, it is purified by vacuum distillation, impure glycerine is purified by this method

386 (a)

Distillation process is not used for purification of solid impurities. It is used for the purification of liquids which boils without decomposition and contains non-volatile impurities.

387 (b)

sp^3 , sp^2 and sp

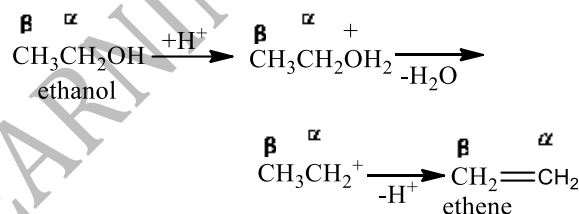
— orbitals are at $109^\circ 28'$, 120° and 180° .

388 (b)

$2^\circ H$ is more reactive than 1° .

389 (b)

Dehydration of alcohol involves the loss of two atoms or groups from the adjacent carbon atoms, hence it is an example of β -elimination reaction.



391 (d)

(i) Enantiomers are pair of optical isomers which are related as non-superimposable mirror images of each other.

(ii) Diastereomers are pair of optical isomers which cannot be related as non-superimposable mirror images of each other.

\therefore The only correct statement about given structures is that (A) and (B) are enantiomers.

392 (a)

Two positive charges present at the adjacent place, elevates the energy, thus lowers the stability most.

393 (d)

Due to H-bonding.

394 (a)

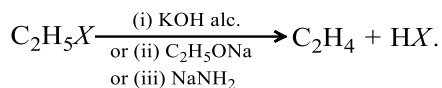
Follow inductive effect.

395 (b)

Naphthalene and benzoic acid cannot be separated by the sublimation method because the naphthalene and benzoic acid both are sublimes on heating. They are separated by hot water in which benzoic acid dissolves but naphthalene does not

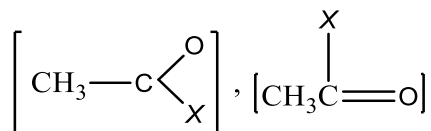
396 (d)

All are used as dehydrohalogenating agent.



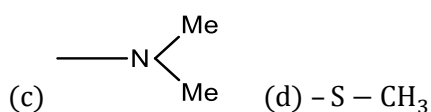
397 (c)

In the given electrophile



Group is the same. So, only X affects their activity, i.e., we have to discuss activity due to

(a) $-\text{OCH}_3$ (b) $-\text{Cl}$



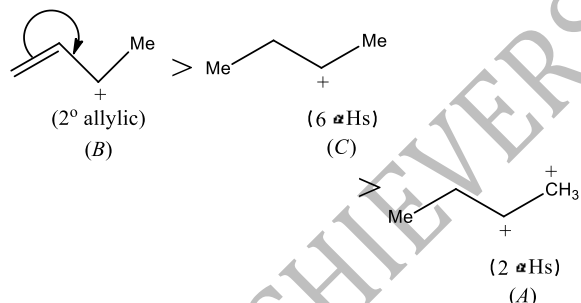
Since, amines are less active, therefore, electrophile (c) will be least active.

398 (c)

The positions of Cl are different.

399 (a)

Higher the stability of carbocation, faster is the reaction because $\text{S}_{\text{N}}1$ reactions involve the formation of carbocation intermediate.



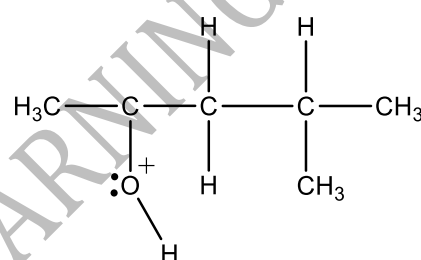
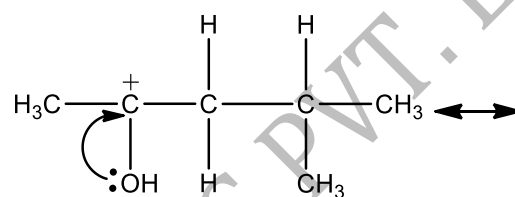
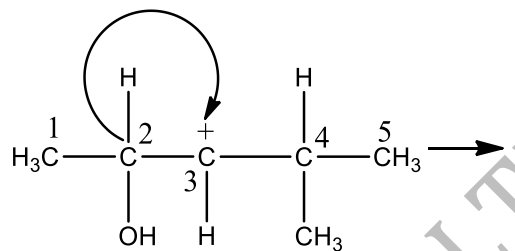
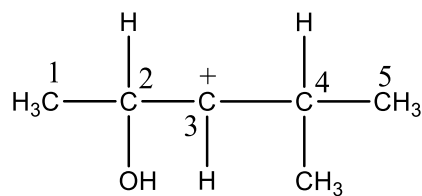
400 (b)

Both Wolff-Kishner and Clemmensen reduction are used to convert >CO to >CH_2 .

The later is not suitable as it will also attack $-\text{OH}$ group of ring.

401 (d)

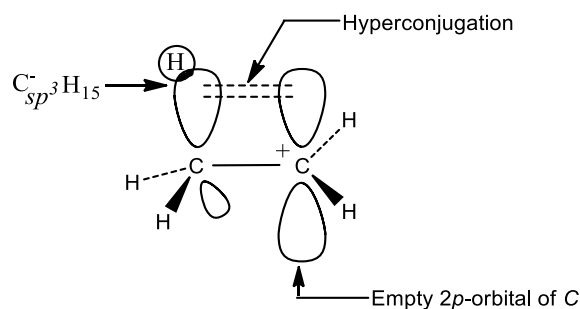
In the following carbocation; H/CH_3 that is most likely to migrate to the positively charged carbon is



(A resonance stabilised carbocation)

402 (b)

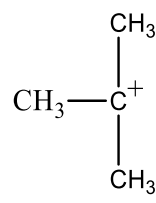
Hyperconjugation arises due to the partial overlap of a $sp^3 - s$ (a C-H bond) with the empty p -orbital of an adjacent positively charged carbon atom.



Hyperconjugation in ethyl cation

403 (c)

In the triphenyl methyl carbonium ion the π -electrons of all the three benzene rings are delocalised with the vacant p -orbital of central carbon atom. So, it is resonance stabilised. It is the most stable of all the carbonium ions given

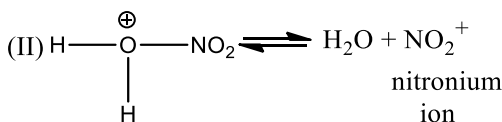
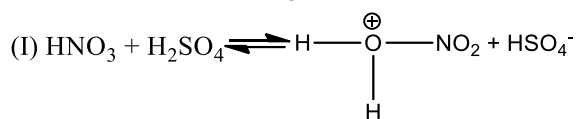


CH_3 is stabilised by hyperconjugation, a

second order resonance.

404 (c)

During nitration of benzene the attacking electrophile is NO_2^+ . It is formed as follows by reaction between HNO_3 and H_2SO_4 .

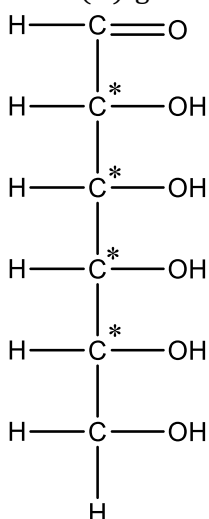


405 (b)

The R and S enantiomers of an optically active compound differ in their optical rotation of plane polarised light.

406 (a)

A carbon atom which is attached by four different group is called chiral centre of asymmetric carbon atom. (+)-glucose has four chiral centres.



408 (b)

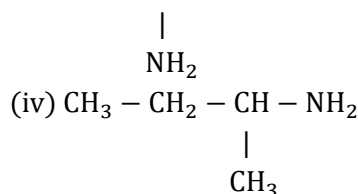
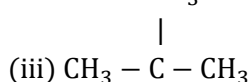
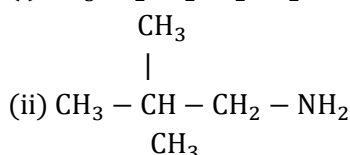
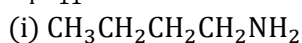
C_2H_2 has two π -bonds.

409 (b)

The various structure derived for a molecule but none of them truly represents all the properties of that molecule are said to be canonical forms and the molecule is said to show resonance.

410 (d)

The possible primary amine with the formula $C_4H_{11}N$ are



411 (c)

Stereoisomerism is of two types-optical and geometrical.

412 (a)

Catenation is the tendency to unite atoms of an element to form a long carbon chain or ring.

414 (b)

Electron withdrawing group has $-I$ effect while electron donating group has $+I$ effect.

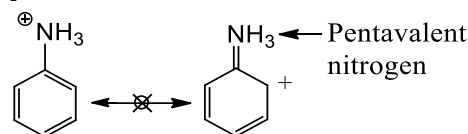
In CH_3COOH , the alkyl group ($-CH_3$) due to its greater $+I$ effect increases the electron density on oxygen atom of the O-H bond. Due to this the release of H^+ ion in acetic acid will be more difficult as compared to formic acid.

415 (b)

It is a fact.

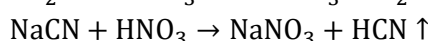
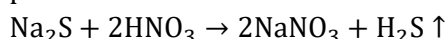
416 (b)

If positive charge is present on nitrogen then positive charge will not be in conjugation to the ring because in this case nitrogen will become pentavalent



418 (c)

HNO_3 is added to decompose Na_2S and $NaCN$ if present



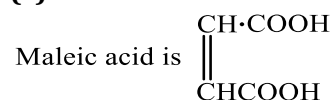
419 (c)

It is a fact.

420 (c)

The definition of electromeric effect.

421 (c)

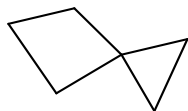


It has no asymmetric carbon, however it shows geometrical isomerism.

422 (a)

Substitution of $-OH$ group from a substrate can be easily made by PCl_5 .

423 (c)

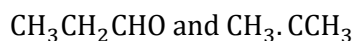


Chair form is unsymmetrical due to absence of any element of symmetry.

424 (a)

When two compounds have similar molecular formula but differ in the functional group then the isomerism is called functional group isomerism

i.e.,



426 (d)

Count σ -and π -bonds on each carbon and report hybridization.

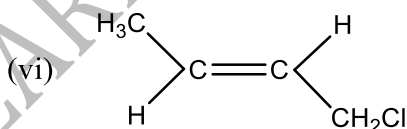
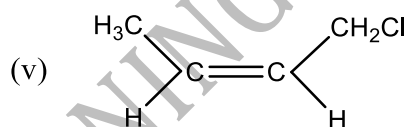
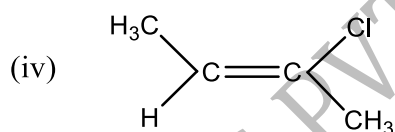
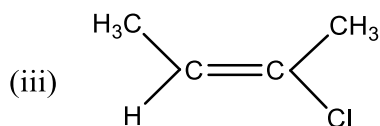
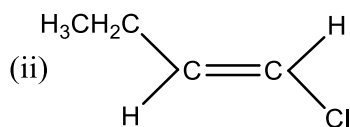
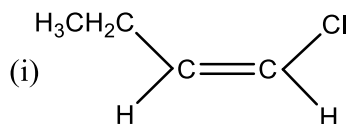
427 (d)

Carbonyl compounds show nucleophilic addition.

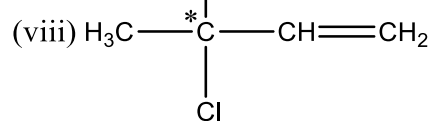
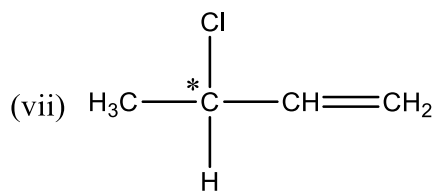
428 (a)

Twelve in all

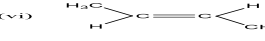
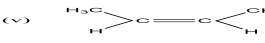
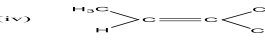
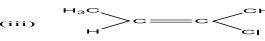
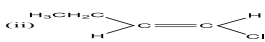
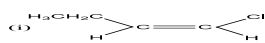
(a) Six geometrical isomers



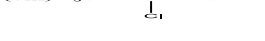
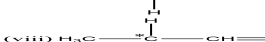
(b) Two optical isomers



(c)



(b) Two optical isomers



429 (c)

Ortho and *para*- nitrophenol is separated by

distillation because *p*-nitrophenol has higher boiling point than *o*-nitrophenol due to H-bonding.

430 (b)

Electromeric effect implies complete transfer of π electrons in presence of a reagent. Since, simple ethers do not contain a multiple bond, therefore, they do not show electromeric effect

431 (b)

It is definition of electromeric effect.

432 (a)

Mass of silver salt = 0.4 g

Mass of silver = 0.26 g

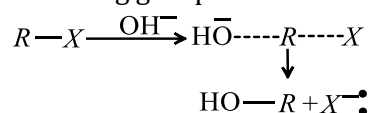
Eq. mass of silver salt / Eq. mass of Ag = $\frac{\text{wt. of silver salt}}{\text{wt. of silver}}$

Eq. mass of silver salt = $\frac{108 \times 0.4}{0.26} = 166$

Eq. mass of acid = 166 - 108 = 58

433 (a)

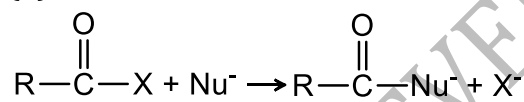
The S_N2 mechanism always involves 100% inversion since nucleophile attacks from back side of leaving group.



434 (a)

Follow IUPAC rules.

435 (d)



Best leaving group (poorest nucleophile) is Cl^\ominus , thus fastest reaction is with Cl.

436 (c)

Note that propyl (propan-1-ol) and isopropyl alcohol (propan-2-ol) are position isomers.

437 (d)

Empirical formula of acid = CH_2O_2

We know that molecular formula = n (empirical formula)

If $n = 1$ molecular formula = $(CH_2O_2)_1 = CH_2O_2$

If $n = 2$ molecular formula = $(CH_2O_2)_2 = C_2H_4O_4$

If $n = 3$ molecular formula = $(CH_2O_2)_3 = C_3H_6O_6$

Thus, the probable molecular formula = CH_2O_2

438 (c)

Excited state of carbon is $2s^1 2p^3$.

439 (a)

$C = 10.5 \text{ g} = \frac{10.5}{12} \text{ mol} = 0.87 \text{ mol}$

$H = 1 \text{ g} = \frac{1}{1} \text{ mol} = 1 \text{ mol}$

$\therefore (C_{0.87}H_1)_7 = C_{6.09}H_7 \approx C_6H_7$

$$pV = nRT = \frac{w}{m}RT$$

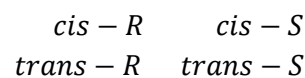
$$1 \times 1 = \frac{2.4}{m} \times 0.082 \times 400$$

$$m = 79$$

Hence, the hydrocarbon is C_6H_7

440 (c)

There are four stereoisomers



441 (c)

IUPAC name is *N*-methyl methanamine.

442 (d)

Oil and water are immiscible liquids thus are separated by using separating funnel

443 (a)

Can be solved on the basis of hyperconjugative structures

444 (d)

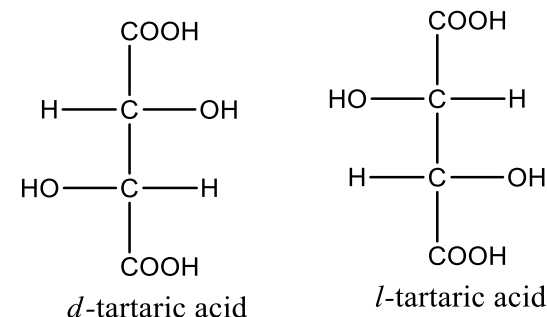
Total number of optical isomers = $(2)^n$

(where n = number of asymmetric carbon atom).

$$= (2)^2 = 4$$

Out of these four optical isomers two are *meso* structures which are optically inactive.

\therefore Only two structures *d* and *l*-tartaric acid are optically active.



446 (d)

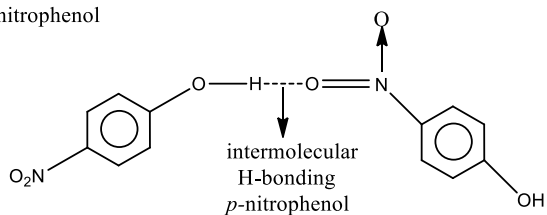
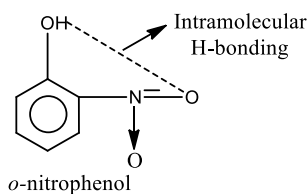
Three coordinate bond on O atom.

447 (c)

Furan is heterocyclic and aromatic due to Huckel's rule of aromaticity, *i. e.*, 6π -electrons.

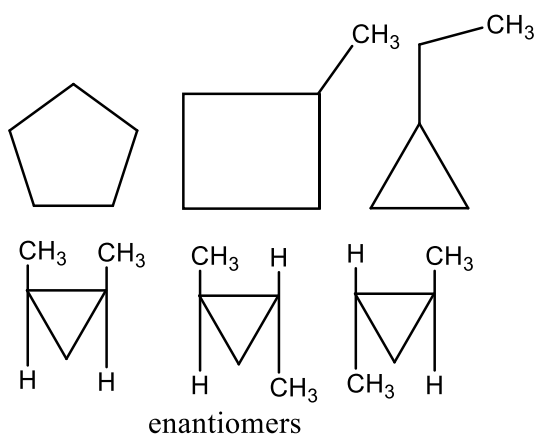
448 (d)

In mixture of *o*-nitrophenol, *p*-nitrophenol, *o*-nitrophenol is steam volatile due to intra molecular hydrogen bonding whereas *p*-nitrophenol is less volatile due to inter molecular hydrogen bonding.



449 (c)

The total number of cyclic isomers are six as shown below.



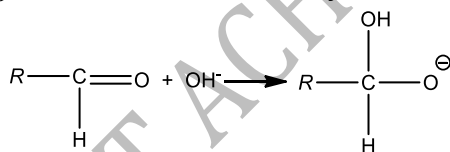
451 (d)

Electromeric effect involves complete transfer of π -electron pair to more electronegative atom on the need of attacking reagent.

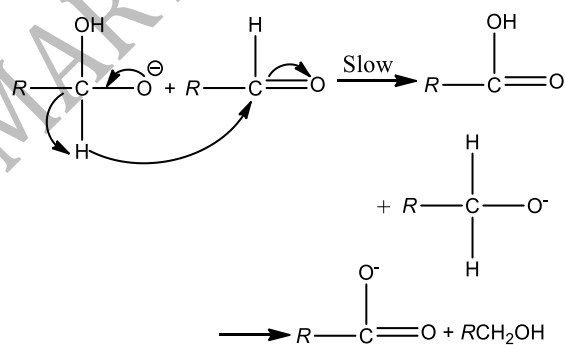
452 (c)

Cannizzaro reaction involves oxidation as well as reduction of aldehydes having lack of $\alpha - H$ atom. The mechanism of this reaction is as

(I) Attack of OH^- on carbonyl carbon



(ii) Transfer of hydride ion



(II) Transfer of hydride ion

453 (d)

$$C : H : Br = \frac{2.27}{12} : \frac{5.69}{1} : \frac{65.04}{80}$$

$$= 2.43 : 5.69 : 0.813$$

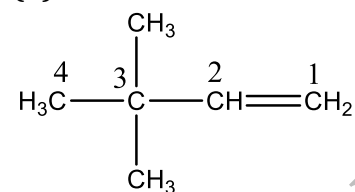
$$= 3 : 7 : 1$$

or empirical formula = C_3H_7Br

454 (b)

The terminal 'e' of ene is retained if suffix name starts with consonant.

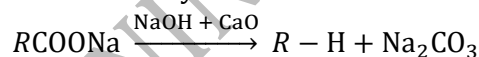
455 (d)



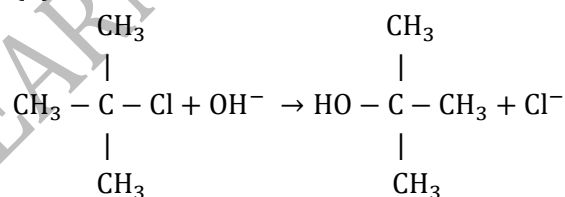
IUPAC name = 3,3-dimethyl-1-butene.

456 (b)

CaO is added to NaOH to retard activity of NaOH, otherwise decarboxylation of acids will occur more violently.



457 (b)

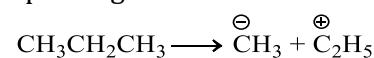


Rate \propto [t-butyl chloride]

Tertiary butyl carbocation is first formed which is more stable

458 (c)

In heterolysis, the covalent bond is broken in such a way that one species (less electronegative) is deprived of its own electron, while the other species gain both the electrons



459 (c)

Both have different functional groups, i.e., $-CN$ and $-NC$.

460 (b)

A mixture of 50-50% of *d* and its *l* form is called racemic mixture.

461 (d)

Sublimation is the process employed for those solids which convert directly into vapours on heating without converting into liquid phase

462 (c)

It is the definition of optical activity.

463 (a)

Stability of alkyl carbanion \propto

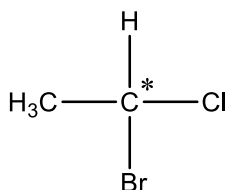
1
 $\xrightarrow{\text{magnitude of negative charge}}$ and magnitude of negative charge $\propto +I$ power of the group. Hence, acetylenic carbanion is more stable than vinylic carbanion which is more stable than alkyl carbanion

465 (b)

Follow IUPAC rules.

466 (b)

A carbon atom which is attached by four different groups is called an asymmetric carbon atom or chiral centre.



468 (a)

A carboxylic acid is stronger acid than phenol, hence both III and IV are stronger acids than both I and II. Also IV has a methyl group that gives electrons donating inductive effect and decreases the acid strength. Therefore, III is stronger acid than IV. Between I and II, the dominate electron withdrawing inductive effect of chlorine increases acid strength of phenol slightly, hence II is stronger of phenol slightly, hence, II is stronger acid than I.

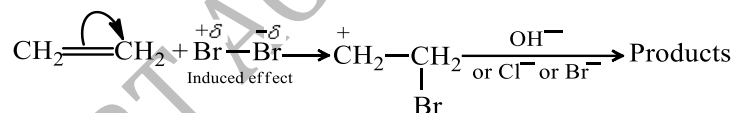
Thus, the overall order is: (a) III>IV>II>I.

469 (a)

All neutral covalent compound in which central atom has incomplete octet are electrophile. For

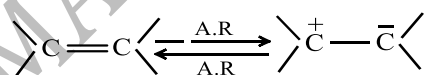
474 (d)

Once the carbocation is formed as an intermediate, the nucleophile Cl^- and OH^- present in solution also attach it in addition of Br^- .



475 (a)

It is arised on the need of attacking reagent, e. g.,



478 (b)

An organic reaction intermediate, neutral species having divalent carbon atom with six valence electron out of which two are present in same orbital with opposite spin is called singlet carbene.

479 (a)

Nitration or aromatic compounds takes place by an electrophile. The electrophile will be more

example $\text{BeCl}_2, \text{BH}_3, \text{ZnCl}_2, \text{AlCl}_3$

470 (d)

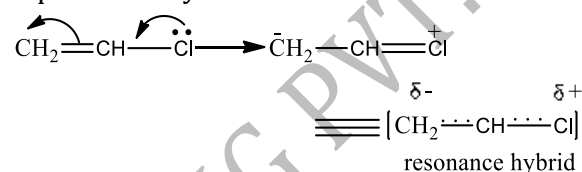
Planar hexagon conformer has considerable angle strain due to the fact that its bonds are not 109.5° . It also has torsional strain. Due to presence of these strains planar hexagon conformer of cyclohexane is least stable.

471 (a)

Both have same molecular formula.

472 (a)

Due to resonance partial double bond character is created on vinyl chloride. So, chlorine atom is not replaced easily



473 (a)

Glycerol is a trihydric alcohol. It is $\text{CH}_2\text{OH}-\text{CHOH}-\text{CH}_2\text{OH}$. It contains three hydroxyl group. It is present in nature in oils and fats as its carboxylic esters.

attracted towards electron rich position in benzene ring. Hence, electron donating groups will be easily nitrated.

Toluene will be most easily nitrated among these compounds due to presence of electron donating group (i. e., CH_3).

Nitrobenzene will be most slowly nitrated due to the presence of electron withdrawing group (i. e., NO_2).

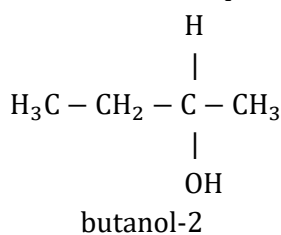
CH_3NO_2 will be formed by free radical substitution of CH_4

480 (b)

Optical isomerism is shown by an asymmetric

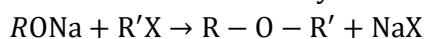
carbon atom which has a carbon atom attached to four different atoms or groups.

So, butanol-2 is optically active.



481 (c)

When sodium or potassium alkoxide is heated with an alkyl halide to give ether, this reaction is known as Williamson's synthesis.



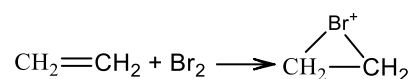
This is an example of nucleophilic substitution and follow $\text{S}_{\text{N}}2$ mechanism.

482 (d)

These are characteristics of free radicals.

483 (a)

Addition of Br_2 on ethane follow electrophilic addition



Intermediate is cyclic bromonium ion

484 (d)

Metamers of ethyl propionate are as $\text{CH}_3\text{COOC}_3\text{H}_7$, $\text{C}_3\text{H}_7\text{COOCH}_3$

485 (c)

Each carbon has two σ -and two π -bonds.

486 (b)

It should be 4-ethyl-3-methyl heptane.

487 (c)

Due to asymmetric carbon atom in it.

488 (b)



This reaction is governed by Saytzeff's rule.

According to this rule the elimination of β -hydrogen atom take place from the carbon having the lesser number of H-atoms or in other words a stable alkene is formed. (More substituted alkene is more stable)

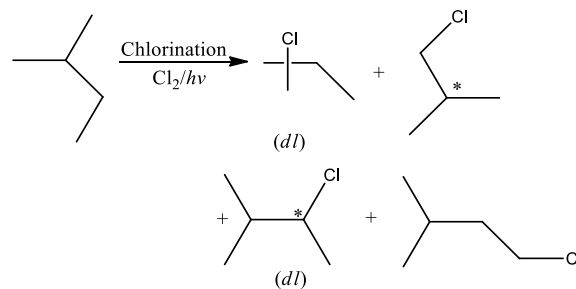
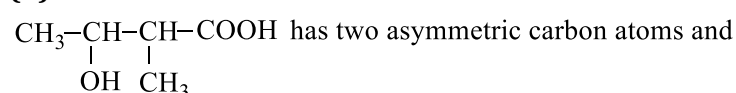
489 (a)

Due to same functional group.

490 (a)

On chlorination of 2-methyl butane

496 (d)



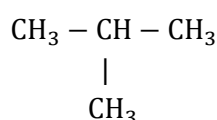
2-chiral compound are formed.

491 (d)

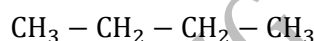
Due to the presence of asymmetric carbon atom.

492 (c)

Two isomers



iso-butane



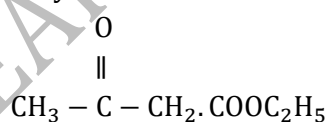
n-butane

493 (c)

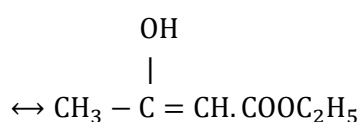
-do-

494 (d)

Ethyl acetoacetate shows tautomerism.



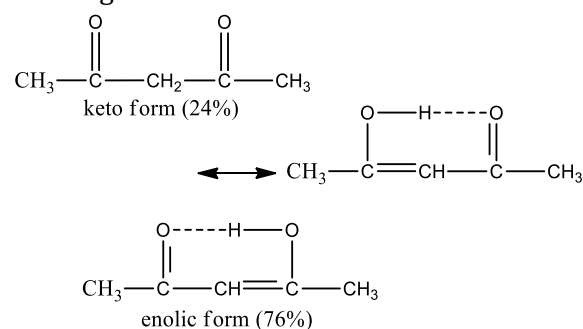
Keto form



enol form

495 (d)

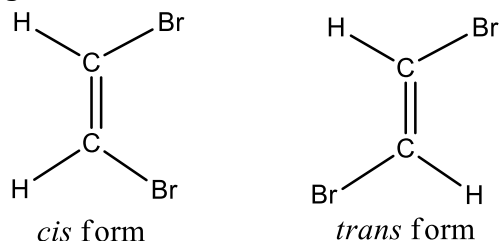
The amount of enolic form is highest in acetyl due to the stabilisation of enolic form by hydrogen bonding



molecule has no symmetry. Thus, number of optical isomers = $2^n = 2^2 = 4$.

497 (c)

Due to restricted rotation about double bond, the alkene shows geometrical isomerism because the relative position of atoms or groups attached to the carbon atoms of the double bond get fixed. If same groups or atoms attached with double bond bearing carbon, then alkene doesn't show geometrical isomerism.



498 (a)

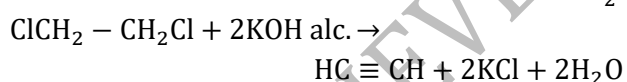
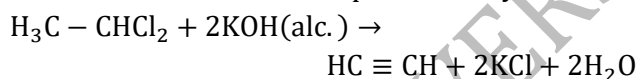
Due to +I effect of CH_3 in toluene, it is more reactive than benzene. Due to electron withdrawing nature of $-\text{COOH}$ group in benzoic acid and $-\text{NO}_2$ group in nitrobenzene, both benzoic acid and nitrobenzene are less reactive than benzene.

499 (b)

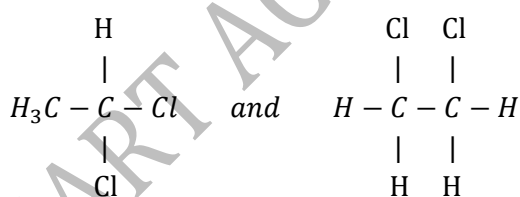
These are isopentane, neopentane and *n*-pentane.

500 (d)

(a) Ethylene dichloride and ethylidene chloride both react with alc. KOH to produce ethyne.



(b) They are position isomers because they have same molecular formula but different position of chlorine atom.

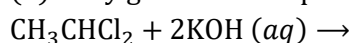


ethylidene dichloride ethylene dichloride

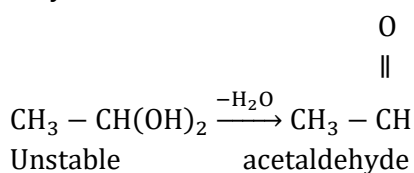
(c) \therefore Their molecular formula is same

\therefore They have same percentage of chlorine.

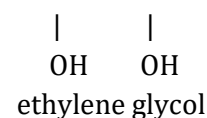
(d) They give different product on hydrolysis



ethylenedichloride

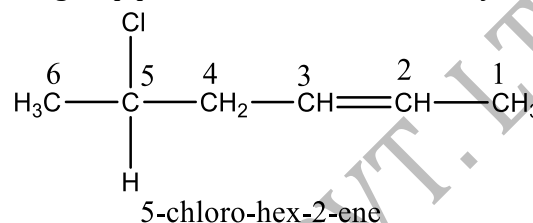


ethylene dichloride

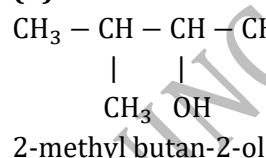


501 (a)

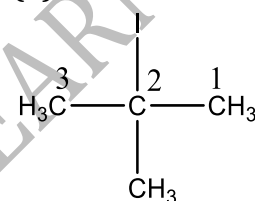
First the longest continuous chain of carbon atoms is selected. Now numbered the chain from the side containing senior functional group (*i. e.*, the group placed above in the seniority table).



502 (d)



503 (d)

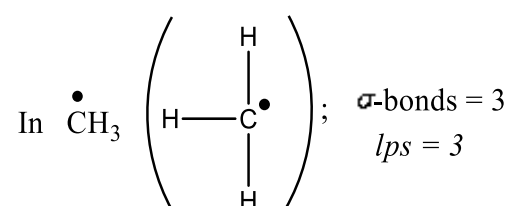


t-butyl iodide

Its IUPAC name is 2-iodo-2-methyl propane.

504 (b)

Number of hybrid orbitals = number of σ -bonds + number of *lps*



\therefore Number of hybrid orbitals = 3 + 0 = 3

Hence, hybridisation is sp^2 and geometry is planar.

506 (b)

Follow the concept of hyperconjugation.

507 (c)

On the basis of stability of carbocation formed.

508 (a)

ϕ is phenyl group, the question can be solved on the basis of number of conjugative structures

509 (a)

S_N2 order : methyl $>$ $1^\circ >$ $2^\circ >$ 3° .

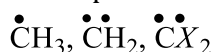
510 (c)

Activating groups like $-OCH_3$, $-OH$ etc activates the benzene ring towards electrophilic substitution while deactivating groups like $-NO_2$, $-COOH$ etc. deactivates the benzene ring towards electrophilic substitution. Thus, order of reaction towards electrophile (of the given compounds) is as

I > II > III.

511 (a)

Electron deficient species or electron acceptor is electrophile. For example



513 (b)

As the min mol wt. must have at least one S-atom so

$$S\% = \frac{\text{wt. of one S-atom}}{\text{min. mol. wt}} \times 100$$

$$4 = \frac{32}{\text{min mol. wt}} \times 100$$

$$\text{Min mol wt.} = \frac{32 \times 100}{4} = 800$$

514 (b)

A carbonium ion is sp^2 -hybridized.

515 (a)

It is a fact.

517 (c)

Ortho and *para* directing groups facilitate the ring for electrophilic substitution reaction. $-NH_2$ group increase electron density in ring, hence activate it is to electrophilic substitution.

518 (d)

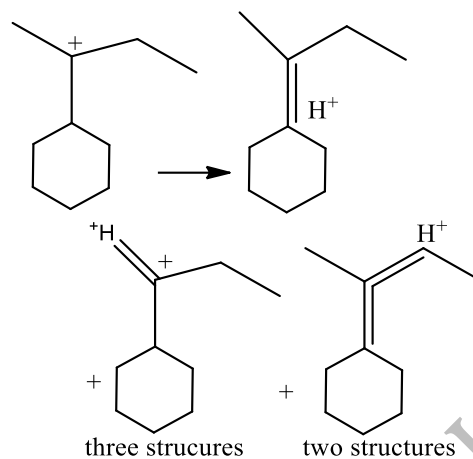
n-pentanol, 2-pentanol, 3-pentanol, 2-methylbutanol, 2-methylbutan-2-ol, 3-methylbutanol, 2, 2-dimethylpropanol, and 3-methylbutan-2-ol (8 isomers)

519 (a)

Substances which sublimes on heating is usually purified by sublimation. Hence, naphthalene is purified by sublimation.

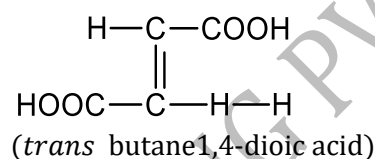
520 (d)

There are total $6\alpha - H$ to sp^2 carbon and they all can participate in hyperconjugation.



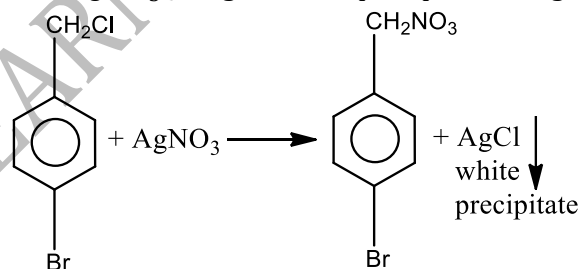
521 (d)

The structural formula of fumaric acid is



523 (b)

A chloride linked with alkyl group is replaced with $AgNO_3$ and give white precipitate of $AgCl$.



524 (c)

Br is replaced by $-OH$.

525 (c)

Free radicals are represented by putting dot on entity.

527 (d)

Kjeldahl and Duma's methods are used for the quantitative estimation of nitrogen in an organic compound. In the Kjeldahl method, the nitrogen element of organic compound is changed to the ammonia.

528 (d)

Lesser is bond energy of $2p - 2p$ overlapping in $C-C$, more is its reactivity than $C-H$ bond showing $2p-1s$ overlapping.

529 (a)

Carbon atom in singlet carbene is sp^2 -hybridized.

531 (b)

$C_6H_5CH_2^+$ is stabilized by conjugation while intermediates of rest of the compounds given are stabilized by hyperconjugation

532 (a)

$CH_3CH_2CH_2CH_2CH_3$ is *n*-pentane.

533 (b)

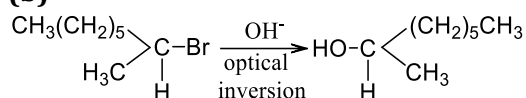
Resonance in benzene gives rise to identical C—C bond lengths.

534 (a)

During nitration benzene ring is attacked by NO_2^+ and hydrogen of benzene ring is replaced by NO_2 group.

\therefore Nitration of benzene is electrophilic substitution because NO_2^+ is an electrophile.

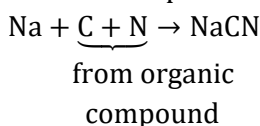
535 (b)



In this reaction inversion takes place. Hence, it is an example of $\text{S}_{\text{N}}2$ reaction. In this mechanism the attack of OH^- ions take place from the back side while the Br^- ion leaves from the front side

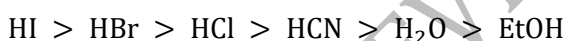
536 (b)

Organic compound containing nitrogen is fused with a small piece of sodium metal to form NaCN.



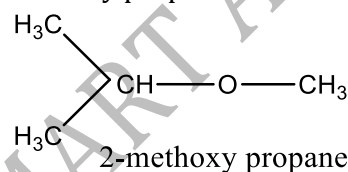
537 (d)

The order of nucleophilicity depends upon the nature of alkyl group 'R' on which a nucleophile to attack as well as on nature of solvent. However, if these are same, then weaker is acid, stronger is base, *i.e.*, stronger is nucleophilicity. This acidic character is.



540 (d)

Only two unsymmetrical ether is possible from the formula $\text{C}_4\text{H}_{10}\text{O}$ viz
 $\text{CH}_3\text{CH}_2\text{CH}_2 - \text{O} - \text{CH}_3$
methoxy propane



541 (c)

$\text{S}_{\text{N}}1$ mechanism gives rise to 50% inversion as it involves front seat as well as back seat substitution. This leads to racemic products.

542 (c)

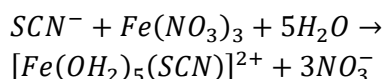
Canonical structures proposed in resonance are not the real structure of compound. The compound showing resonance has a definite structure which can however be not drawn on paper.

543 (d)

All the names are correct. Options (d) is IUPAC name.

544 (b)

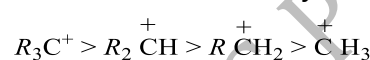
On adding SCN^- to an aqueous solution of $\text{Fe}(\text{NO}_3)_3$, a blood red colour, due to formation of $[\text{Fe}(\text{H}_2\text{O})_5(\text{SCN})]^{2+}$ complex is obtained. This test is used for the detection of Fe^{3+} ion.



Blood red colour

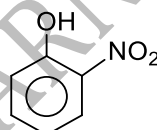
545 (d)

In case of alkyl carbocations as the number of R group decreases stability decreases. Thus, the correct order of stability of carbocation is



546 (b)

Ortho nitrophenol is the most acidic because electron withdrawing group increases acidic character due to $-I$ effect of NO_2



o - nitrophenol

548 (a)

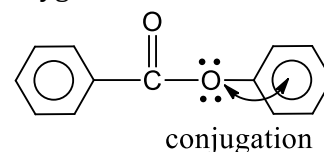
$\text{CCl}_2 = \text{CCl}_2$ has ethene like structure (*i.e.*, sp^2 -hybridization); CCl_4 has CH_4 like structure, *i.e.*, sp^3 -hybridization.

549 (b)

$\text{C}_6\text{H}_5\text{C} \equiv \text{N}$ and $\text{C}_6\text{H}_5\text{N} \equiv \text{C}$ are functional isomers.

551 (c)

Second ring is in conjugation with lone pair of oxygen



conjugation

552 (d)

$$\begin{aligned} \% \text{ of N} &= \frac{28}{22400} \times \frac{\text{volume of N}_2 \text{ at NTP}}{\text{wt. of compound}} \times 100 \\ &= \frac{28}{22400} \times \frac{224}{1.18} \times 100 \\ &= \frac{28}{1.18} = 23.728 \end{aligned}$$

553 (d)

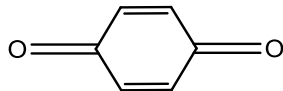
In (II) and (IV) lone pair is involved in resonance.

554 (d)

A primary carbon is one which is joined to 1 carbon atom. A secondary carbon atom is joined to two carbon atoms and the tertiary carbon is

attached to three carbon atoms. A quaternary carbon has all its four valencies attached to carbon atoms.

- 555 (a) The compounds which contain active methylene group at the adjacent position of carboxyl group show tautomerism.

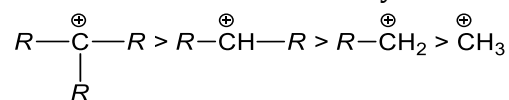


This compound does not contain active methylene group, hence does not exhibit tautomerism. Moreover, this compound is highly stable due to extensive cross-conjugation.

- 557 (b) $\text{CH}_3\text{CH}_2\text{OH}$ and CH_3OCH_3 have different functional groups. (ie., -OH in a alcohol and -O- in ether), hence they are the example of functional isomerism.

- 558 (a) Two pairs of *cis* and *trans* forms.

- 559 (b) Stability of alkyl carbocations can be explained by inductive effect and hyperconjugation. According to these two effects the stability order is



- 560 (d) In the given compound four π - electrons of double bond and 1 lone pair on N atom leads to delocalization of six electrons.

- 562 (a) Due to resonance, extra stability in 3° carbocation.

- 564 (b) Follow IUPAC rules.

- 565 (b) Na reacts with water less violently than K and Rb.

- 566 (a) $\text{Na}_2\text{S} + \text{Na}_2[\text{Fe}(\text{CN})_5\text{NO}] \rightarrow \text{Na}_4[\text{Fe}(\text{CN})_5\text{NOS}]$
Sod. extract pink/violet colour

- 567 (b) Heterolytic bond fission produces +ve and -ve ions.

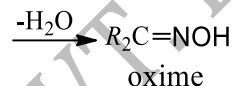
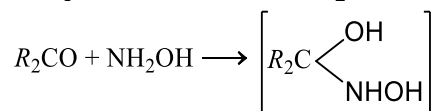
- 568 (b) Racemic mixture is formed by mixing two chiral compounds.

- 569 (c) Distillation is applied if organic liquid is stable at its boiling point and contains a non-volatile impurity.

- 570 (b) Two double bonds are treated as different functional groups with a triple bond.

- 571 (b) Follow priority rule.

- 572 (c) Aldehydes and ketones combine with a variety of compounds of the $Z - \text{NH}_2$ to form oxime.



- 573 (b) Addition of HCl is not peroxide effect and it occurs via electrophilic addition.

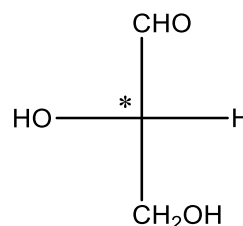
- 574 (b) $(\text{CH}_3)_3\text{C} - \text{CH}_2\text{OH}$ is *neo* -pentyl alcohol.

- 575 (d) -do-

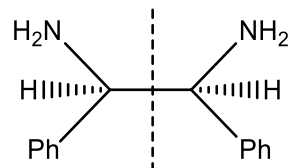
- 576 (d) A lot of plant kingdom is made up of cellulose.

- 579 (b) The different arrangement of atoms in space that results from the carbon-carbon single bond free rotation by 360° are called conformations or conformational isomers and this phenomenon is called conformational isomerism.

- 580 (a) The molecule, which is optically active, has chiral centre, is expected to rotate the plane of polarised light.



One chiral center \Rightarrow optically active



Two chiral centres, but plane of symmetry within molecule \Rightarrow optically inactive

- 583 (b) Note the fact.

- 585 (d) Alkanes do not show resonance.

586 (d)

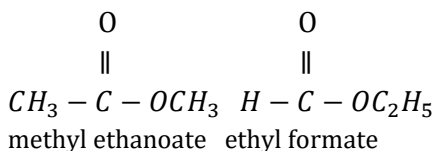
Both CHCl_3 and CCl_4 burn with smoky flame although both are aliphatic. $\text{C}_6\text{H}_5\text{CH}_2\text{OH}$, aromatic but burns with non smoky flame. These are exceptions.

587 (b)

BF_3 is an electron deficient compound.

590 (a)

Isomers of propionic acid are as



591 (c)

Heterolytic bond fission give rise to formation of ions.

592 (a)

This can be judged by comparing the stabilities of carboxylate ions formed. The most stable carboxylate ion is formed by strongest acid

593 (c)

CH_3NH_2 and CH_3OH are nucleophiles, $\text{CH}_3 - \text{Cl}$ is

an electrophile. But $\text{CH}_3 - \overset{\delta+}{\text{C}} \equiv \overset{\delta-}{\text{N}}:$ is a nucleophile due to the presence of a lone pair of electrons on N and is an electrophile due to the presence of a partial positive charge on C

594 (a)

No bond around chiral carbon is broken and so configuration will be retained.

595 (b)

Due to resonance in benzene.

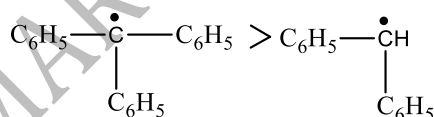
596 (c)

Kjeldahl's method is used for estimation of nitrogen

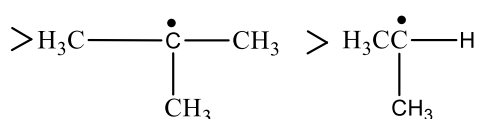
597 (a)

Free radicals stability

Free radicals stability



Highly stable by delocalisation

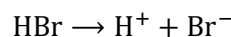


9-hyperconjugative hydrogens and +I effect

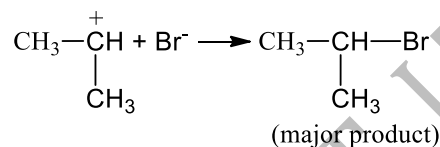
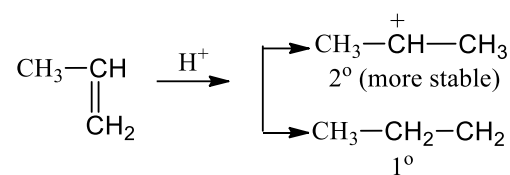
598 (b)

HBr being better source of proton. It gives a H^+

and a Br^- ion



Thus, H^+ attack the π bond of propene to form carbonium ion as



599 (c)

Follow IUPAC rules.

600 (d)

Report prefixes in alphabetic order.

601 (c)

Sulphur is present in the sodium extract in the form of sodium sulphide (Na_2S)

FeCl_3 gives blood red colour with sodium extract contain N and S

602 (a)

The name of the compound (2Z,4Z)-2,4-hexadiene.

603 (c)

It is a fact.

604 (a)

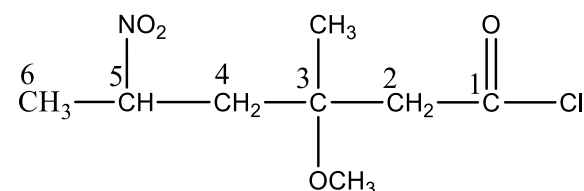
The number of stereoisomers = 2^n

(Here, n = chiral carbon atom)

Thus, number of stereoisomers = $2^3 = 8$

605 (a)

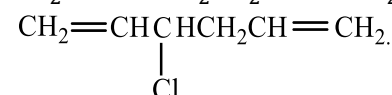
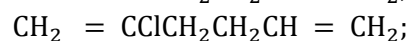
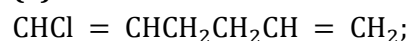
The structural formula of the compound 5-nitro-3-methoxy-3-methyl hexanoyl chloride is as



606 (d)

Presence of methyl group on NH_3 molecule increases the tendency of N atom to lose electron pair. However, tertiary amines are less basic due to steric hindrance.

607 (a)

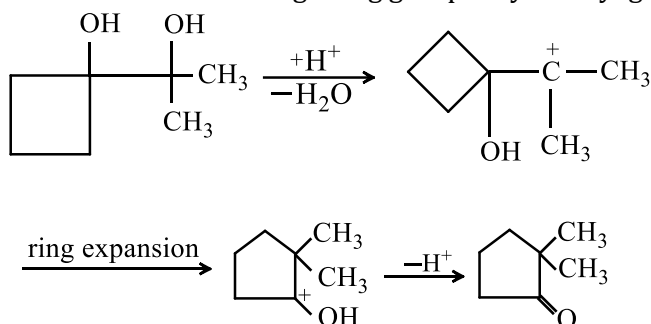


608 (c)

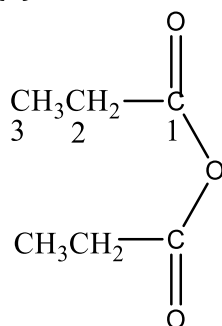
2° carbocation is more stable.

609 (b)

In such cases where migrating group is cycloalkyl group, ring expansion may occur.



610 (d)

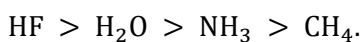


propanoic anhydride

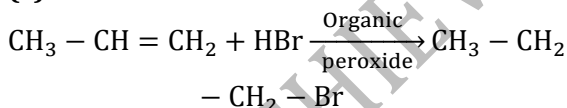
In IUPAC system, anhydrides are named as alkanonic anhydride.

611 (c)

Stronger is an acid, weaker is its conjugate base or weaker is nucleophile. The acidic character order is :



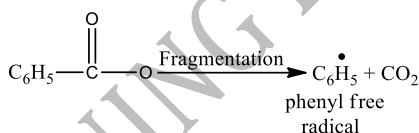
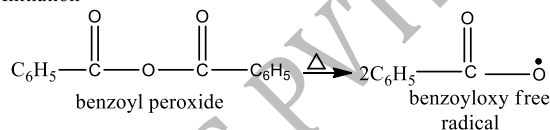
613 (c)



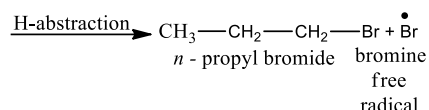
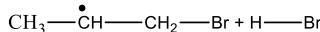
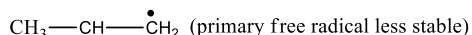
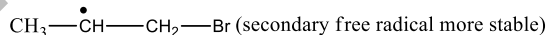
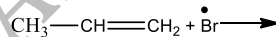
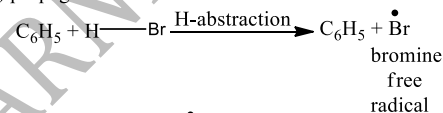
requires radical intermediate.

Mechanism

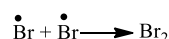
(i) Initiation



(ii) propagation



(iii) Termination



614 (a)

Chiral molecules should not contain any kind of symmetry.

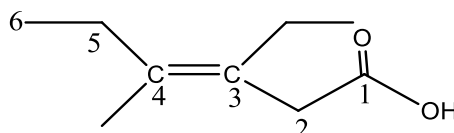
615 (d)

It is honour to Lavoisier.

616 (d)

Stability of carbanions increase with increasing in *s*-character of hybrid orbitals of carbon bearing charge therefore, the order is $sp^3 < sp^2 < sp$

617 (c)



E-3-ethyl-4-methyl hex-3-en-1-oic acid.

[The configuration of this compound is *E* because

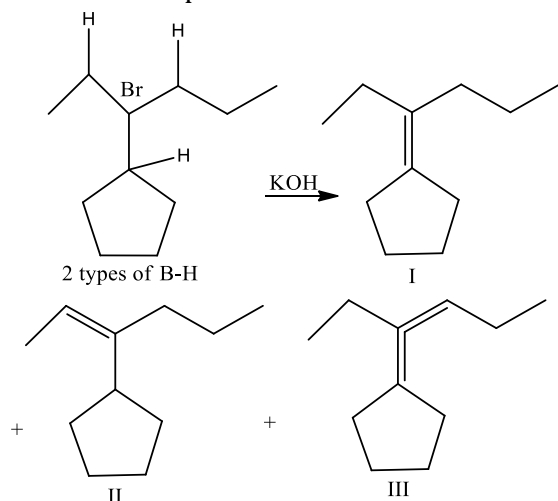
bulkier groups are present at opposite of the double bond.]

618 (a)

—do—

619 (c)

The substrate has three different types of B—H, therefore, first, three structural isomers of alkenes are expected as



The last two alkenes II and III are also capable of showing geometrical isomerism hence two geometrical isomers for each of them will be counted giving a total of five isomers.

620 (c)

CH_2Cl_2 has sp^3 -hybridization and tetrahedral nature.

621 (a)

Chain initiation step involves formation of free radicals only.

622 (d)

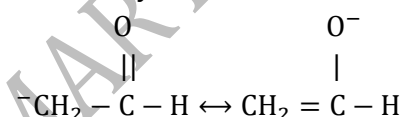
Follow characteristics of S_N2 mechanism.

623 (a)

Follow elimination of HBr from two ends.

624 (d)

$^-\text{CH}_2\text{CHO}$ is the most stable carbanion since it is stabilize by resonance



625 (b)

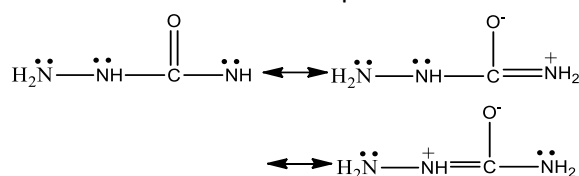
X-crown-Y, 18-crown-6

First number X is the total number of 'C' and 'O' atoms in the ring and second number Y is the number of oxygen atom in ring.

626 (b)

When the nucleophilic site is the same, nucleophilicity parallels basicity. It means more basic the nucleophile, stronger is the nucleophile.

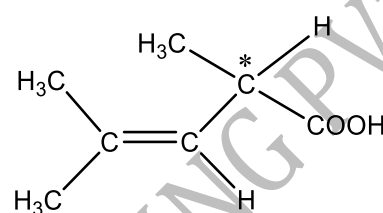
$\text{H}_2\ddot{\text{N}}^{\ominus}$ (I) is the most nucleophilic



Furthermore the NH_2 group away from the $-\text{C}-$ group is not involved in resonance. Hence, its lone pair is readily available.

627 (c)

A compound could be optically active only when it contains, at least one asymmetric carbon atom or a chiral centre.

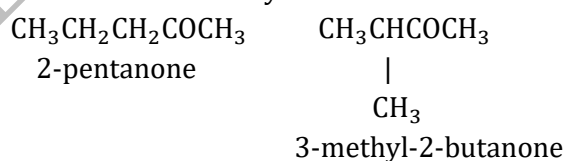


629 (d)

$$\text{C}:\text{H}:\text{Cl}:\text{O} = \frac{18.5}{12} : \frac{1.55}{1} : \frac{55.04}{35.5} : \frac{24.81}{16} = 1:1:1:1$$

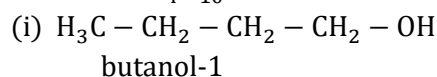
630 (b)

2-pentanone and 3-methyl-2-butanone are chain isomers because they differ in carbon skeleton.

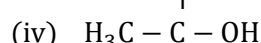
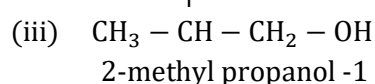


631 (c)

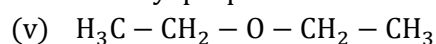
Isomers of $\text{C}_4\text{H}_{10}\text{O}$ are as follows



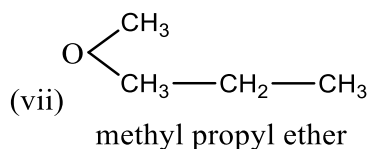
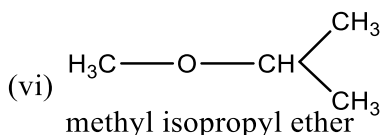
butanol-2



2-methyl propan -2-ol



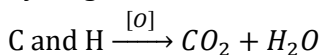
Diethyl ether



Hence, three isomeric ethers are possible.

632 (c)

Liebig's method is used to estimate carbon and hydrogen.

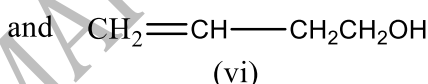
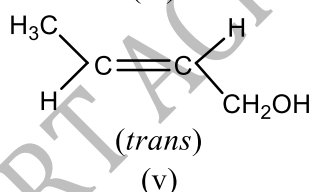
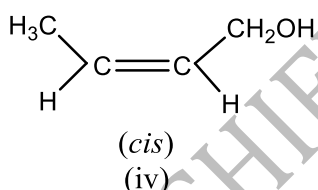
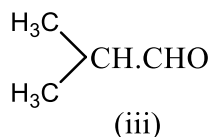
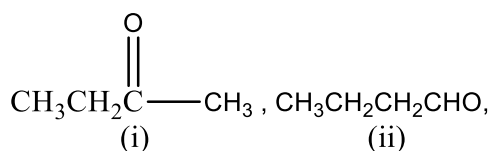


$$\% \text{C} = \frac{12}{44} \times \frac{\text{weight of CO}_2}{\text{weight of compound}} \times 100$$

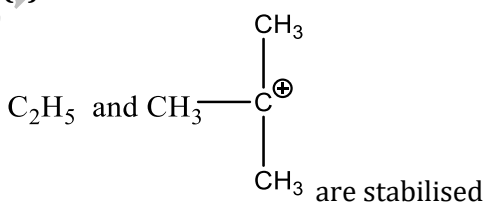
$$\% \text{H} = \frac{2}{18} \times \frac{\text{weight of H}_2\text{O}}{\text{weight of compound}} \times 100$$

633 (d)

There are six isomers possible for the compounds having molecular formula $\text{C}_4\text{H}_8\text{O}$, which are as follows



634 (c)



hyperconjugation. In $\text{C}_6\text{H}_5\text{CH}_2^+$ benzyl group is resonance stabilised. In the triphenyl methyl

carbonium ion, the π -electrons of all the three benzene rings are delocalised with the vacant p -orbital of central carbon atom. So, it is resonance stabilised. Therefore, it is most stable of the given carbonium ions.

More the number of resonant structures more will be the stability.

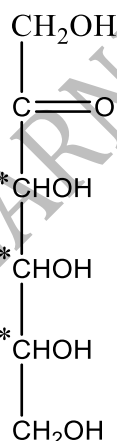
635 (d)

Chlorine atoms are strongly electro negative (show negative inductive effect i.e., $-I$ effect). They deactivate the ring towards electrophilic reaction.

The increasing order of substituent-E towards electrophilic substitution is $-\text{CCl}_3 < -\text{CHCl}_2 < -\text{CH}_2\text{Cl} < -\text{CH}_3$

636 (b)

Fructose has three chiral carbon atoms, hence the number of optical isomerism = $2^3 = 8$



637 (d)

O has two unpaired electrons in ground state.

638 (d)

An organic ion with a pair of available electrons and a negative charge on the central carbon atom is called a carbanion.

Electron attracting group ($-\text{CN}$, $>\text{C}=\text{O}$) increases stability and electron releasing group ($-\text{CH}_3$ etc) decreases the stability of carbanion. In $(\text{CH}_3)_3\text{C}^-$, three $-\text{CH}_3$ groups (electron releasing group) are present, so it least stable.

639 (d)

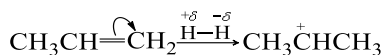
The stability order of conformation of cyclohexane is chair > twist boat > boat > half chair. Hence, half chair is less stable due to torsional and angle strain.

640 (a)

It is a fact.

642 (a)

Formation of 2° carbocation, i. e.,



643 (d)

In $\text{CH}_3\text{CH}_2\text{OH}$, there is intermolecular H-bonding, while it is absent in isomeric ether CH_3OCH_3

1. Larger heat is required to vaporise $\text{CH}_3\text{CH}_2\text{OH}$ as compared to CH_3OCH_3 , thus (a) is incorrect.
2. $\text{CH}_3\text{CH}_2\text{OH}$ is less volatile than CH_3OCH_3 , thus vapour pressures are different, thus (b) is incorrect.
3. Boiling point of $\text{CH}_3\text{CH}_2\text{OH} > \text{CH}_3\text{OCH}_3$, thus (c) is incorrect.

Density = $\frac{\text{mass}}{\text{volume}}$, due to ideal behaviour at a given temperature and pressure volume and molar mass are same.

Hence, they have same vapour density.

644 (a)

Follow IUPAC rules.

646 (b)

$$\begin{aligned} \% \text{ of chlorine} &= \frac{35.5}{143.5} \times \frac{\text{mass of AgCl}}{\text{mass of the compound}} \times 100 \\ &= \frac{35.5}{143.5} \times \frac{0.287}{0.099} \times 100 \\ &= 71.71 \% \end{aligned}$$

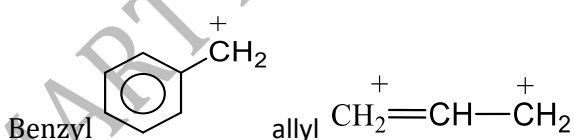
647 (c)

Due to presence of delocalised π -electrons in the aromatic compounds, the electron density is maximum inside the ring. Therefore, aromatic compounds undergo electrophilic substitution reaction and resistance to addition reactions.

648 (a)

The acidic nature is $\text{H}_2\text{O} > \text{C}_2\text{H}_2 > \text{C}_2\text{H}_4 > \text{C}_2\text{H}_6$.

649 (b)



methyl CH_3 , vinyl $\text{CH}_2=\overset{\oplus}{\text{C}}\text{H}$ given options can be solved on the basis of conjugative and hyperconjugative structures

650 (a)

Follow IUPAC rules.

652 (a)

$(\text{CH}_3)_3\text{C}-\text{C}(\text{CH}_3)_3$ has maximum number of alkyl groups in it.

653 (d)

Halogenation of methane is chain reaction, propagate through free radical

655 (a)

Follow IUPAC nomenclature.

658 (c)

\therefore C - H bond in toluene has partial double bond character due to resonance.

\therefore C - H bond in toluene has less energy as compared to others.

659 (b)

The reaction $(\text{CH}_3)_3\text{C}-\text{Br} \xrightarrow{\text{H}_2\text{O}} (\text{CH}_3)_3\text{COH}$ is an example of substitution reaction

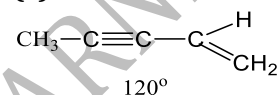
660 (b)

Draw the isomers.

661 (b)

Distillation is used to purify liquids and based on difference in their boiling points. When the boiling points of liquids are very closed to each other, then fractional distillation is used.

662 (c)



The C-atoms attached to the triple bond lie in a straight line while the carbon of the CH_2 group is inclined at an angle of 120° . Therefore, only 2 carbon atoms are linearly arranged

663 (c)

The conversion of α -glucose to β -glucose is called mutarotation.

664 (c)

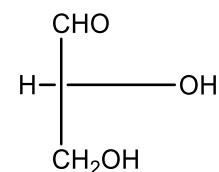
Positively charged species in which central atom has incomplete octet is called electrophile, H^+ , X^+ , R^+ are electrophile

665 (b)

An organic reaction intermediate, neutral species having divalent carbon atom with six valence electron out of which two are present in same orbital with opposite spin is called singlet carbene

666 (a)

The structure of D-glyceraldehyde is as



The priority of groups is decided by the following rules

(i) Atom having higher atomic number gets higher priority

(ii) If the priority cannot be decided by rule 1 then the next atoms are considered for priority assignment.

(ii) Where there is a = bond or = bond both atoms are considered to be duplicated or triplicated

$\begin{array}{c} \text{H} \\ | \\ \text{---C=O} \end{array}$ has higher priority than $-\text{CH}_2\text{OH}$.

Hence, the correct order of priority of groups in D-glyceraldehyde is as:

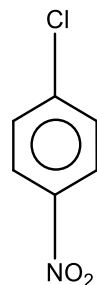
$\text{OH}(1), \text{CHO}(2), \text{CH}_2\text{OH}(3)$ and $\text{H}(4)$

668 (c)

Nucleophile always attacks on electron deficient site. Presence of electron withdrawing groups such as NO_2 , CHO etc decreases the electron density on benzene nucleus, hence such groups activate the ring towards nucleophilic attack. While presence of electron releasing groups such as R or OR increases the electron density, thus deactivates the nucleus towards nucleophilic attack.

NO_2 group activates the ring more than Cl towards nucleophilic attack,

Hence reacts readily with nucleophile.



669 (d)

The increasing order is :

$-\text{CH}_3 < \text{CH}_3 - \text{CH}_2 - < (\text{CH}_3)_2\text{CH} - < (\text{CH}_3)_3\text{C} -$

670 (a)

The treatment with FeCl_3 yield ferric ferrocyanide which has bluish green or prussian blue colouration



671 (c)

Each π -bond contributes two π electrons and the two electrons of the lone pair are present in a p -orbital. Therefore, total number of π electrons is six

672 (a)

Allyl carbocations are more stable than the alkyl carbocations due to the resonance stabilization

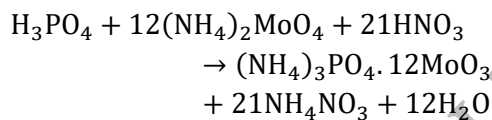
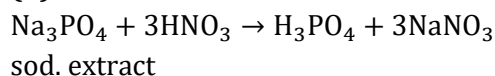
673 (b)

The middle carbon has 2σ - and 2π -bonds.

675 (c)

Di-chloro acetic acid due to presence of two electron withdrawing chloro groups ($-I$ showing group) is more acidic than acetic acid ($+I$ showing $-\text{CH}_3$ group).

677 (b)



yellow

ppt.

678 (b)

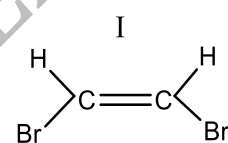
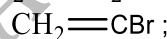
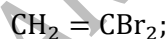
1,2,3; 1,2,4 and 1,3,5-trimethyl benzene.

679 (b)

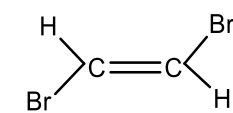
Hydride ion is formed when hydrogen accepts a proton, so it has a tendency to donate electron. Since, hydride ion (H^-) has a tendency to donate electron, it functions as nucleophile.

680 (b)

The structure of isomers from $\text{C}_2\text{H}_2\text{Br}_2$ are

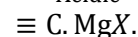
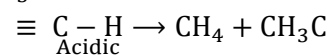
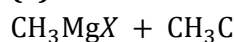


cis-isomer II



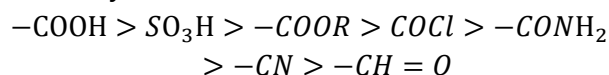
trans-isomer III

681 (a)



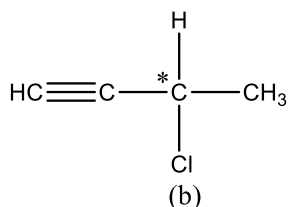
682 (a)

The correct decreasing order of priority for the functional groups of organic compounds in the IUPAC system is



683 (b)

Optical isomerism is shown by compounds which have one or more chiral carbon atoms.



∴ It has asymmetric or chiral carbon atom.
∴ It shows optical isomerism.

684 (d)

S_N2 reaction does not involve ion formation, these infact involve formation of transition state

685 (a)

pK_a value of carboxylic group is less than pK_a of NH_3^+ in amino acid and NH_3^+ (Z) will have

comparatively less pK_a than NH_3^+ (Y) due to $-I$ effect of carboxylic group. We know that acidic strength is inversely proportional to pK_a . Hence, correct order of acidic strength is



686 (a)

Chromatography is a modern technique used for the separation of mixtures into its components, purification of compounds and also to test the purity of compounds.

688 (d)

Kharasch effect involves addition of HBr.

689 (d)

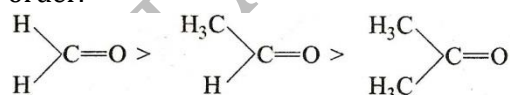
These are characteristics of carbocations.

691 (b)

Symmetrical *trans*-form has non-polar nature.

694 (c)

The nucleophilic addition reaction is the characteristic addition of carbonyl compounds. Reactivity order of carbonyl compounds is in the order.



This is due to increase in the intensity of charge on carbon of carbonyl group due to $+I$ effect of alkyl groups.

695 (c)

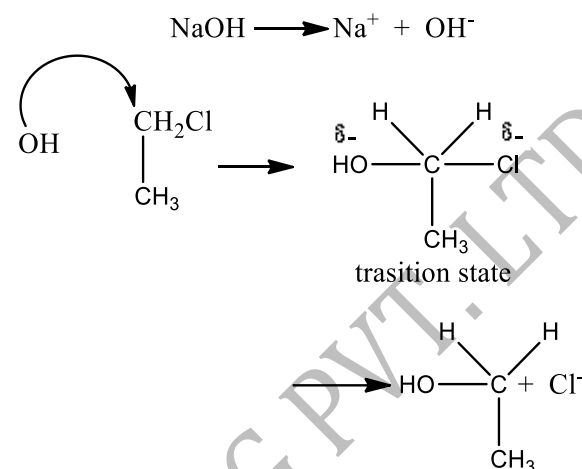
Chlorobenzene has only one deactivating group, *i.e.*, $-\text{Cl}$. In 2, 4-dinitrochlorobenzene three deactivating group, *i.e.*, two $-\text{NO}_2$ and one $-\text{Cl}$ are present and *p*-nitrochlorobenzene two deactivation groups, *i.e.*, one NO_2 and one Cl is present. So, the order of reactivity is $A > C > B$.

696 (a)

Acid has $-\text{COOH}$ group whereas, ester has $-\text{COOR}$ group.

697 (d)

The given reaction can be represented as $\text{NaOH} \rightarrow \text{Na}^+ + \text{OH}^-$



Since in this reaction, a nucleophile replaces the other group, it is an example of nucleophilic substitution reaction.

The mechanism shows that the rate depends on the concentration of both alkyl halide and nucleophile. So, it is an example of S_N2 (nucleophilic substitution of II order) reaction.

698 (a)

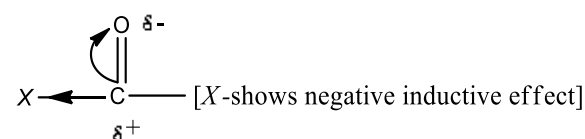
Follow IUPAC rules.

699 (d)

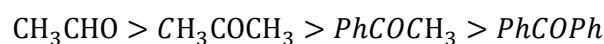
Follow IUPAC rules.

702 (a)

Carbonyl compounds undergo nucleophilic addition reaction.



If group or atom attached with carbonyl carbon shows negative inductive effect, then it decreases electron density on carbonyl carbon and facilitates the attack of nucleophile, hence reactivity of carbonyl compound increases. The aromatic aldehydes and ketones are less reactive than their aliphatic analogues due to $+R$ effect of benzene ring. The increasing order of the nucleophilic addition reaction in the following compounds will be.



703 (b)

Chiral compounds which have one chiral centre. All four atoms or groups attached to carbon are

different.

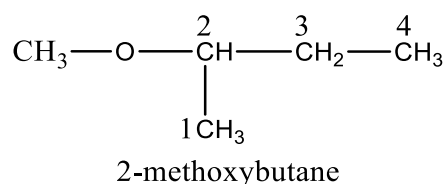
704 (b)

Due to the presence of methyl group positive inductive effect increases and the stability of carbocation also increases. The stability order of carbocation is

Tertiary > Secondary > Primary

705 (b)

According to IUPAC system ethers are named as alkoxy alkanes. The larger alkyl group forms the parent chain while lower alkyl group is taken with the ethereal oxygen and forms a part of alkoxy group.

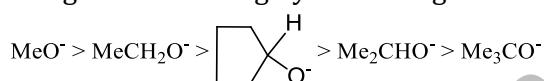


706 (c)

H_3O^+ cannot accept electron pair.

707 (a)

Epoxide is ambident substrate for nucleophilic substitution reactions. In protonated epoxide carbon-2 and carbon-3 both acquire some positive charge due to the highly electronegative atom



708 (d)

Beilstein test is used to detect halogens in organic compounds.

709 (b)

Free radical chain reaction is initiated by UV light. It proceeds in three main steps like initiation, propagation and termination. It gives major products derived from most stable free radical

711 (b)

Follow IUPAC rules.

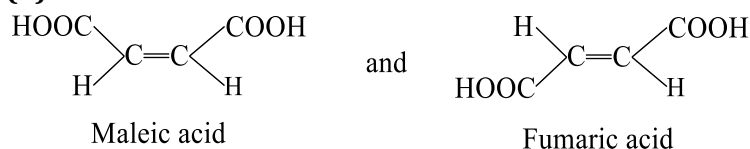
713 (d)

Elimination reactions involve removal of a molecule (HBr here) from a substrate.

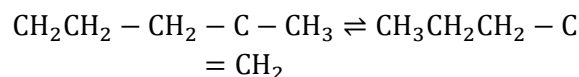
714 (c)



724 (b)



are geometrical isomers.



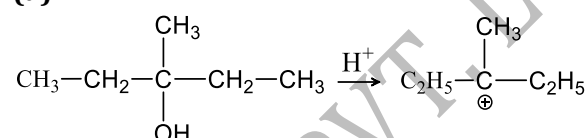
ketoform

enol form

715 (b)

The species which are electron deficient and accept a pair of electron are called electrophile. Hence, SO_3 is an electrophile as it contains an electron deficient centre. While H_2O , NH_3 and $\text{R}-\text{O}-\text{R}$ are nucleophiles.

718 (a)



In the above reaction more stable carbocation is generated hence, the compound dehydrated very easily

719 (a)

In case of Kjeldahl's method the percentage of N_2 is then calculated from the amount of NH_3

721 (b)

Such dehydrohalogenation follows E_2 mechanism. The driving force of such reaction is the stability of alkene produced. Since, tertiary alkyl halide can give more substituted alkene, it reacts fastest followed by secondary and primary *i.e.*, $3^\circ > 2^\circ > 1^\circ$.

722 (c)

Central carbon atom is chiral carbon.

723 (d)

Those organic compounds, which are volatile in steam are purified by steam distillation. Since, aniline is a steam volatile compound, hence it is purified by steam distillation.

Acetone and methanol have nearly equal boiling point. thus, they are separated by fractional distillation

743 (b)

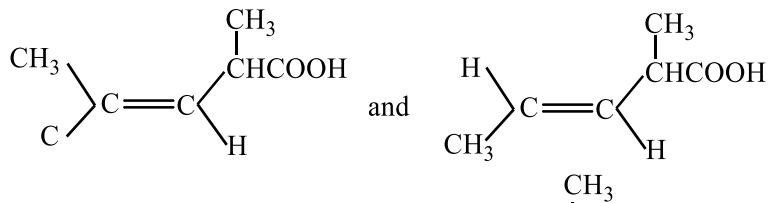
Follow IUPAC rules.

744 (c)

The oxygen atom in phenol has more dominating

745 (c)

The acid exist in *cis* and *trans* forms :

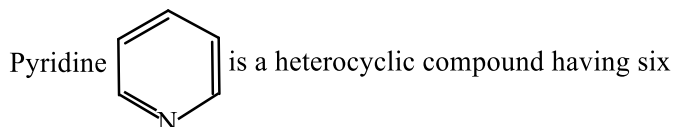


Also it has asymmetric carbon atom $\text{CH}_3\text{CH}=\text{HCOOH}$.

746 (a)

Follow the mechanism of esterification.

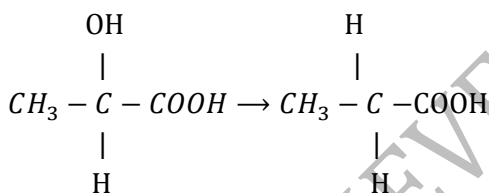
747 (b)



membered ring formed with C and N-atoms.

748 (a)

When -OH group of lactic acid is replaced by H, then chiral carbon is lost.



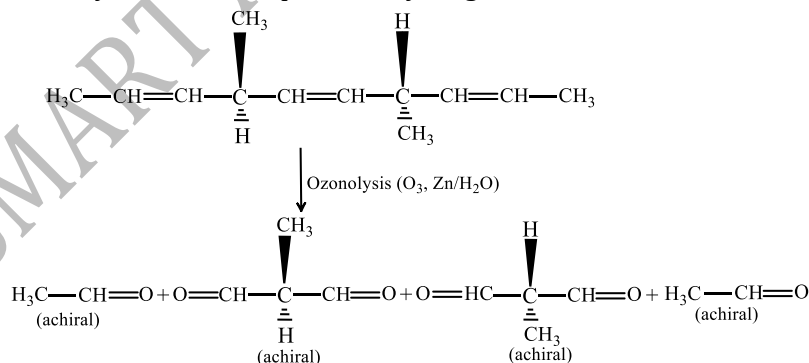
lactic acid

∴ Its optical activity is lost.

750 (a)

752 (a)

Ozonolysis of the compound may be given as :



753 (b)

2-aminopentane and 3-aminopentane; Position is different.

755 (c)

resonance effect than inductive effect. Increase in charge separation decreases the stability of a resonating structure

Stability of resonating structure in decreasing order will be

I > II ≡ IV > III

2-butene exhibit rotamers. Rotamers are the isomers formed by restricted rotation.

751 (d)

It contains lone pair electron on N atom.

$$\begin{aligned} \% \text{ of H} &= \frac{2}{18} \times \frac{\text{weight of H}_2\text{O}}{\text{weight of organic compound}} \times 100 \\ &= \frac{2}{18} \times \frac{0.9}{0.5} \times 100 = 20\% \end{aligned}$$

∴ The percentage of carbon = $100 - 20 = 80\%$

756 (b)

o – and *p*-directing groups facilitate S_E reactions whereas *m*-directing groups deactivate benzene ring for S_E reactions.

757 (a)

(+) and (-) tartaric acid does not possess any element of symmetry.

758 (b)

A molecule having doubly bonded carbon atoms shows geometrical isomerism only if both the doubly bonded carbon have altogether different group, *i.e.*, $baC \equiv Cab$ or $abC = Cac$ or $dcC = Cab$.

759 (c)

The chemical formula of thiourea is NH_2CSNH_2 so here Na_2S , $NaCN$ and $NaCNS$ will be formed but not Na_2SO_4

760 (a)

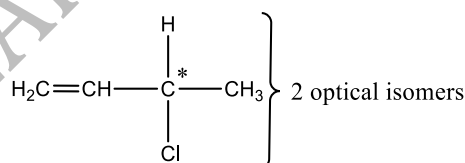
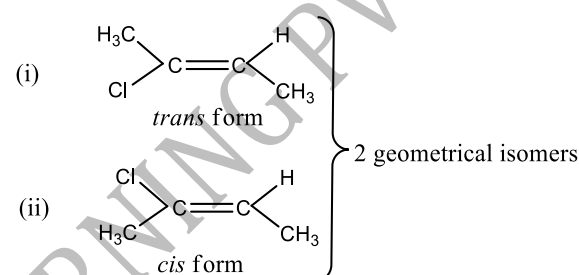
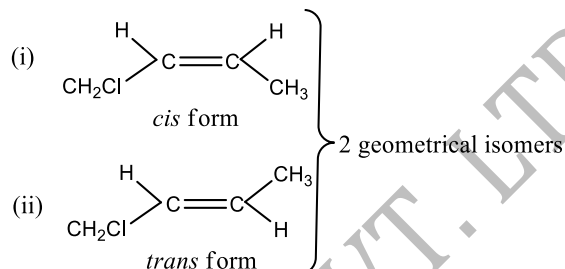
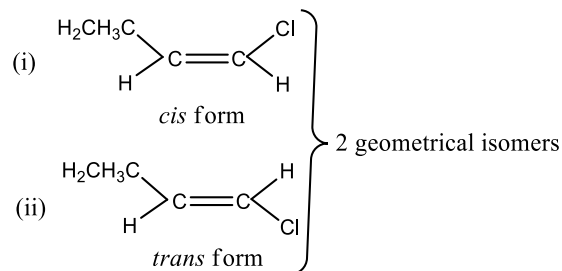
A white precipitate with am. $AgNO_3$ confirms the presence of terminal alkyne.

761 (a)

Racemisation involves change in entropy, *i.e.*, change in arrangement of groups position leading to a change in entropy of disorderness.

762 (a)

The acyclic stereoisomers of C_4H_7Cl are

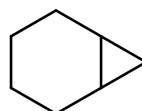


Number of optical isomers = $2^n = 2^1 = 2$

Hence, total number of geometrical isomers = 6

Total number of optical isomers = 2.

763 (c)



bicyclo (4, 1, 0) heptane

This compound contains 7 carbon atoms, so the corresponding alkane is heptane. Two bridges contain 4 and 1 carbon atom respectively and one bridge does not contain any carbon atom. So the name of the compound is bicyclo (4,1,0) heptane.

764 (d)

Stability of alkyl free radicals can be explained by hyperconjugation and number of resonating structure due to the hyperconjugation. The decreasing order of stability of alkyl free radical is as follows

3° free radical > 2° free radical > 1° free radical > $\dot{C}H_3$

766 (b)

Inductive effect involves only displacement (and not delocalisation) of σ –electrons.

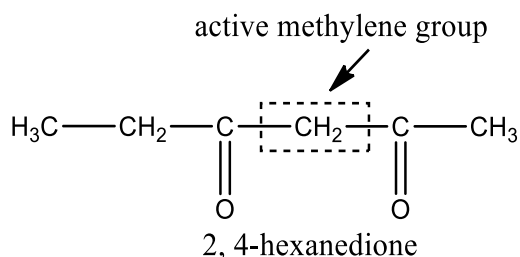
767 (c)

Meso forms are optically inactive as they are superimposable to their mirror images.

768 (b)

CH₄ has highest ratio of H to C

769 (b)



When methylene group ($-CH_2$) is attached with two electron withdrawing groups (like, $-CHO$, $C=O$, $-COOH$, $-CN$, $-X$, etc), its acidity will increase due to $-I$ effect of the electron withdrawing groups.

770 (a)

Follow IUPAC rules.

771 (c)

The reactivity order for H atom is $3^\circ > 2^\circ > 1^\circ$; Neocarbon does not have H atom.

773 (b)

— do —

774 (a)

Organic compound which are volatile in steam can be purified by steam distillation. It is based on the fact that vaporisation of organic liquid takes place at lower temperature than its boiling point

775 (b)

Follow IUPAC rules.

777 (d)

CH₃O⁻ is nucleophile;



778 (a)

Inductive effect is the permanent effect on σ -electrons. It involve the electron displacement along the chain of saturated carbon atoms due to the presence of a polar covalent bond at one end of the chain.

779 (c)

Homologous differ by a group $-CH_2$ and cannot be isomer.

780 (c)

The reagent selected should be such that only one of components to be separated, reacts with it. Aniline + aq. HCl \rightarrow salt, which is water soluble Nitrobenzene + aq. HCl \rightarrow no reaction

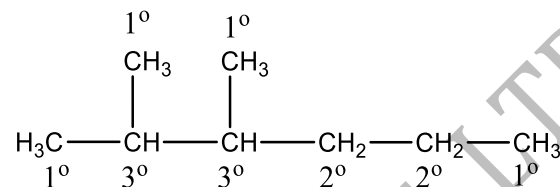
\therefore aq. HCl is used to separate aniline and nitrobenzene.

781 (b)

Formic acid was obtained from ant (fromica in greek). This is trivial name for HCOOH.

782 (a)

The structure of 2, 3-dimethyl hexane is



So, the number of tertiary carbon atoms = 2

The number of secondary carbon atoms = 2

The number of primary carbon atoms = 4

783 (a)

Follow IUPAC rules.

786 (c)

CH₃⁺ has planar structure.

787 (d)

These are characteristics of carbanion.

788 (a)

Follow Saytzeff rule for elimination. 3-halopentane will give only pentene-2.

789 (b)

Atom	Atomic Ratio	Percentage	$\frac{b}{a} = x$	
	Mass (a)	(b)		
C	12	10.06	$\frac{10.06}{12}$	1
H	1	0.84	$\frac{0.84}{1}$	1
Cl	35.5	89.10	$\frac{89.10}{35.5}$	3

Empirical formula = CHCl₃

Empirical formula mass = 12 + 1 + 106.5 = 119.5 \approx 120

Molecular mass = 2 \times V. D = 2 \times 60 = 120

$$n = \frac{\text{molar mass}}{\text{empirical formula mass}}$$

$$= \frac{120}{120} = 1$$

Molecular formula = (CHCl₃)₁ = CHCl₃

790 (d)

During nucleophilic substitution weaker nucleophile is replaced by stronger nucleophile.

The compound having C-Cl bond which can be most easily broken will be most reactive towards nucleophilic substitution reaction.

In vinyl chloride CH₂ = CH - Cl and chlorobenzene C₆H₅Cl the C - Cl bond has partial double bond character due to resonance.

— CH₃ is electron repelling group.

812 (c)

Metamerism is found in molecules having polyvalent functional group.

813 (d)

There are IUPAC rules.

814 (c)

$a = 2^n$; where n is no. of dissimilar asymmetric carbon atoms and a is no. of optically active isomers.

816 (a)

Follow IUPAC rules.

817 (d)

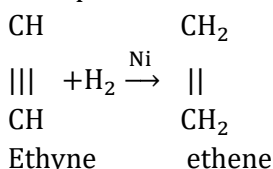
Nucleophile (—NH₃) replaces other nucleophile (—Br) in the reaction.

818 (a)

Meso form is optically inactive.

819 (d)

Formation of ethylene from acetylene is an example of addition reaction

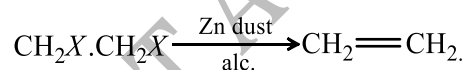


820 (b)

Sodium hydrogen sulphite adds to aldehydes and ketones to form crystalline bisulphite addition products. The product is water soluble and can be converted back to the original carbonyl compound by treating it with dilute mineral acid or alkali. Therefore, these are useful for separation and purification of aldehydes like acetaldehydes.

821 (b)

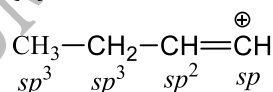
Zn dust is used for dehalogenation,



823 (d)

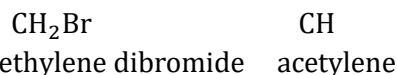
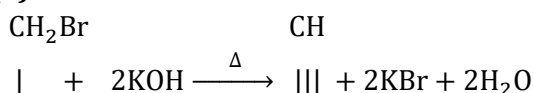
Resonance in a molecule is arising due to delocalisation of π -electrons.

824 (d)



Electronegativity of different hybrid and unhybrid orbitals in decreasing order is as follows
 $s > sp > sp^2 > sp^3 > p$

825 (b)



This is a dehydrohalogenation reaction.

826 (d)

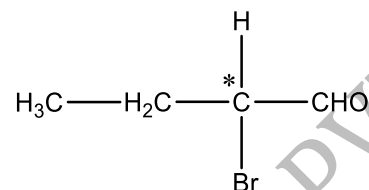
Stereoisomerism is of two types, geometrical and optical.

827 (c)

Follow IUPAC rules.

828 (c)

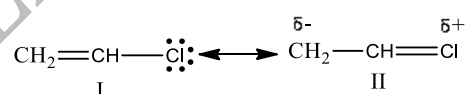
Compounds having asymmetric C-atom is optically active, e. g.,



The C-atom whose four valencies are satisfied by four different groups is asymmetric C-atom.

829 (b)

Chlorine of vinyl chloride (CH₂ = CHCl) is non-reactive (less reactive) towards nucleophile in nucleophilic substitution reaction because it shows the following resonating structure due to $-M$ effect of —Cl atom.



In structure II, Cl-atom has positive charge and partial double bond character with C of vinyl group, so it is more tightly attracted towards the nucleus and it does not get replaced by nucleophile in S_N^- reaction.

830 (d)

Follow mechanism of debromination.

831 (c)

Atom	Atomic Ratio	Percentage	$\frac{b}{a} = x$
C	12	40	$\frac{40}{12} = 3.33$
H	1	6.66	$\frac{6.66}{1} = 6.66$
O	16	53.34	$\frac{53.34}{16} = 3.33$

Hence, empirical formula = CH₂O

832 (d)

Grignard reagents can act as electrophile and nucleophile.

833 (b)

Both these carbon atoms have 3σ - and 1π -bond. Recall hybridized orbitals never form π -bonds.

834 (c)

S_N1 mechanism involves the formation of carbocation intermediate. Hence, the species which gives the most stable carbocation readily undergoes S_N1 mechanism. *t*-butyl bromide gives the most stable carbocation, *i.e.*, 3° carbocation, so it readily undergoes S_N1 reaction.

835 (b)

Follow IUPAC rules.

836 (b)

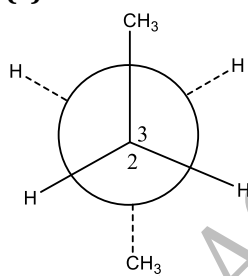
In the Lassaigne's test, a blue colour is obtained if the organic compound contains nitrogen. The blue colour is due to ferri-ferro cyanide *i.e.*, $Fe_4[Fe(CN)_6]_3$.

837 (d)

According to Cahn-Ingold-Prelog sequence rules, the priority of groups is decided by the atomic number of their atoms. When the atom (which is directly attached to the asymmetric carbon atom) of a group has higher atomic number, then the group gets higher priority. Groups which atoms of comparable atomic number having double or triple bond, have high priority than those have single bond.

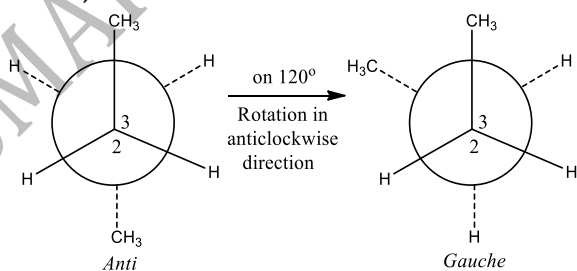
Hence, the order of priority of group is $-OH > -COOH > -CHO > -CH_2OH$

838 (c)

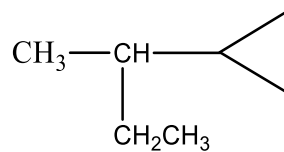


Here, when C_2 is rotated anticlockwise 120° about $C_2 - C_3$ bond the resulting conformer is *Gauche* conformer.

Hence,

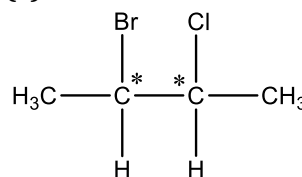


839 (c)



contains asymmetric carbon, thus optically active.

840 (c)



2-bromo 3-chloro butane

\therefore Number of asymmetric carbon atoms = 2

\therefore Number of chiral isomers = $2^n = 2^2 = 4$

841 (c)

Glycerol can be separated from spent lye in soap industry by the distillation under reduced pressure because it decomposes near its boiling point

843 (b)

In gas phase tertiary amines are more basic than secondary amines which are more basic than ammonia

$-I$ group present on central atom decreases electron density, hence decreases basicity
 $CH_3NH_2 > NH_3 > NF_3$

844 (a)

Atom	At mass (a)	% (b)	$\frac{b}{a}$
C	12	49.3	$\frac{49.3}{12} = 4.10$
H	1	6.84	$\frac{6.84}{1} = 6.84$
O	16	43.86	$\frac{43.86}{16} = 2.74$

1

Hence, empirical formula = (C_2H_3O)

Molecular mass = $2 \times VD = 2 \times 73$

= 146

$$n = \frac{\text{molar mass}}{\text{empirical formula mass}} = \frac{146}{43} \approx 3$$

So, formula = $(C_2H_3O)_3 \approx C_6H_9O_3$

845 (c)

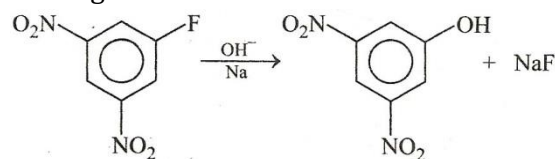
Wöhler prepared urea from inorganic compounds and rejected the vital force theory that organic compounds can only be synthesised from living organisms.

846 (c)

Follow mechanism of addition of HCl and HI in presence of peroxide. One of the chain

- propagation step is endothermic in both cases.
- 847 (c)
All aromatic compounds are resonance hybrid.
- 848 (a)
It is the stability order for various conformers.
- 849 (c)
Glucose has aldehyde group and fructose keto group. The general formula for both is $C_6H_{12}O_6$.
- 851 (b)
Follow conformation.
- 852 (b)
In *o*-, *m*-, *p*- derivatives vectors are at 60° , 120° and 180° . Thus, *para* has zero dipole moment. Also *ortho* form has more dipole moment than *meta* form.
- 853 (c)
The staggered form has lower energy than eclipsed form because of repulsive interaction between the H-atoms attached to two carbon atoms are minimum due to maximum distance between them.
- 854 (c)
Victor Mayer's method is applicable only for the determination of molecular mass of volatile substance
- 856 (d)
Hexane is non-polar molecule.
- 857 (c)
Nucleophilicities may be neutral or negatively charged, whereas substrate undergoing nucleophilic substitution may be neutral or positively charged
 $C_2H_5 - I + OH^- \rightarrow C_2H_5OH + I^-$
- 858 (a)
Nucleophilicity increases on going down in the group of the Periodic Table
 $I^- > Br^- > Cl^- > F^-$
- 859 (d)
Free radicals have unpaired electrons, but are neutrals and are reactive.
 $\cdot CH_3 + \cdot CH_3 \rightarrow CH_3 - CH_3$
- 861 (b)
Follow mechanism of Kharasch effect.
- 862 (d)
—do—
- 864 (c)
Reaction of NaOH with dinitrofluorobenzene represents nucleophilic aromatic substitution reaction because $-NO_2$ group is deactivating

group. They make benzene nucleus electron deficient and facilitate the nucleophile to attack the ring.



- 865 (b)
-
- Cyano group has the highest priority therefore, parent name must be benzonitrile. Br occurs at 2-position, and hydroxyl at 3-position, hence the IUPAC name is 2-bromo-5-hydroxy benzonitrile.
- 866 (d)
Ethers show metamerism.
- 867 (b)
Due to resonance; the carbonyl group of benzoic acid is coplanar with the ring. If the electron withdrawing substituent (i.e., $-I$ showing) is present at *ortho* position, it prevents the coplanarity and thus, the resonance. Hence, makes the acid more stronger. Thus, among the given acids, *ortho* hydroxy benzoic acid is the most acidic.
- 868 (a)
Diamond (sp^3), Graphite (sp^2), Acetylene (sp).
- 869 (d)
 $CH_3CHClCOOH$ contains asymmetric carbon atom.
- 870 (d)
Statement (c) is wrong.
- 871 (b)
The $-ve$ inductive effect of $-CHO$ group play role to give anti Markownikoff's addition.
 $CH_2=CH \rightarrow -CHO \rightarrow \overset{+}{C}H_2 - \overset{-}{C}H - CHO$
- 872 (c)
The structure of 1-chloro-2-nitroethene is as
- In this compound E-Z isomerism is possible because it is highly substituted alkene. The E-Z system of nomenclature is developed by Cahn,

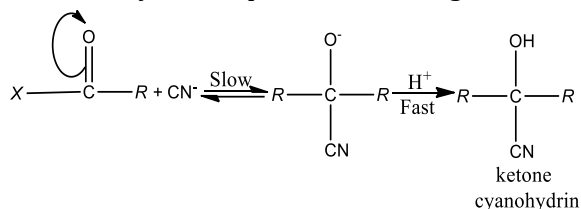
Inglod and Prelog.

873 (a)

$\text{CH}_3\text{C}=\text{N}$ is known as acetonitrile or methyl cyanide.

874 (b)

Ketone undergoes nucleophilic addition reaction because nucleophilic end of reagent attack first followed by electrophilic end of reagent.



875 (d)

Halogen containing compounds ($\text{C}_6\text{H}_5\text{Cl}$)

When placed in a flame, the presence of halogen is revealed by a green to blue flame.

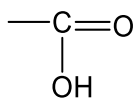
876 (a)

Two similar asymmetric carbon atoms; $\therefore a = 2^{n-1}$. Also meso form = $2^{\frac{n}{2}-1}$.

Total = $a + m$.

877 (d)

In C_6H_5 ring there are three π -bonds and one π -



bond is present in OH group.

Therefore, in all there are four π - bonds in $\text{C}_6\text{H}_5\text{COOH}$. In $\text{CH}_3\text{CH}_2\text{COCH}_3$ there is only one π - bond in $\text{C}=\text{O}$ group, in $\text{CH}_2=\text{CH}-\text{CH}=\text{CH}_2$ there are two π -bonds while in $\text{HC}\equiv\text{C}-\text{CH}=\text{CH}_2$ there are three π - bonds

878 (c)

Order of bond length

σ bond (sp^3) > σ bond (sp^2) > σ bond (sp)

879 (d)

It is a reason for the given fact.

880 (c)

The octet of all atoms are complete in structures *a* and *b*. The molecule in which all the atoms have completed octet is more stable than atom which have incomplete octet. Larger the number of resonating structures, larger will be the stability, thus structures *a* and *b* are stable.

In structure (d), the electron deficient of positive charged carbon is duly compensated by one pair electrons of adjacent oxygen atoms while such neighbour group support is not available in structure (c). Hence, structure (c) is least stable in comparison to structure (d).

883 (a)

$\text{CH}_3\text{CH}_2\text{Cl}$; CH_3CHCl_2 ; $\text{CH}_2\text{ClCH}_2\text{Cl}$; CH_3CCl_3 ; $\text{CH}_2\text{CHCl}_2\text{CCl}_3$; CCl_3CCl_3

884 (d)

(1) and (3) are enantiomeric forms to each other.

885 (d)

Methoxy group, due to +I effect, increase electron density on OH- group, thus making it less acidic.

Thus, *o*-methoxy phenol and acetylene are less than phenol.

p-nitrophenol is more acidic than phenol.

886 (c)

When organic compound is fused with sodium metal, nitrogen of the compound is converted into sodium cyanide as

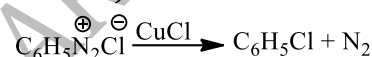


887 (c)

It is structure of furan, a heterocyclic compound.

888 (a)

Diazonium salts are highly reactive. In Sandmeyer reaction diazo group is replaced by chlorine or bromine in presence of CuCl or CuBr . (Substitution reaction)



889 (b)

X^- is replaced by OH^- .

890 (b)

There are four structural isomers are possible for $\text{C}_4\text{H}_9\text{Cl}$

(a) $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{Cl}$

(b) $\text{CH}_3-\text{CH}_2-\text{CH}(\text{Cl})-\text{CH}_3$

(c) $\text{CH}_3-\text{CH}(\text{Cl})-\text{CH}_2\text{Cl}$

(d) $\text{CH}_3-\text{C}(\text{Cl})(\text{CH}_3)-\text{CH}_3$

891 (b)

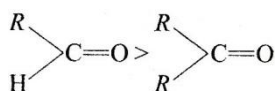
A carbanion or carboanion has -ve charge on it.

894 (c)

The case with which a nucleophile attacks the carbonyl groups depends upon the electron-deficiency, *i. e.*, magnitude of the positive charge on the carbonyl carbon. Since, an alkyl groups has electron-donating inductive effect.

(+I effect), therefore, greater the number of alkyl groups attached to the carbonyl groups greater is

the electron-density on the carbonyl carbon and hence, lower is its reactivity towards nucleophilic addition reactions.



896 (c)

n-pentane and isopentane or 2-methylbutane are chain isomers since both have different hydrocarbon chain.

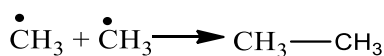
897 (a)



Prop -2-en-1-al

898 (d)

Free radicals have unpaired electrons but are neutrals and are reactive.



900 (a)

The second carbon is asymmetric.

901 (c)

Both have different mode of linkage, *i.e.*, chain and ring.

902 (c)

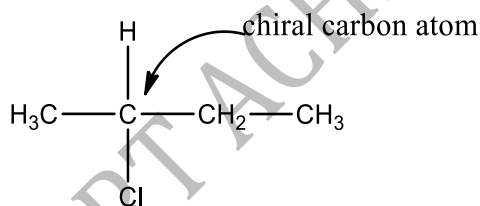
Carbanions contain even number of valence electrons and thus, show diamagnetic behaviour.

903 (d)

Molecules with two similar groups attached on either of the doubly bonded carbon do not show geometrical isomerism.

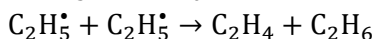
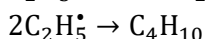
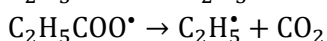
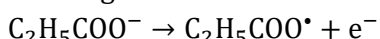
904 (c)

Compound $CH_3 - CHCl - CH_2 - CH_3$ shows optical isomerism due to the presence of chiral carbon atom.



905 (c)

The Kolbe's electrolysis proceeds *via* free radical mechanism. For example, when sodium propionate is electrolysed, *n*-butane, ethane, ethylene are obtained. The propionate ion discharge at the anode to form free radicals.

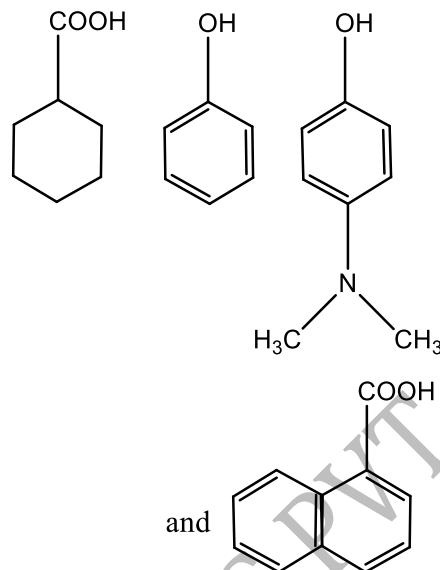


907 (c)

In TLC, adsorbent is made of silica gel or alumina

gel

908 (d)



are soluble in aq. NaOH. Benzylic alcohol is less acidic than water so not soluble in aq. NaOH,

909 (c)

Lead unreacted $0.1 \text{ M (=0.2 N)} H_2SO_4 = V \text{ mL}$

$20 \text{ mL of } 0.5 \text{ NaOH} = V \text{ mL of } 0.2 \text{ N } H_2SO_4$

$$20 \times 0.5 = V \times 0.2$$

$$V = \frac{20 \times 0.5}{0.2} = 50 \text{ mL}$$

Used $H_2SO_4 = 100 - 50 = 50 \text{ mL}$

$$\% \text{ of N} = \frac{1.4 NV}{w} = \frac{1.4 \times 0.2 \times 50}{0.30}$$

$$= 46.67 \%$$

% of nitrogen in

$$(a) CH_3CONH_2 = \frac{14 \times 100}{59} = 23.73 \%$$

$$(b) C_6H_5CONH_2 = \frac{14 \times 100}{121} = 11.57 \%$$

$$(c) NH_2CONH_2 = \frac{28 \times 100}{60} = 46.67 \%$$

$$(d) NH_2CSNH_2 = \frac{28 \times 100}{76} = 36.84 \%$$

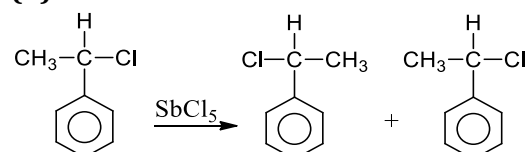
910 (d)

Removal of H from alkane, alkene and alkyne gives alkyl, alkenyl, alkynyl groups respectively.

911 (d)

There are two symmetrical hexenes as given in (a) and (b).

913 (d)

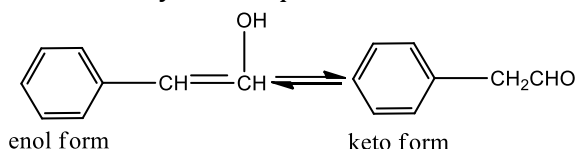


The solution of D(+)-2-chloro-2-phenylethane in toluene racemises slowly in the presence of $SbCl_5$ due to the formation in carbocation

914 (a)

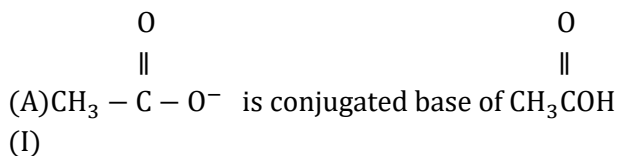
Tautomerism it is functional isomerism in which

the isomers are readily interchangeable and maintain a dynamic equilibrium with each other.



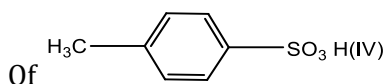
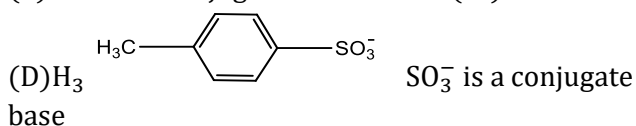
915 (b)

If acid is weak, its conjugate base (nucleophile) is strong and *vice versa*.



(B) CH_3O^- is a conjugate base of CH_3OH (II)

(C) CN^- is a conjugate base of HCN (III)



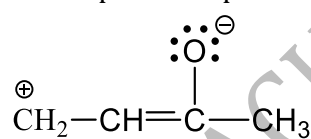
Acidic nature of $\text{IV} > \text{I} > \text{III} > \text{II}$
and nucleophilicity of $\text{B} > \text{C} > \text{A} > \text{D}$.

916 (d)

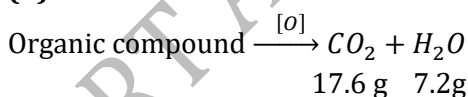
$\text{S}_{\text{N}}2$ reaction proceeds with inversion and a transition state is formed which does not carry any charge

918 (b)

The most stable one is that in which the positive and negative charges reside on the most electropositive and most electronegative atoms of the species respectively. Like



919 (b)



$$\% \text{ of C} = \frac{12}{44} \times \frac{17.6}{5.6} \times 100 = 85.7\%$$

$$\% \text{ of H} = \frac{2}{18} \times \frac{7.2}{5.6} \times 100 = 14.28\%$$

Element	Percentage	Relative no. of atoms	Simplest ratio
C	85.7	$85.7/12=7.14$	$7.14/7.14=1$
H	14.28	$14.28/1=14.28$	$14.28/7.14=2$

Hence, empirical formula of compound of = CH_2
 \therefore Molecular formula of compound = C_4H_8

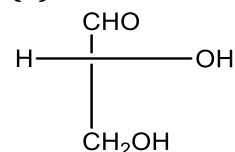
920 (c)

Stronger is acid, weaker is its conjugate base.

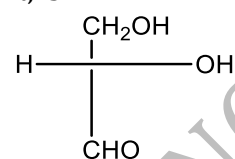
Acidic nature : $\text{CH} \equiv \text{CH} > \text{CH}_2 = \text{CH}_2 > \text{CH}_3 - \text{CH}_3$

Conjugate basic : $\text{CH} \equiv \text{C}^- < \text{CH}_2 = \text{CH}^- < \text{CH}_3 - \text{CH}_2^-$ nature.

921 (b)



D-glyceraldehyde has the above formula. So, the Fischer's projection formula which is identical to it, is



922 (b)

Percentage of N in an organic

$$\begin{aligned} \text{Compound} &= \frac{1.4 \times N \times V}{w} \\ &= \frac{1.4 \times 1 \times 30}{1.2} = 35 \end{aligned}$$

923 (c)

Dissociation of proton from ddd is very difficult due to -I effect of Cl^- and N^+ while in $\text{C}_6\text{H}_5\text{OH}$ due to the resonance stabilization of phenoxide ion proton eliminates easily. Similarly due to H-bonding in $\text{C}_6\text{H}_5\text{CH}_2\text{OH}$ it can be eliminated easily and in $\text{CH}_3\text{C} \equiv \text{CH}$ the proton is acidic in nature hence, it can be dissociated

924 (d)

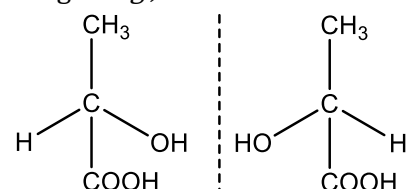
$$\begin{aligned} \% \text{ of S} &= \frac{32}{233} \times \frac{\text{wt. of BaSO}_4}{\text{wt. of organic compound}} \times 100 \\ &= \frac{32}{233} \times \frac{1.158}{0.53} \times 100 \\ &= 30\% \end{aligned}$$

925 (c)

Tautomerism is a dynamic isomerism because two forms (keto and enol) of substance cannot be separated they are in dynamic equilibrium with each other.

926 (a)

Enantiomers are non-superimposable mirror images. *e.g.*, lactic acid

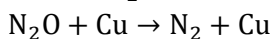


927 (a)

Vinyl carbocations are more stable than primary carbocation but less stable than secondary carbocation.

928 (b)

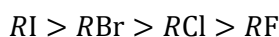
Duma's method involve the determination of nitrogen content in the organic compound in the form of N_2



$$d\% \text{ of N} = \frac{28}{22400} \times \frac{\text{volume of } N_2 \text{ at NTP}}{\text{weight of compound}} \times 100$$

930 (a)

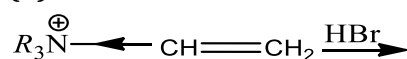
The correct order of reactivity is



It is due to fact, that weaker the base, better it will be the leaving group.

Hence, I^- is the best leaving group.

931 (b)



Due to R_3N^{\oplus} (e^- withdrawing tendency) carbocation will appear farther to that (terminal). Hence, product is $R_3N - CH_2 - CH_2Br$.

932 (d)

n-pentane and 2-methyl butane are constitutional isomers or chain isomers or skeletal isomers.

934 (a)

Follow IUPAC rules.

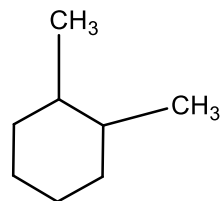
935 (b)

In toluene ($-CH_3$) group is present which has +I effect and increases electron density on *ortho* and *para* position. While in sulphonation $-SO_3$ acts as electrophile. Therefore, it ($-SO_3H$) attacks on *ortho* and *para* position readily.

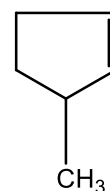
936 (d)

Follow elimination rules.

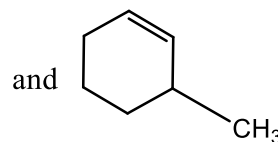
937 (a)



1, 2-dimethyl cyclohexane



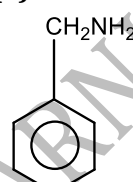
3-methyl cyclopentene



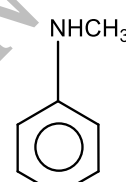
3-methyl cyclohexene

contain two, one, one asymmetric carbon atoms respectively.

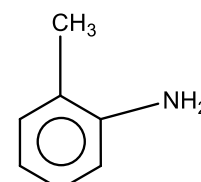
939 (a)



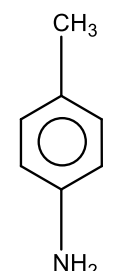
benzylamine



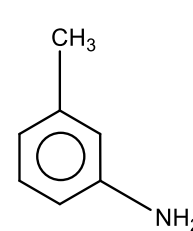
N-methyl aniline



o-toluidine



p-toluidine

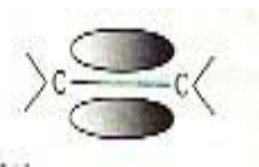


m-toluidine

\therefore Total of five isomers are possible by formula C_7H_9N .

941 (a)

Such a condition is seen when π bond is formed between similar atoms *ie*,



943 (b)

From kjeldahl's method,

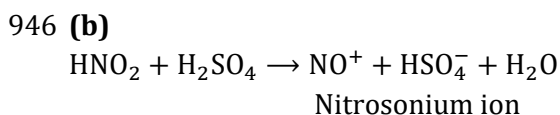
$$\begin{aligned} \text{Percent of nitrogen} &= \frac{1.4 \times N \times V}{W} \\ &= \frac{1.4 \times 0.5 \times 2 \times 10}{0.25} = 56\% \end{aligned}$$

944 (d)

It is the definition of distereoisomers.

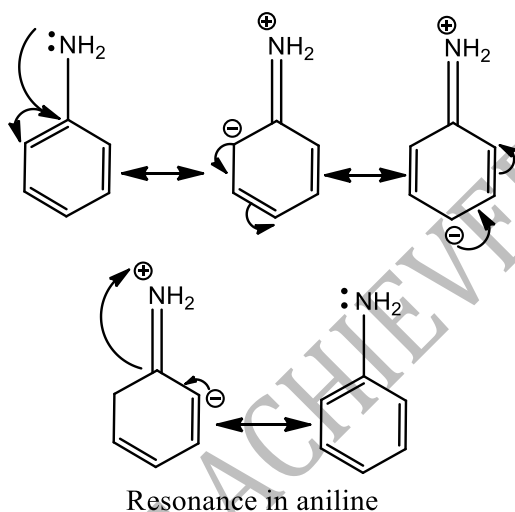
945 (b)

The central carbon is attached to four different substituents, hence it is chiral, therefore optically active.



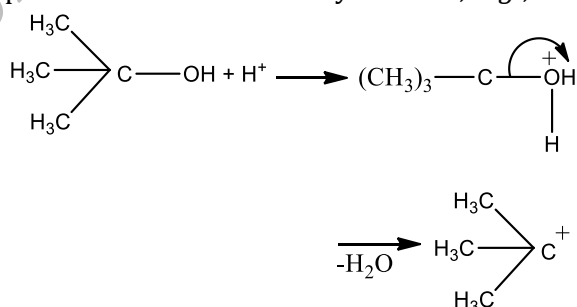
947 (b)
 -Cl is an electron withdrawing (*i.e.*, -I showing) group. It withdraws electrons when attached to the carboxylic acid and decreases the electron density on the oxygen atom. This will facilitate the release of H^+ by making O - H bond more polar and thus -Cl increases the acidity of acetic acid when attached at, α position because of -I effect.

948 (a)
 - NH_2 has +R effect, it donates electrons to the benzene ring. As a result, the lone pair of electron on the N-atom gets delocalized over the benzene ring. As a result, the lone pair of electron on the N-atom gets delocalized over the benzene ring and thus it is less readily available for protonation. Hence, aniline is a weaker base than cyclohexylamine.

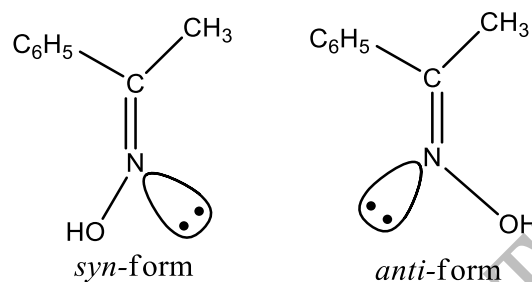


949 (c)
 This is annulene.

950 (a)
 Alcohols undergo dehydration usually by E1 mechanism. This is because elimination is preferred in case of tertiary alcohols, *e.g.*,



951 (c)
 Acetophenone oxime can show geometrical isomerism.



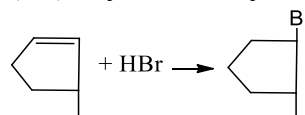
952 (d)
 Ethers show functional isomerism with molecular formula $\text{C}_n\text{H}_{2n+2}\text{O}$. For example, $\text{C}_2\text{H}_6\text{O}$
 CH_3OCH_3 , $\text{CH}_3\text{CH}_2\text{OH}$
 dimethyl ether, ethyl alcohol

953 (c)
 The alkyl halide which produce stable carbonium ion undergo $\text{S}_\text{N}1$ reaction. Tertiary alkyl halide is most stable. Thus, decreasing order of tendency of alkyl halides undergoes $\text{S}_\text{N}1$ mechanism.
 t -alkyl halide > *sec*-alkyl halide > *primary*-alkyl halide

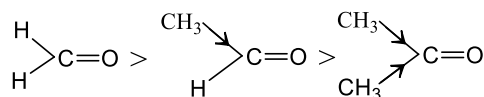
954 (c)
 Vinyl chloride ($\text{CH}_2 = \text{CHCl}$) undergoes addition and elimination reactions. Substitutions reaction is shown by compounds having single bonds only.

955 (a)
 Fisher projections are for illustration of optical isomers.

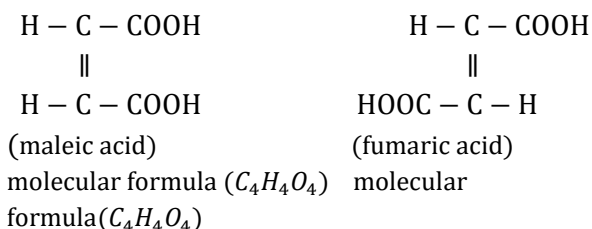
956 (b)
 A hydrogen halide contain a highly polar H - X bond can easily lose H^+ to the pi bond of an alkene. The result of the attack of H^+ is an intermediate carbocation, which quickly undergoes reaction with the negative halide ion (X^-) to yield an alkyl halide



960 (c)
 Aldehydes and ketones readily undergo nucleophilic addition reaction. The order of reactivity, is as the +I effect of alkyl group increases



961 (b)
 The structures of maleic and fumaric acids are given below



The structures of fumaric and maleic acid suggest that they are geometrical isomers because they have same molecular formula but different spatial arrangement of atoms around a double bond.

962 (b) Stability order of arenium ion
II > III > I

963 (d) In condensed structure formula, paranthesis is used for identical group of atoms.

964 (d) Compound which sublime on heating can be purified by sublimation method. Benzoic acid, camphor and naphthalene sublime on heating hence, they are purified by sublimation method.

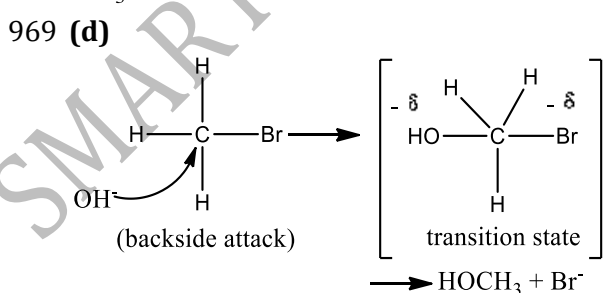
965 (d) $\text{CH}_2 = \text{CH} \cdot \text{CH}_2\text{Cl}$ compound undergoes nucleophilic substitution most readily.

966 (a) As the $-I$ group increases at the α -carbon, acidity increases

967 (b) In $\text{S}_\text{N}2$ reactions, the nucleophile attaches itself from the direction opposite to that of the nucleophile already present in the second step, the previous nucleophile is removed and a single stereoisomer is obtained

968 (b) Follow IUPAC rules.

$$\overset{5}{\text{CH}_3} \cdot \overset{4}{\text{CH}} = \overset{3}{\text{CH}} \cdot \overset{2}{\text{C}} \equiv \overset{1}{\text{CH}}$$

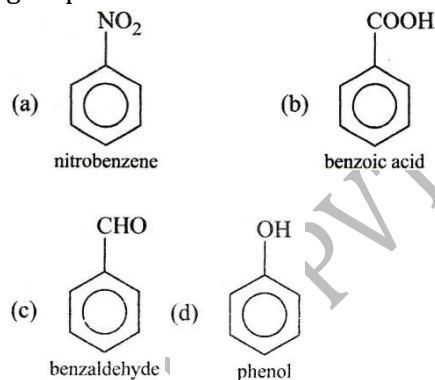


Since, the reaction rate depends upon the concentration of both reactant and nucleophile, it is a $\text{S}_\text{N}2$ reaction. It involves inversion of configuration.

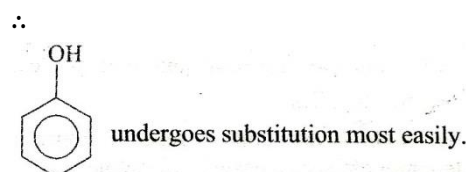
970 (c) The given compound is nitrobenzene.

971 (c) Both differs by a $-\text{CH}_2$ group.

972 (d) During electrophilic substitution electrophile attacks the double bond of benzene ring. The aromatic compounds having electron donating groups undergo electrophilic substitution more easily due to favourable effect of electron donating group.



(i) NO_2 , COOH and CHO groups are electron withdrawing groups so, they decrease the reactivity of organic compounds.
 (ii) $-\text{OH}$ group is electron donating group, so it increases the electron density in benzene ring and increases the rate of reaction



973 (b) Oxygen cannot be detected by direct test because oxygen is present in atmosphere and all tests are carried in atmosphere of oxygen

974 (a) Follow IUPAC rules.

975 (a) o -, m -, p - isomers are position isomers.

976 (b) Carbinol is trivial name for HCH_2OH . Thus, $\text{C}_6\text{H}_5\text{CH}_2\text{OH}$ is phenyl carbinol and chloral is CCl_3CHO .

977 (a) A primary carbon is one which is attached with one carbon atom.

978 (a) Follow IUPAC rules.

979 (c) 1,1-dibromoethane and 1,2-dibromoethane.

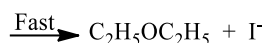
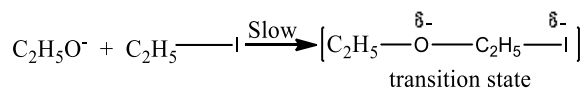
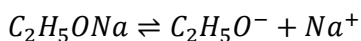
980 (a)

A solvent molecule lacking a polar X-H bond is called aprotic solvent. NH_3 , SO_2 and CH_3CN are aprotic solvent while CH_3COOH is protic solvent.

981 (b)

When sodium ethoxide reacts with iodoethane, diethyl ether is obtained (**Williamson's synthesis**)

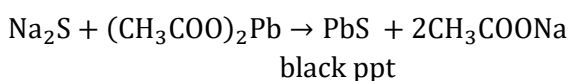
The mechanism of this reaction is as follows



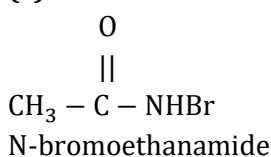
Since, the reaction involves substitution of a group by a nucleophile, it is an example of nucleophilic substitution reaction.

982 (c)

The organic compound is fused with Na metal, Na_2S is formed which is tested as It reacts with lead acetate and forms black ppt. of PbS



983 (c)



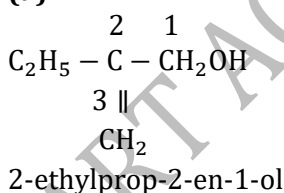
984 (c)

$$\frac{E}{108} = \frac{100}{60}$$

$$\text{Eq. wt of the silver salt } E = 108 \times \frac{100}{60} = 180$$

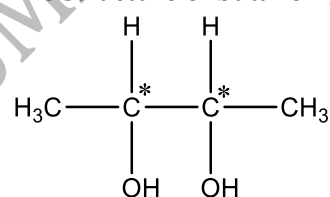
$$\therefore \text{Eq. wt. of the acid} = E - 108 + 1 = 73$$

985 (a)



986 (d)

The structure of butane-2, 3-diol is as



\therefore Optical isomers in compounds have similar asymmetric carbon atom, which are even in number = $2^n - 1$

$$\text{Here, } n = 2$$

\therefore Total number of optically active stereoisomers

$$= 2^2 - 1 = 3$$

987 (b)



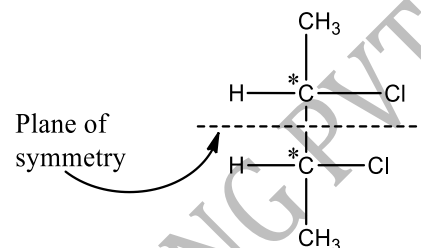
CH_3^+ is methyl carbonium.

988 (b)

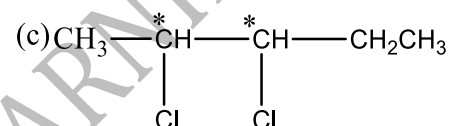


One asymmetric carbon atom, forms *d*, and *l* – optical and isomers.

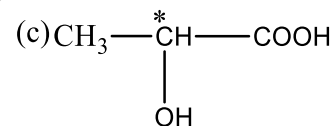
(b) Two asymmetric carbon atoms, forms *d*, *l* and *meso* forms



Meso due to internal compensation



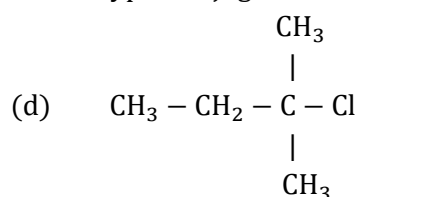
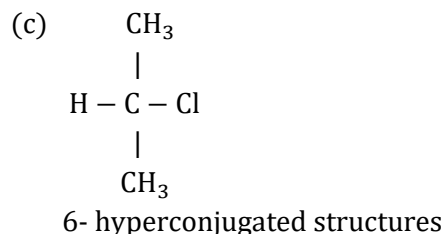
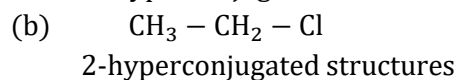
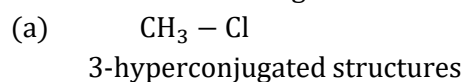
Two asymmetric carbon atoms but does not have symmetry. Hence, *meso* form is not formed.



One asymmetric carbon atom, *meso* form is not formed.

989 (d)

More the number of hyperconjugated structures, more will be electronegative chlorine atom.



\therefore 8-hyperconjugated structures are possible for

(d)
∴ Chlorine in this is most electronegative.

990 (a)

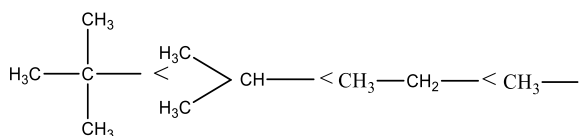
Follow resonance characteristics.

991 (b)

Diastereoisomers are a pair of optical isomers which cannot be related as non-superimposable mirror images of each other.

994 (a)

The rate of reaction is influenced by the hyperconjugation effect of group R. It depends on the electron donating power of alkyl group (R). The electron releasing power of R group depends on the number of hydrogen present on α carbon. The increasing order of speed with R group in the reaction is



i.e., IV < III < II < I

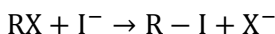
995 (b)

The given compound forms two geometrical isomers and two optical isomers.

996 (b)

Geometrical isomerism is shown by $>\text{C}=\text{C}<$ only when identical groups are not present on the double bonded carbon atoms.

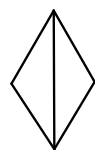
999 (b)



This reaction is an example of nucleophilic substitution.

100 (c)

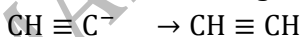
0



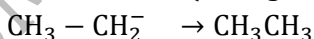
Its IUPAC name is bicyclo [1,1,0] butane.

100 (a)

1 Weak base \rightarrow strong conjugate acid



weakest base (strongest acid among the given)



(strongest base) (weakest acid)

100 (d)

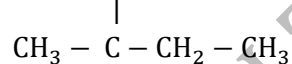
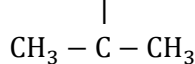
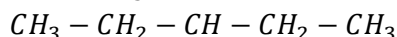
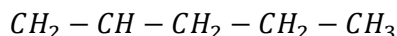
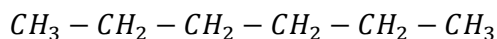
2 With the increasing basicity of the added base, the rates of the elimination reactions have been found to increase. Thus, RO^- is most reactive

100 (b)

3 Follow IUPAC rules.

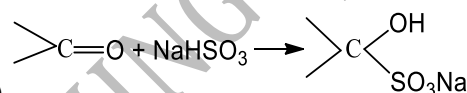
100 (a)

4 Number of isomers in hexane are five as follows



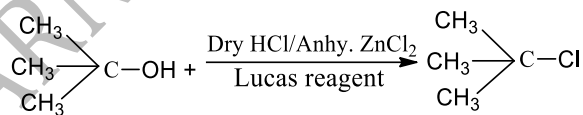
100 (c)

5 (a) it is Diels Alder's reaction (cyclo addition)



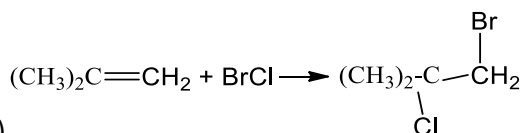
(b)

It is nucleophilic addition reaction



(c)

It is nucleophilic substitution reaction



(d)

It is electrophilic addition reaction

100 (d)

6 (d) is with maximum conjugative structure among them

100 (a)

7 Based on heat of hydrogenation.

101 (c)

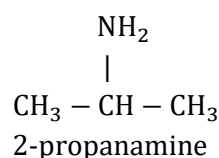
0 Butyne-2 is $\text{CH}_3 - \text{C} \equiv \text{C} - \text{CH}_3$; Two carbon of corner are sp^3 -hybridized.

101 (c)

1 Four π -electrons of double bond and 1 lone pair on N atom leads to delocalisation of six electrons.

101 (d)

2



101 (b)

3

Elem ent	Perce ntage	Percentage at. wt.	Simple ratio
----------	-------------	--------------------	--------------

C	20.0	$\frac{20.0}{12} = 1.66$	$\frac{1.66}{1.66} = 1$
H	6.67	$\frac{6.67}{1} = 6.67$	$\frac{6.67}{1.66} = 4$
N	46.67	$\frac{46.67}{14} = 3.33$	$\frac{3.33}{1.66} = 2$
O	26.66	$\frac{26.66}{16} = 1.66$	$\frac{1.66}{1.66} = 1$

Empirical formula = CH_4N_2O

Empirical formula weight

$$= 12 + (4 \times 1) + (2 \times 14) + 16 = 60$$

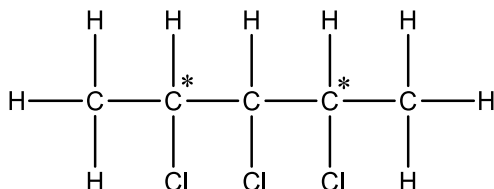
$$\therefore n = \frac{\text{mol. formula weight}}{\text{emp. formula weight}} = \frac{60}{60} = 1$$

\therefore Molecular formula = CH_4N_2O

Given compound gives biuret test. Thus, given compound is urea ($(NH_2)_2CO$).

101 (c)

4 The structure of 2, 3, 4-trichloro pentane is



Hence, two chiral carbon atoms are present in 2, 3, 4-trichloropentane.

101 (b)

5 The electronegativity of F is maximum and thus, C—F bond is more polar.

101 (a)

6 1, 1-dichloro-1-pentene does not exhibit geometrical isomerism.

101 (b)

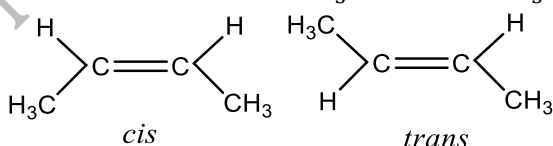
7 The hydrolysis of sugar solution (*dextrorotatory*) leads to formation of *laevorotatory* mixture due to formation of glucose (*dextrorotatory*) and fructose (*laevorotatory*).

101 (c)

8 First two and fourth will show stereoisomerism.

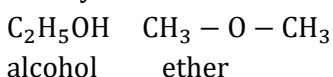
101 (d)

9 Geometrical isomers of $CH_3CH=CH-CH_3$ are



102 (c)

0 Ethyl alcohol shows functional isomerism with dimethyl ether.

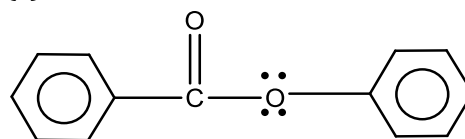


102 (a)

1 Highest to lowest priority ($Br > Cl > CH_3$) is clockwise than *R*.

102 (c)

2



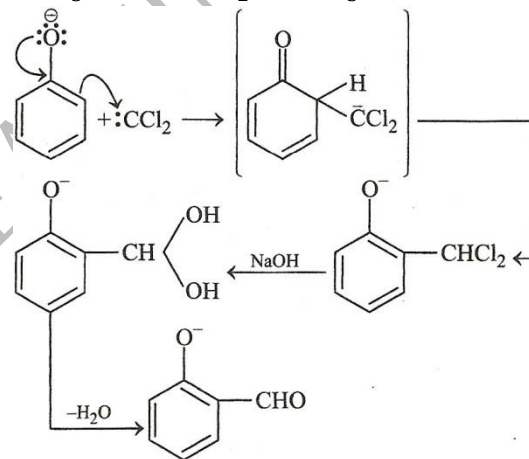
Ring I

Ring II

Electrophilic substitution reaction takes place in compounds in which π -electrons are highly delocalised. The electrophile attacks the region of high electron density, therefore, electrophilic substitution occurs at *ortho/para* position at ring II.

102 (c)

3 When phenol reacts with chlroform and aqueous NaOH solution, it give salicyladehyde.



102 (c)

4 It is definition of asymmetric synthesis.

102 (a)

5 Since, the compound on heating with CuO produced CO_2 , it contains carbon. Again, it does not produce water, hence it does not contain hydrogen. So, the organic compound is carbon tetrachloride (CCl_4).

102 (d)

6 If organic compound gives blue or green colour at the tip of red hot copper wire, this indicates the presence of halogens in the compound. However, compounds like urea, thiourea etc also give blue or green colour in this test even in the absence of halogens, thus, it is not a sure test for halogens

102 (a)

8 Mesomeric effect involves complete transfer of π or lone pair of electrons to the adjacent atom or covalent bond. Hence, it involves delocalisation of pi (π) electrons.

103 (b)

0	Species	Valence electrons	Magnetic behavior
	Carbonium ion	6	Diamagnetic
	Free radical	7	Paramagnetic
	Carbene	6	Diamagnetic
	Nitrane	6	Diamagnetic

103 (b)

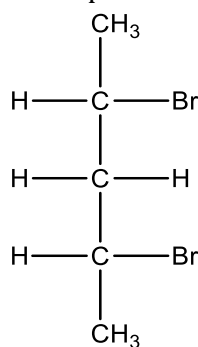
1 It should contain $(\text{CH}_3)_2\text{CH}$ - group to be named as iso.

103 (b)

2 One propene and one cyclopropane.

103 (c)

3 Those compounds which contain two or more asymmetric carbon atoms but are optically inactive due to presence of plane of symmetry, are called *meso* compounds. *Meso* compounds are optically inactive due to internal compensation. Out of the given compounds only 2, 4-dibromopentane have a plane of symmetry, so it is a *meso* compound.



2, 4-dibromopentane (*meso* compound)

103 (a)

4 It is a fact.

103 (a)

6 Electrophiles are the species having a tendency to accept a pair of electron, *e.g.*, NO_2^+ , Br^+ etc. Nucleophiles are the species having a tendency to donate a pair of electron. *e.g.*, CH_3OH , N_3^-

103 (a)

7 C_5H_8 has three possible alkynes. These are
 $\text{CH}_3\text{CH}_2 - \text{CH}_2\text{C} \equiv \text{CH}$, $\text{CH}_3\text{CH}_2\text{C} \equiv \text{C} - \text{CH}_3$
pent-1-yne pent-2-yne
 $\begin{array}{c} \text{CH}_3 \\ | \\ \text{CH}_3 - \text{CH} - \text{C} \equiv \text{CH} \end{array}$

3-methyl but-1-yne

104 (d)

0 I can have maximum 3 hyperconjugative structures. II has maximum 5 hyperconjugative structure, III has 2 conjugative structure while IV has 1 conjugative structure

104 (a)

1 $\text{CH}_3\text{C} \equiv \text{CCH}_2\text{CH}_3$; It is always pentyne-2 and never pentyne-3.

104 (d)

3 The components of an azeotropic mixture are separated by special method, *ie*, fractional distillation. The simple fraction which distils at 337.8 K is a ternary azeotrope consisting of all water. Some alcohol and benzene

104 (a)

4 Hence, an equimolar mixture of the enantiomers (*dextro* or *laevo* forms) is called racemic mixture. It is represented as *dl*-form or \pm form and is optically inactive due to external compensation. Separation of racemic mixture into *d*- and *l*-forms is called resolution.

104 (a)

5 Two successive homologous differ in their formula by CH_2 or have a difference of 14 units in their molecular weight.

104 (c)

6 If a liquid decomposes at or below its boiling point, it is purified by vacuum distillation

104 (c)

7 $\text{CH}_3\text{CH}_2\text{NH}_2$ and CH_3NHCH_3 .

104 (a)

8 IUPAC name of $\text{CH}_3\text{CH}_2\text{CHO}$ is propan-1-al.

104 (b)

9 Alkyl group (an electron releasing (+I group) increases electron density at N-atom, hence, basic nature is increased. In ammonia, no alkyl group is present, so it is least basic.