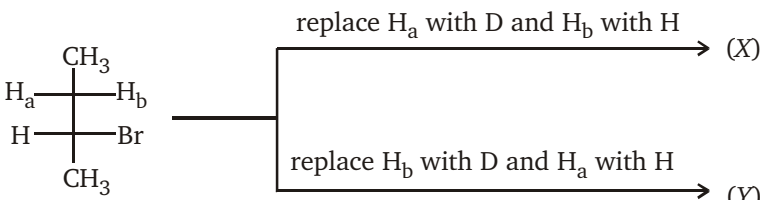
2

ISOMERISM

(Structural & Stereoisomerism)

Level - 1

1.

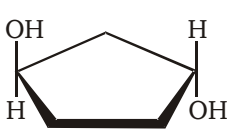


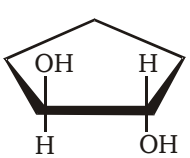
Relation between (*X*) and (*Y*) is :

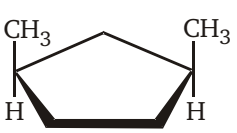
(a) enantiomers (b) diastereomers

(c) *E* and *Z* isomer (d) constitutional isomer

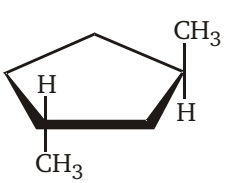
2. Which of the following cyclopentane derivative is optically **inactive** ?

(a) 

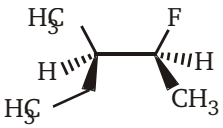
(b) 

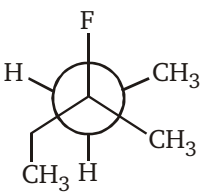
(c) 

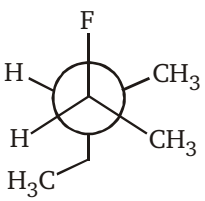
(d) 

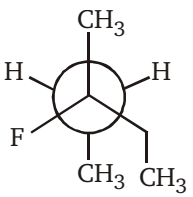
(e) 

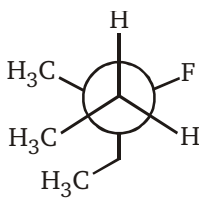
3. Which is the most stable conformer along the 2, 3 C – C bond axis of the compound ?



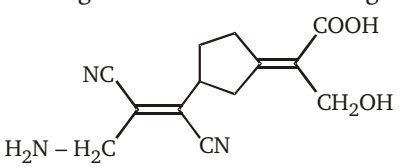
(a) 

(b) 

(c) 

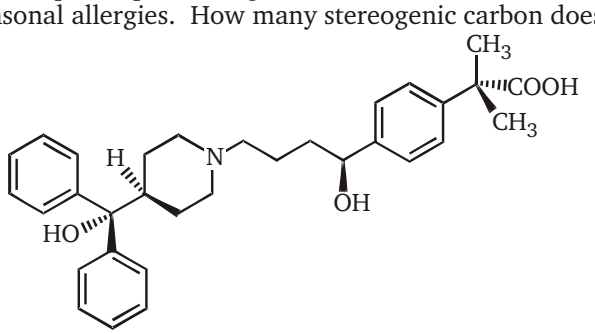
(d) 

4. Assign double bond configurations to the following :



(a) E (b) Z (c) E, E (d) Z, Z

5. Allegra, a common prescription drug with the structure shown below, is given for the treatment of seasonal allergies. How many stereogenic carbon does Allegra possess ?



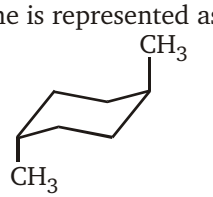
(a) 1 (b) 2 (c) 3 (d) 4

6. How many meso isomers of $C_4H_8Cl_2$ will be ?

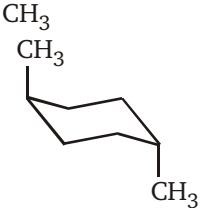
(a) 0 (b) 1 (c) 2 (d) 3

7. The stable form of *trans*-1, 4-dimethylcyclohexane is represented as:

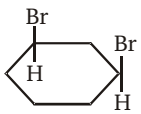
(a) 

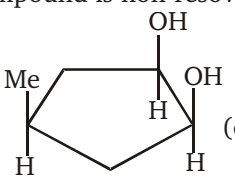
(b) 

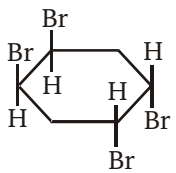
(c) 

(d) 

8. Which of the following compound is non-resovable (meso) compounds ?

(a) 

(b) 

(c) 

(d) All of these

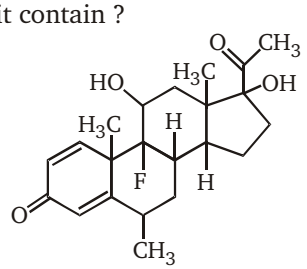
9. HO $\underset{(2)}{CH_2}$ $\underset{(3)}{CH_2}$ F

Which conformer of above compound is most stable across C_2 C_3?

(a) staggered (b) eclipsed (partially)

(c) gauche (d) fully eclipsed

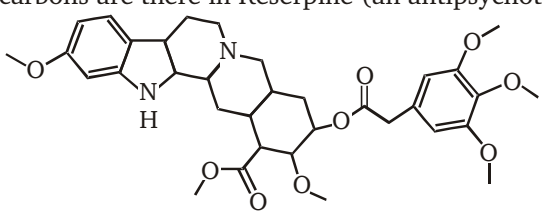
10. The following molecule is fluorometholone, a steroidal anti-inflammatory agent. How many stereogenic centers does it contain ?



fluorometholone

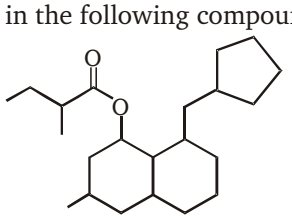
(a) 5 (b) 6 (c) 7 (d) 8

11. How many chiral carbons are there in Reserpine (an antipsychotic drug) ?



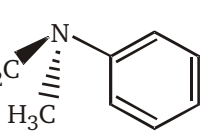
(a) 9 (b) 8 (c) 7 (d) 6

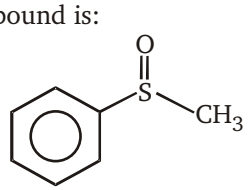
12. How many chiral centers are in the following compound ?

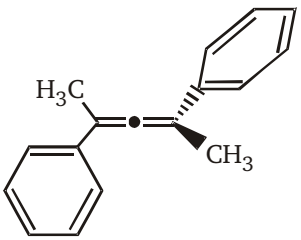


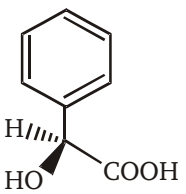
(a) 4 (b) 5 (c) 6 (d) 7

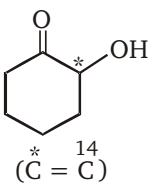
13. Among the following, the optically inactive compound is:

(a) 

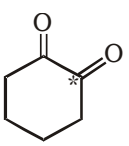
(b) 

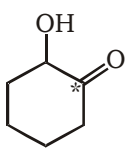
(c) 

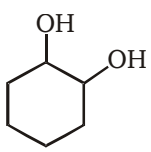
(d) 

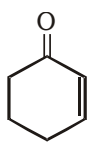
14. 

(*A*) ; Unknown compound (*A*) is :

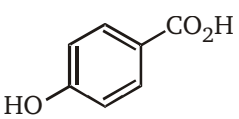
(a) 

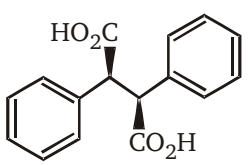
(b) 

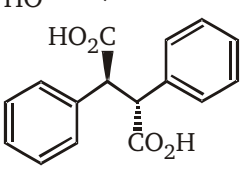
(c) 

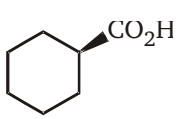
(d) 

15. Which of the following compounds might be useful to the chemist trying to increase the optical purity of the (d) sample ?

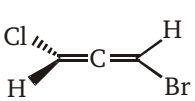
(a) 

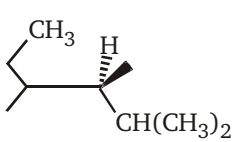
(b) 

(c) 

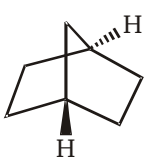
(d) 

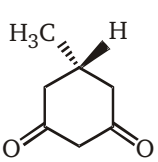
16. Which of the following molecules is (are) chiral ?

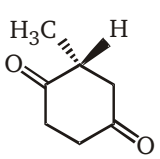

(I)


(II)


(III)

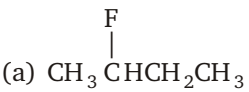

(IV)

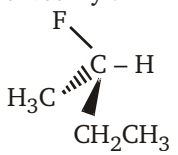

(V)

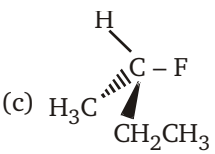

(VI)

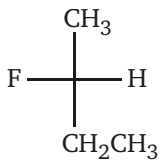
(a) I and II (b) III and IV (c) II, IV and VI (d) I, II, III and VI

17. The structure of (S)-2-fluorobutane is best represented by :

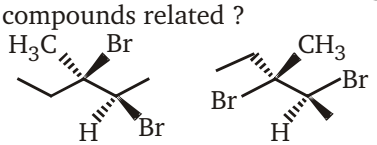
(a) 

(b) 

(c) 

(d) 

18. How are the following compounds related ?



(a) Diastereomers (b) Enantiomers

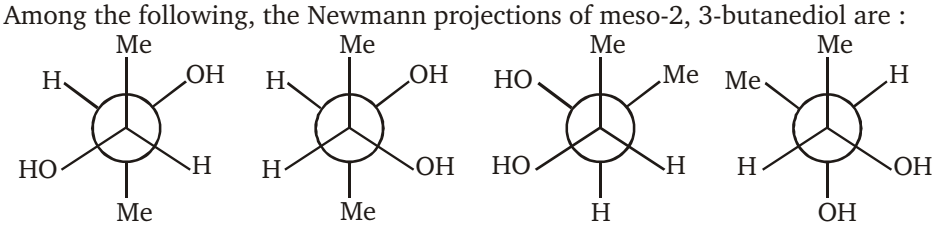
(c) Meso compounds (d) Identical

19. Which one of the following is chiral ?

(a) 1, 1-Dibromo-1-chloropropane (b) 1, 3-Dibromo-1-chloropropane

(c) 1, 1-Dibromo-3-chloropropane (d) 1, 3-Dibromo-2-chloropropane

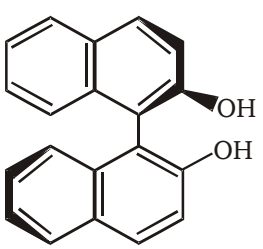
20. Among the following, the Newmann projections of meso-2, 3-butanediol are :



P Q R S

(a) P, Q (b) P, R (c) R, S (d) Q, S

21. The binaphthol (**Bnp**) is:



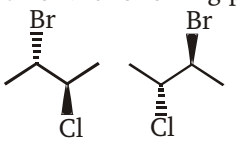
(a) an optically active compound having chiral centre

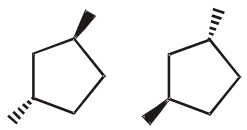
(b) an optically inactive compound

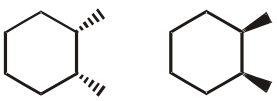
(c) a meso compound

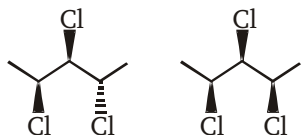
(d) an optically active compound without having chiral centre

22. Which of the following pairs of compounds is a pair of enantiomers ?

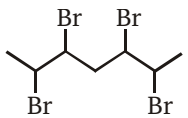
(a) 

(b) 

(c) 

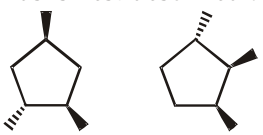
(d) 

23. The maximum number of stereoisomers that could exist for the compound below ?



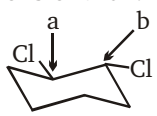
(a) 6 (b) 8 (c) 10 (d) 16

24. The following pair of compounds is best described as :



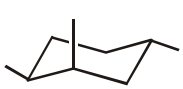
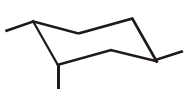
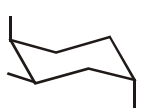
(a) identical (b) diastereomers
(c) enantiomers (d) none of the above

25. Determine the absolute configurations of the labeled carbons (*a* and *b*):

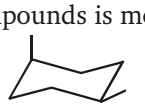
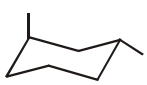
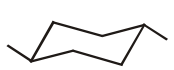


(a) a = R ; b = R (b) a = R ; b = S
(c) a = S ; b = R (d) a = S ; b = S

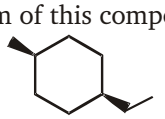
26. Which of the structures (a – d) will be produced if a "ring flip" occurs in the following compound in chair form ?

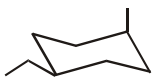
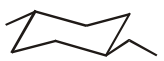
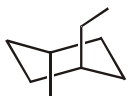
(a)  (b)  (c)  (d) 

27. Which of the following compounds is most stable ?

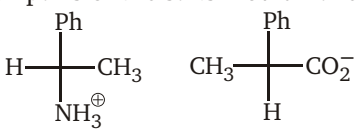
(a)  (b)  (c)  (d) 

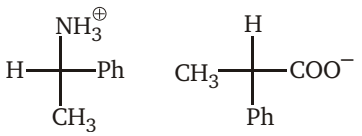
28. Which is the most stable chair form of this compound ?

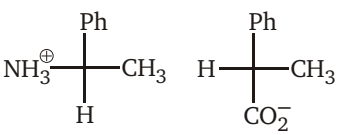
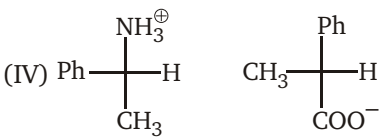


(a)  (b)  (c)  (d) 

29. Which pairs of the salts would have identical solubilities in methanol ?

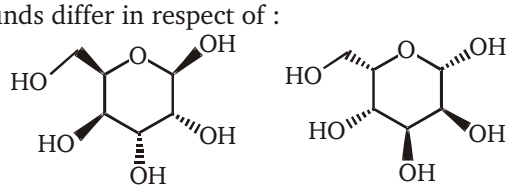
(I) 

(II) 

(III)  (IV) 

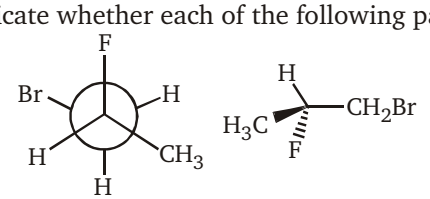
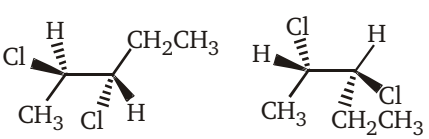
(a) I & IV (b) I & III (c) I & II (d) II & IV

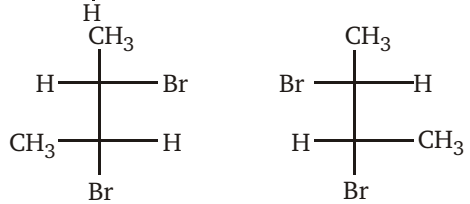
30. The following compounds differ in respect of :



(a) their chemical and physical properties
(b) nothing
(c) the direction in which they rotate plane of polarized light
(d) their interactions with molecules

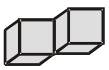
31. Indicate whether each of the following pairs are identical, or ?

(I)  (II) 

(III) 

	I	II	III
(a)	enantiomers	diastereomers	enantiomers
(b)	identical	enantiomers	enantiomers
(c)	enantiomers	diastereomers	identical
(d)	enantiomers	identical	identical

32. Which of the following is achiral ?

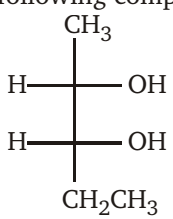
(a) 

(b) 

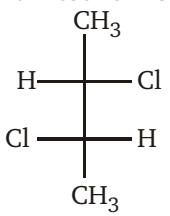
(c) 

(d) a molecule of 3-methylheptane

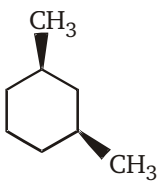
33. Which of the following compounds are meso forms ?



1



2



3

(a) 1 only (b) 3 only

(c) 1 and 2 (d) 2 and 3

34. The separation of a racemic mixture into pure enantiomers is termed as :

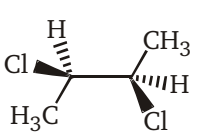
(a) Racemization (b) Isomerization

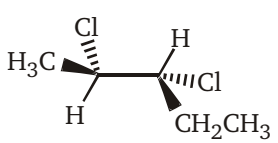
(c) Resolution (d) Equilibration

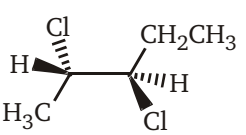
35. Rank of the following groups in order of R, S precedence (IV is highest) :

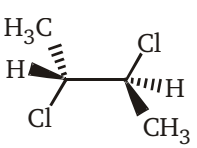
– $CH(CH_3)_2$		– CH_2CH_2Br		– CH_2Br		– $C(CH_3)_3$	
1		2		3		4	
I	II	III	IV	I	II	III	IV
(a) 3	2	4	1	(b) 1	4	2	3
(c) 3	4	1	2	(d) 3	4	2	1

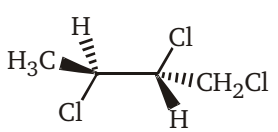
36. Which of the following is a meso compound ?

(a) 

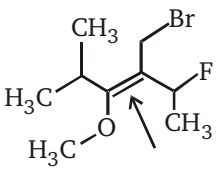
(b) 

(c) 

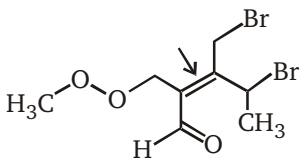
(d) 

(e) 

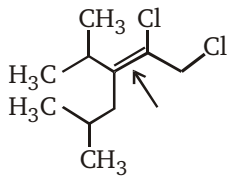
37. Among the following structures, select E isomers (arrows indicate the bonds to be considered) ?



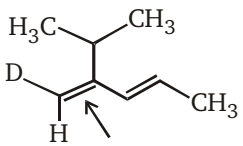
(1)



(2)



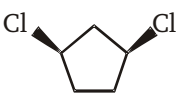
(3)

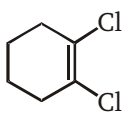


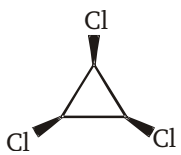
(4)

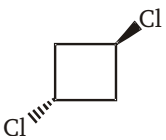
(a) 1 and 2 (b) 1 and 3 (c) 1 and 4 (d) 2 and 3

38. Which of the following compounds has a zero dipole moment ?

(a) 

(b) 

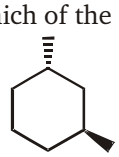
(c) 

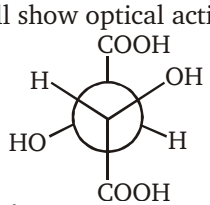
(d) 

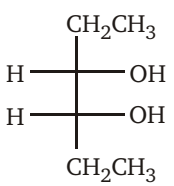
39. On Pluto, where everything is frozen, astronauts discovered two forms of butane gauche and anti. Assuming that there are no rotations around single bonds, which statement about the two forms is correct ?

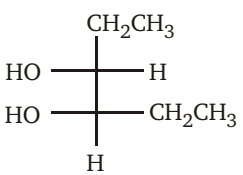
(a) They are enantiomers
(b) They are diastereoisomers
(c) They are meso compounds
(d) The gauche form has two stereogenic centers, and the anti has only one

40. Which of the following will show optical activity ?

(A) 

(B) 

(C) 

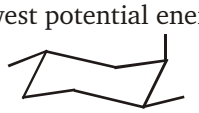
(D) 

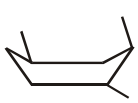
(E) 50/50 mixture of C and D

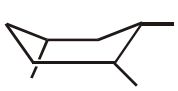
(a) A, D and E (b) A and E only (c) B, C and D (d) All except C

41. Among the structure shown below, which has lowest potential energy ?

(a) 

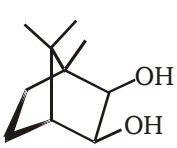
(b) 

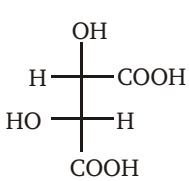
(c) 

(d) 

42. Which of the following molecules is/are chiral ?

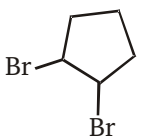
(I) 

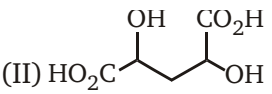
(II) 

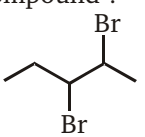
(III) 

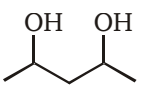
(a) I (b) II (c) III (d) I, II

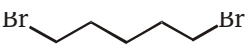
43. A compound was synthesized by a student, but its structure was not identified. However, his wonderfully helpful instructor told him that it was a meso compound with 5 carbons and 2 stereogenic centers. Which of the following structures should the student consider as possibilities for his compound ?

(I) 

(II) 

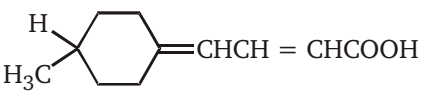
(III) 

(IV) 

(V) 

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

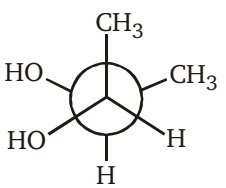
44. How many isomers are possible for the following molecule ?

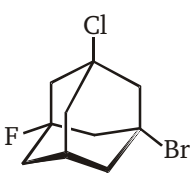


(a) 1 (b) 2 (c) 3 (d) 4

45. Which of the following molecules are chiral ?

(I) 

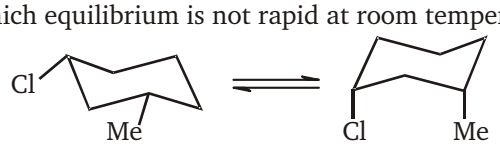
(II) 

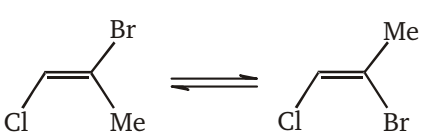
(III) 

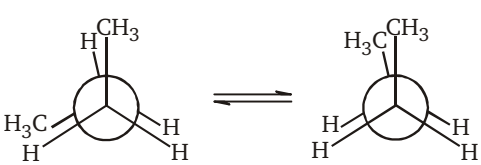
(IV) 

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

46. Which equilibrium is not rapid at room temperature ?

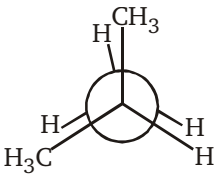
(a) 

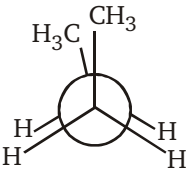
(b) 

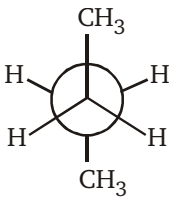
(c) 

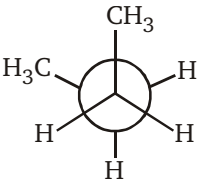
(d) 

47. Which is the lowest energy conformation of butane ?

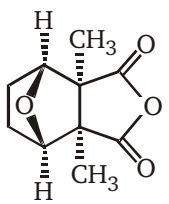
(a) 

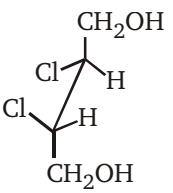
(b) 

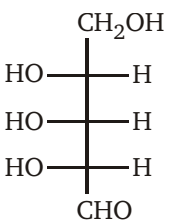
(c) 

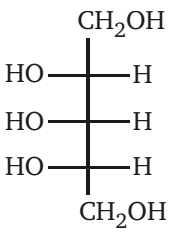
(d) 

48. Which of the structures given below are chiral ?

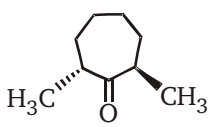
(I) 

(II) 

(III) 

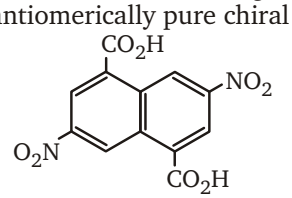
(IV) 

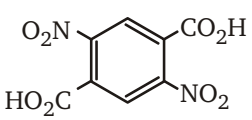
Fischer projections

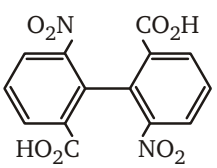
(V) 

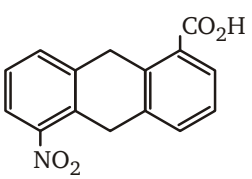
(a) I, II, III (b) II, III, V (c) II, III (d) I, II

49. Which of the following carboxylic acids could be resolved by reaction with an enantiomerically pure chiral amine ?

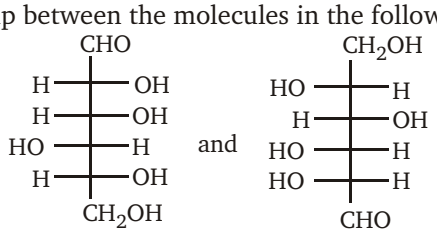
(a) 

(b) 

(c) 

(d) 

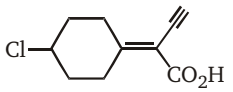
50. What is the relationship between the molecules in the following pairs ?



(Fischer projections)

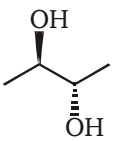
(a) enantiomers (b) diastereomers (c) identical (d) structural isomers

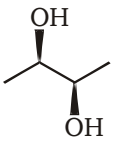
51. What are the correct designations for the structure below ?

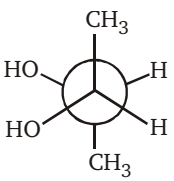


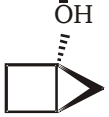
(a) E, E
(b) Z, E
(c) E, Z
(d) No geometrical isomers are possible

52. Which of the following molecules are chiral ?

(I) 

(II) 

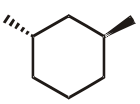
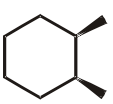
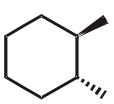
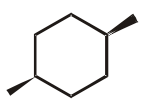
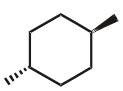
(III) 

(IV) 

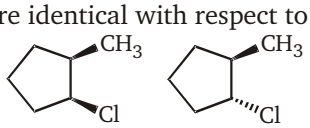
(V) 

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

53. Which one of the following isomeric structures has the lowest energy ?

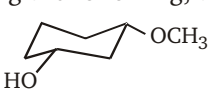
(a) 
(b) 
(c) 
(d) 
(e) 

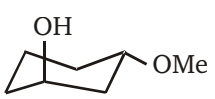
54. The following compounds are identical with respect to :

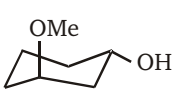


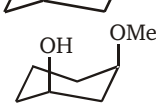
(a) molecular composition
(b) boiling point
(c) melting point
(d) IUPAC name

55. Among the following, the most stable isomer is :

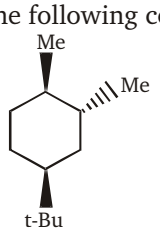
(a) 

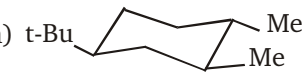
(b) 

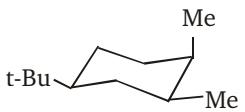
(c) 

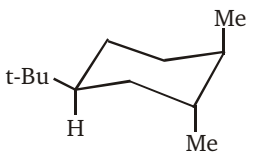
(d) 

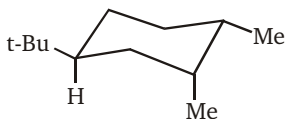
56. The most stable conformation of the following compound is :



(a) 

(b) 

(c) 

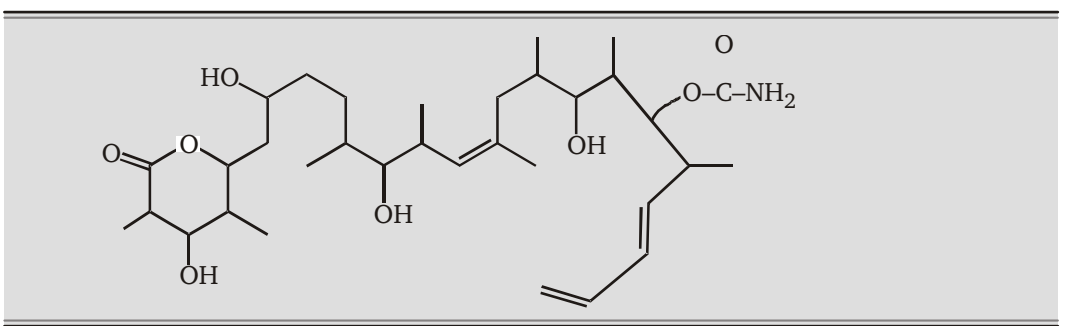
(d) 

57. Which of the following molecules have non-zero dipole moments ?

(I) gauche conformation of 1, 2-dibromoethane
(II) anti conformation of 1, 2-dibromoethane
(III) *trans*-1, 4-dibromocyclohexane
(IV) *cis*-1, 4-dibromocyclohexane
(V) tetrabromomethane
(VI) 1, 1-dibromocyclohexane

(a) I and II
(b) I and IV
(c) II and V
(d) I, IV and VI

58. What is the maximum number of stereoisomers possible for discodermolide ?



(a) 2^{14}
(b) 2^{15}
(c) 2^{16}
(d) 2^{17}

59. An aqueous solution containing compounds *A* and *B* shows optical activity. *A* and *B* are stereoisomers. Which of the following possibilities cannot be correct ?

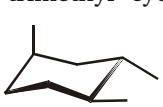
(a) *A* has two chiral centers, but *B* does not have any because it has a symmetry plane

(b) *A* and *B* are enantiomers

(c) *A* and *B* are diastereomers

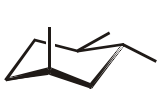
(d) *A* and *B* are not present in equal amounts

60. Which of the following structures represents the lowest-energy form of (1S, 2S, 4R)-trimethyl -cyclohexane ?

(a) 

(b) 

(c) 

(d) 

61. Which one of the following is a diastereomer of (R)-4-bromo-cis-2-hexene ?

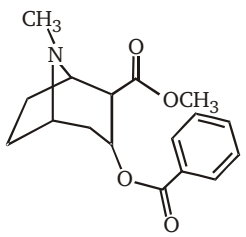
(a) (S)-4-bromo-*cis*-2-hexene

(b) (S)-5-bromo-*trans*-2-hexene

(c) (R)-4-bromo-*trans*-2-hexene

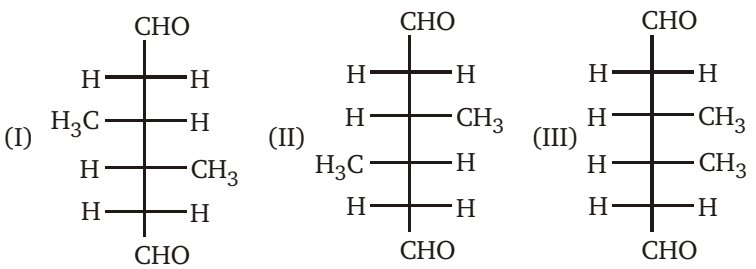
(d) (R)-5-bromo-*trans*-2-hexene

62. The structural formula of cocaine is shown below. How many stereogenic carbon atoms are there in this molecule ?



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

63. Which of the following statements best describes the stereochemical relationships of compound I, II and III shown below ?



(a) All compounds are chiral

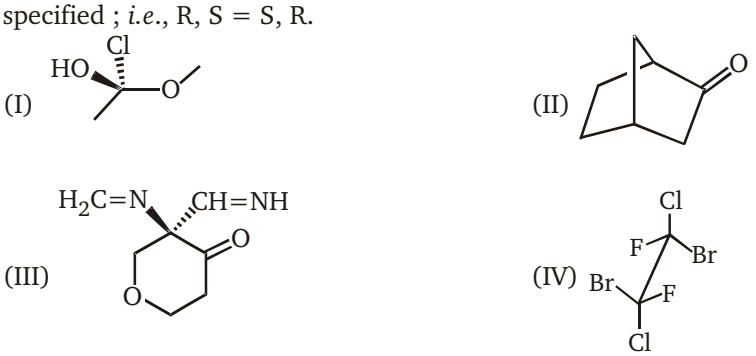
(b) None of the compounds is chiral

(c) I and II are meso compounds

(d) I and II are diastereomers, and III is a meso compound

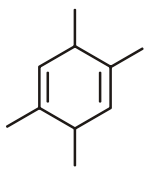
(e) I and II are chiral

64. What is the absolute configuration of the following molecules ? (NS = the molecule has no center) Note : For the purpose of this question only, the order of stereocenters is not specified ; *i.e.*, R, S = S, R.



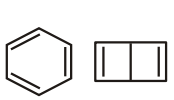
	I	II	III	IV		I	II	III	IV
(a)	R	R, S	R	NS	(b)	R	R, R	S	R, R
(c)	R	R, S	NS	NS	(d)	R	R, S	R	R, S

65. The number of all the possible stereoisomers formed by the given compound is :

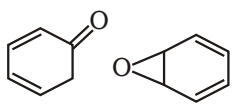


(a) 2 (b) 3 (c) 32 (d) 64

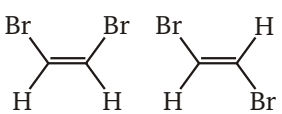
66. The relationship among the following pairs of isomers is:



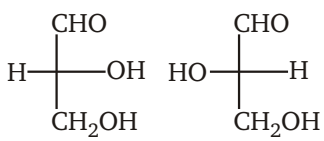
(I)



(II)



(III)

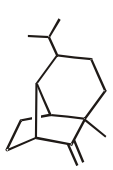


(IV)

I	A: Constitutional
II	B: Configurational
III	C: Conformational
IV	D: Optical

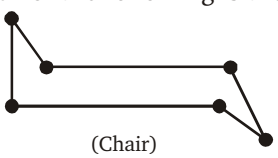
(a) I A,II B,III B,IV D (b) I A,II A,III B,IV D
(c) I B,II A,III B,IV D (d) I B,II B,III A,IV B

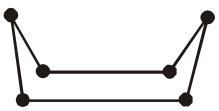
67. The structural formula of sativene is shown below. How many stereogenic centers are there in this molecule ?

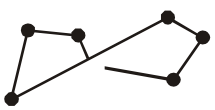


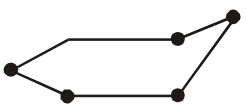
(a) 2 (b) 3
(c) 4 (d) 5

68. Which of the following is the least stable conformer of cyclohexane ?

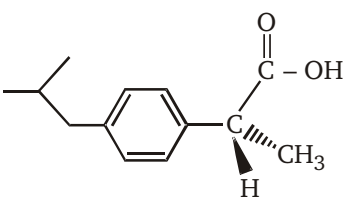
(a) 
(Chair)

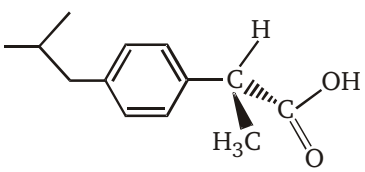
(b) 
(Boat)

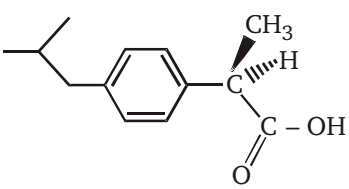
(c) 
(Twist boat)

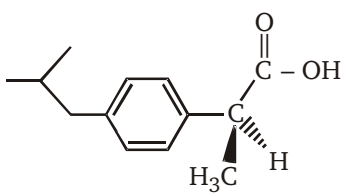
(d) 
(Half-chair)

69. The S- enantiomer of ibuprofen is responsible for its pain-relieving properties. Which one of the following structures shown below is (S)-ibuprofen ?

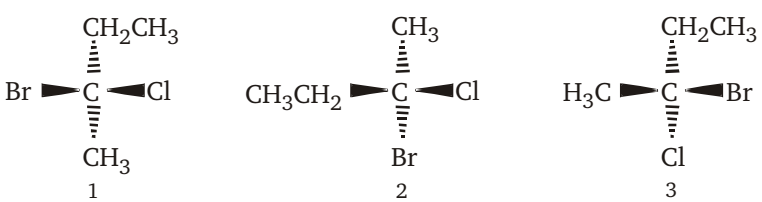
(a) 

(b) 

(c) 

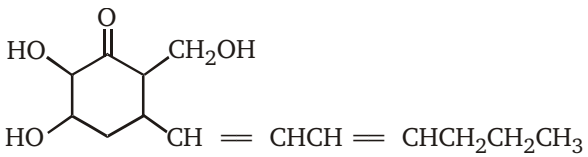
(d) 

70. Which of the following depict the same ?



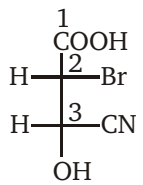
(a) 1 and 2
(b) 1 and 3
(c) 2 and 3
(d) 1, 2, and 3

71. A naturally occurring substance has the constitution shown below. How many may have this constitution ?



(a) 2 (b) 8 (c) 16 (d) 64

72. The absolute configurations of the two centers in the following molecule are :

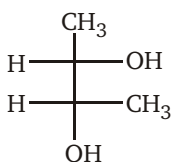


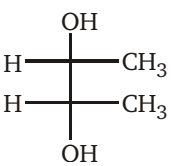
(a) 2(R), 3(S) (b) 2(R), 3(R) (c) 2(S), 3(S) (d) 2(S), 3(R)

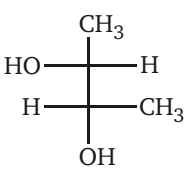
73. The total number of stereoisomer possible for 2, 3-dichloro butane :

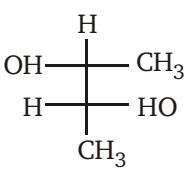
(a) 2 (b) 3 (c) 4 (d) 5

74. Which of the following structure is not meso-2,3-butanediol ?

(a) 

(b) 

(c) 

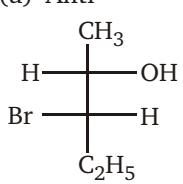
(d) 

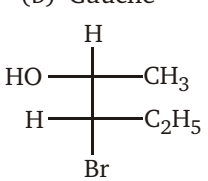
75. A solution of optically active 1-phenylethanol racemizes in acidified aqueous medium. It is due to :

(a) enolization (b) carbonium ion formation
(c) carbanion formation (d) reversible oxidation-reduction

76. The most stable conformation of ethylene glycol is :

(a) Anti (b) Gauche (c) Partially eclipsed (d) Fully eclipsed

77. 



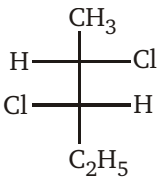
The molecules represented by the above two structures are :

(a) identical (b) enantiomers
(c) diastereomers (d) epimers

78. The correct order of priority of groups SCH_3 (I), $—NO_2$ (II), —C CH (III) and $—CH_2C_6H_5$ (IV), on the basis of CIP classification, is (increasing order) :

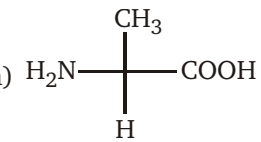
(a) I, III, II, IV (b) IV, III, II, I
(c) II, IV, I, III (d) III, IV, II, I

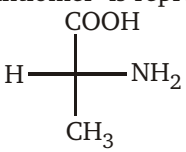
79. The configuration at C-2 and C-3 of the compound given :

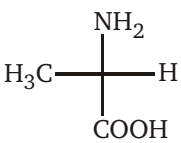


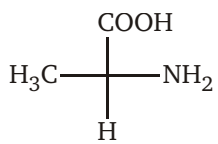
(a) 2R, 3S (b) 2S, 3R (c) 2S, 3S (d) 2R, 3R

80. Amongst the following amino acids, the (R) - enantiomer is represented by :

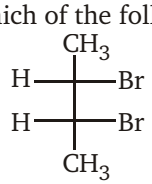
(a) 

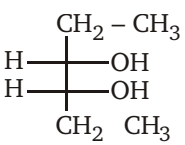
(b) 

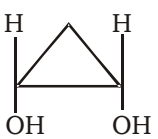
(c) 

(d) 

81. Which of the following is a meso compound ?

(a) 

(b) 

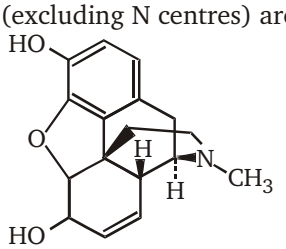
(c) 

(d) All of these

82. Predict stereochemistry of product when *d* and *l*-amine reacts with ℓ-acid:

(a) Diastereomers (b) Meso (c) Racemic (d) Pure Enantiomer

83. How many chiral center (excluding N centres) are there in morphine?

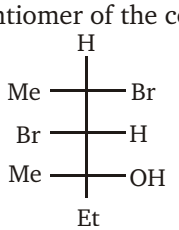


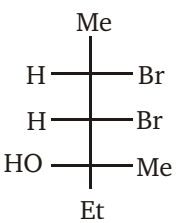
(a) 4 (b) 5 (c) 6 (d) More than 6

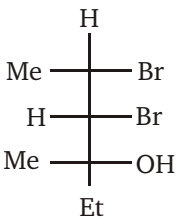
84. Which dimethylcyclobutane is optically active ?

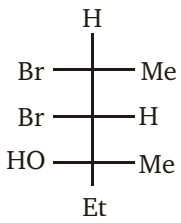
(a) *trans*-1, 2 (b) *cis*-1, 2 (c) *trans*-1, 3 (d) *cis*-1, 3

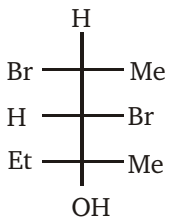
85. Which of the following is the enantiomer of the compound shown below ?



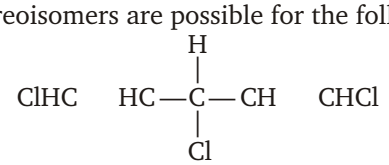
(a) 

(b) 

(c) 

(d) 

86. How many different stereoisomers are possible for the following compound ?



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

87. The following compounds are best described as :

(*R*)-PhCH(OH)CH_3 and (S)-PhCH(OH)CH_3

(a) enantiomers
(b) diastereomers
(c) not stereoisomers
(d) conformational isomers (differing by single bond rotation)

88. Rank the following substituent groups in order of decreasing priority according to the Cahn-Ingold-Prelog system :

$\underset{1}{CH(CH_3)_2}$ $\underset{2}{CH_2Br}$ $\underset{3}{CH_2CH_2Br}$

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

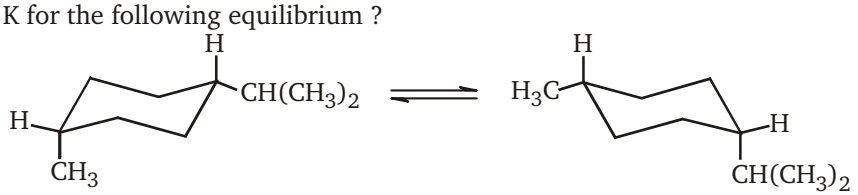
89. Compare the stabilities of the following two compounds :

A : *cis*-1-Ethyl-3-methylcyclohexane

B : *trans*-1-Ethyl-3-methylcyclohexane

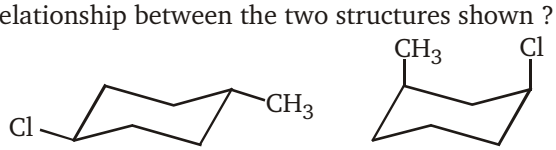
(a) A is more stable (b) A and B are of equal stability
(c) B is more stable (d) No comparison can be made

90. What, if anything, can be said about the magnitude of the equilibrium constant K for the following equilibrium ?



(a) $K = 1$ (b) $K < 1$
(c) $K > 1$ (d) No estimate of K can be made

91. What is the relationship between the two structures shown ?



(a) Constitutional isomers
(b) Stereoisomers
(c) Different drawing of the same conformation of the same compound
(d) Different conformation of the same compound

92. Which of the following statements is true ?

(a) van der Waals' strain in *cis*-1, 2-dimethylcyclopropane is the principal reason for its decreased stability relative to the *trans* isomer

(b) Cyclohexane gives off more heat per CH_2 group on being burned in air than any other cycloalkane

(c) The principal source of strain in the boat conformation of cyclohexane is angle strain

(d) The principal source of strain in the gauche conformation of butane is torsional strain

93. Ph — CH NO_2H $\xrightarrow[3\,\text{days}]{\text{isomerises}}$ (x) $\underset{(50\ 50\%)}{}$, Isomer (x) is :

(a) Ph — NO — CH_2OH — — $_2$

(b) Ph CH_2 NO_2

(d) None

94. Which of the following will not show geometrical isomerism ?

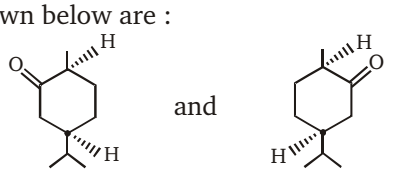
(a) CH_3 — C(CH_3) — CH — CH_2 — CH_3

(b) CH_3 — CH(CH_3) — CH — CH — CH_2 — CH_3

(c) CH_3 — CH — CH — CH_3

(d) CH_3 — CH_2 — CH — CH — CH_2 — CH_3

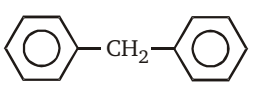
95. The two compounds shown below are :



and

(a) diastereomers (b) enantiomers (c) epimers (d) regiomers

96. The molecular formula of diphenylmethane,

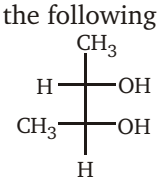


, is $C_{13}H_{12}$;

How many structural isomers are possible when one of the hydrogen is replaced by a chlorine atom ?

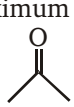
(a) 6 (b) 4 (c) 8 (d) 7

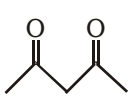
97. Correct configuration of the following molecule is :

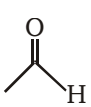


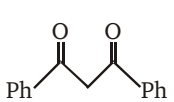
(a) 2S, 3S (b) 2S, 3R (c) 2R, 3S (d) 2R, 3R

98. Maximum enol content is in :

(a) 

(b) 

(c) 

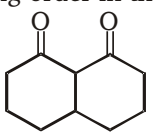
(d) 

99. Which of the following will have one of the stereoisomer meso ?

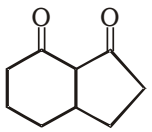
(a) 2-chlorobutane (b) 2, 3-dichlorobutane

(c) 2,3-dichloropentane (d) 2-hydroxypropanoic acid

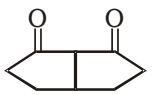
100. The correct decreasing order in the enol content of following molecules is :



(I)



(II)



(III)

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

101. Total number of stereoisomers of the compound 1-bromo-3-chlorocyclobutane is:

(a) 0 (b) 1 (c) 2 (d) 3

102. Total number of stereoisomers of the 1,3-dichlorocyclohexane is:

(a) 0 (b) 1 (c) 3 (d) 4

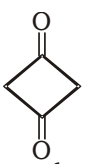
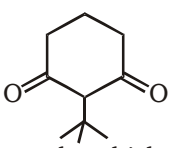
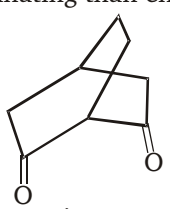
103. Total number of stereoisomers of the compound 1, 4-dichlorocyclohexane is :

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

104. Total number of stereoisomers of the compound 2-4-dichloroheptane is:

(a) 0 (b) 2 (c) 3 (d) 4

105. In which of the following keto form is more dominating than enol form:

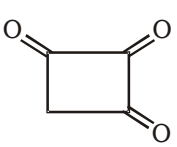
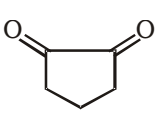
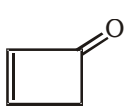
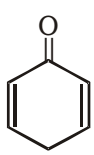
(a)  (b)  (c)  (d) all of these

106. Among the following compounds, which will give maximum enol content in solution :

(a) $C_6H_5-\overset{\overset{O}{\|}}{C}-CH_2-\overset{\overset{O}{\|}}{C}-C_6H_5$ (b) $CH_3-\overset{\overset{O}{\|}}{C}-CH_2-\overset{\overset{O}{\|}}{C}-CH_3$

(c) $CH_3-\overset{\overset{O}{\|}}{C}-CH_2-CH_2-CH_3$ (d) $CH_3-\overset{\overset{O}{\|}}{C}-CH_2-COOC_2H_5$

107. Which of the following has unstable enol form ?

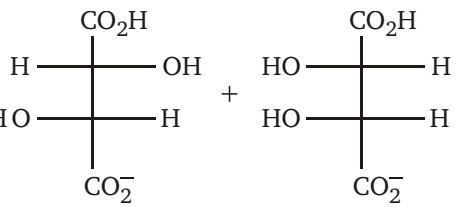
(a)  (b)  (c)  (d) 

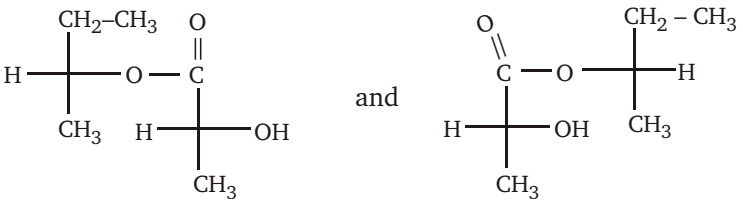
108. Calculate enantiomeric excees of mixture containing 6g of (+) 2-butanol and 4g of (–) -2-butanol.

(a) 10% (b) 20% (c) 40% (d) 33%

109. Which of the following pair represent pair of diastereomers ?

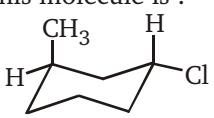
(a) Meso tartaric acid and (*l*) tartaric acid

(b) 

(c) 

(d) All of these

110. The stereochemistry of this molecule is :



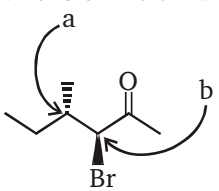
(a) 1R, 3R (b) 1R, 3S (c) 1S, 3S (d) 1S, 3R

111. Pure (S)-2-butanol has a specific rotation of +13.52 degrees. A sample of 2-butanol prepared in the lab and purified by distillation has a calculated specific rotation of +6.76 degrees. What can you conclude about the composition ?

(a) 50% (S), 50% impurity (b) 50% (S), 50% (R)

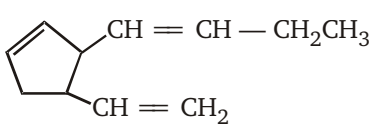
(c) 50% (S), 50% racemic (d) some other mixture

112. Determine the absolute configurations of the chiral centres in the following compound.



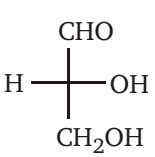
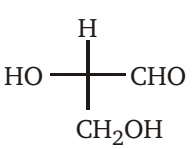
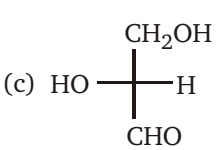
(a) a R; b S (b) a R; b R (c) a S; b S (d) a S; b R

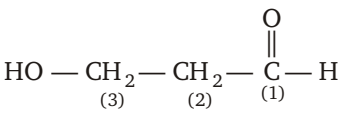
113. Total number of stereoisomers possible for following compound is :



(a) 8 (b) 16 (c) 32 (d) 64

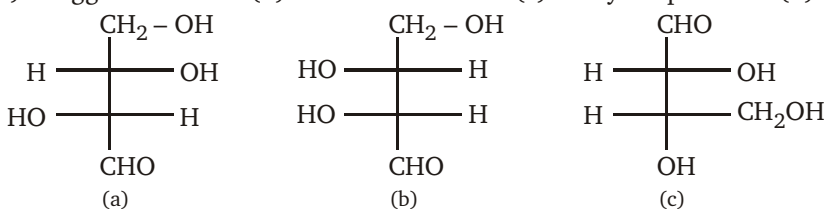
114. Which is the correct structure of D-glyceraldehyde ?

(a)  (b)  (c)  (d) All of these

115. 

Which conformer of above compound is most stable
(consider conformer across (C_2 — C_3)

(a) Staggered (b) Gauche (c) Fully eclipsed (d) Partially eclipsed

116. 

(a) (b) (c)

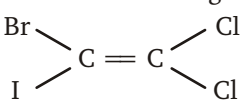
(D) & (L) Configuration of above carbohydrate is :

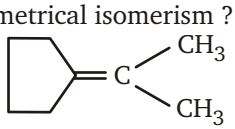
(a) L, L, D (b) L, D, L (c) L, L, L (d) L, D, D

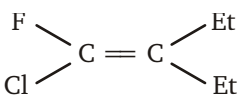
117. How many isomers have the name bromomethylcyclopentane ? (ignoring chirality)

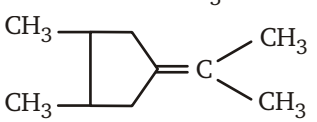
(a) 4 (b) 5 (c) 6 (d) 7

118. Which of the following compound can show geometrical isomerism ?

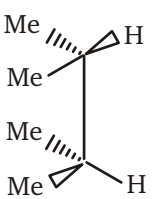
(a) 

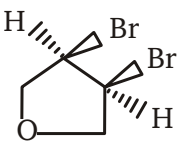
(b) 

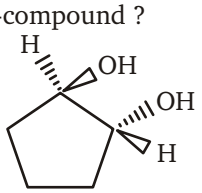
(c) 

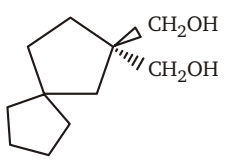
(d) 

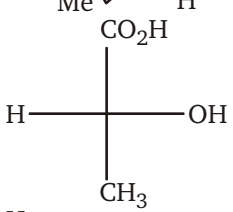
119. Which of the following structure represent meso-compound ?

(a) 

(b) 

(c) 

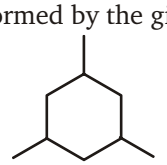
(d) 

120. 

How many representations of lactic acid are possible in Fischer projection (*d* & *l*) ?

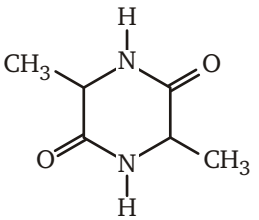
(a) 8 (b) 12 (c) 24 (d) 36

121. Total number of stereoisomer formed by the given compound is :



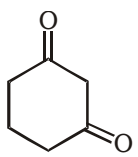
(a) 2 (b) 3 (c) 4 (d) 8

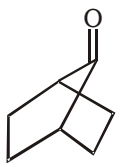
122. The number of stereoisomers formed by the given compound is :

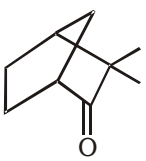


(a) 2
(b) 3
(c) 4
(d) 5

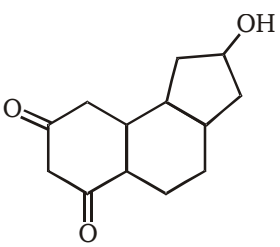
123. Which of the following compound does not undergo base - catalyzed exchange in D_2O even though it has an -hydrogen?

(a) 

(b) 

(c) 

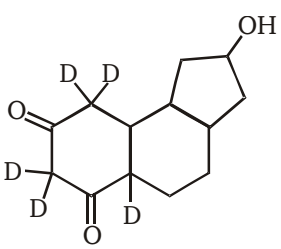
(d) both (b) & (c)

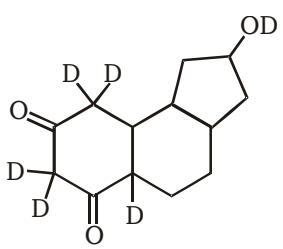
124. 

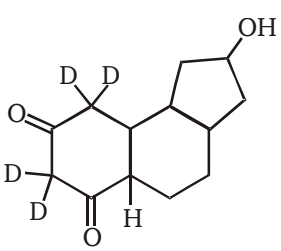
D_2O/OH long time

Product

Identify the product formed in the above reaction:

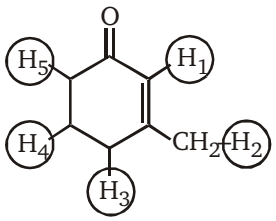
(a) 

(b) 

(c) 

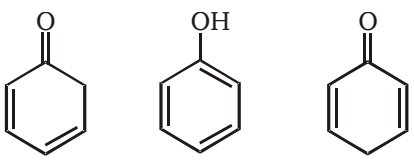
(d) None of these

125. In 3-methyl-2-cyclohexenone which hydrogen cannot undergo deuterium exchange when it reacts with CH_3O^- /CH_3OD ?



(a) H_1, H_4 (b) H_4 (c) H_3, H_2 (d) H_5, H_3

126.

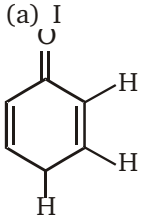


(I) (II) (III)

The tautomer of II is :

(a) I (b) III (c) both I and III (d) none of these

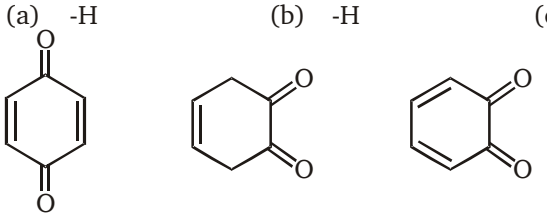
127.



In the enolization of the given molecule, the H-atom involved is :

(a) -H (b) -H (c) -H (d) cannot be enolized

128.

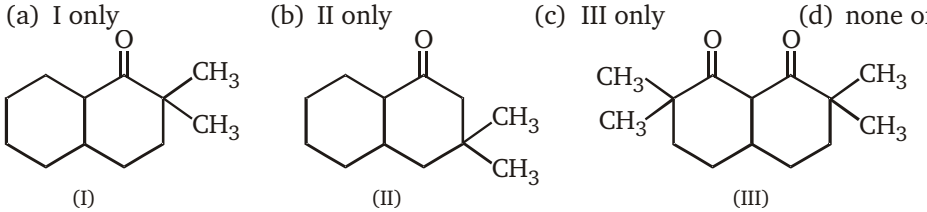


(I) (II) (III)

Among the given structure which can exhibit tautomerism ?

(a) I only (b) II only (c) III only (d) none of these

129.



(I) (II) (III)

Identify the which can exhibit tautomerism ?

(a) I only (b) II only (c) III only (d) all of these

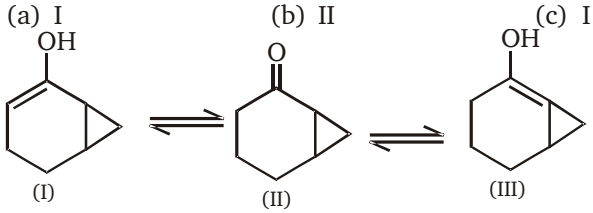
130. $CH_3 - CH = O \rightleftharpoons CH_2 = CH - OH$

(I) (II)

Between the two tautomers which is more stable ?

(a) I (b) II (c) I = II (d) none of these

131.

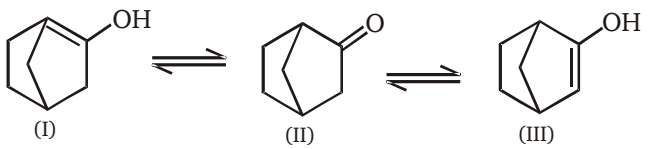


(I) (II) (III)

Correct stability order of the given tautomers is :

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

132.

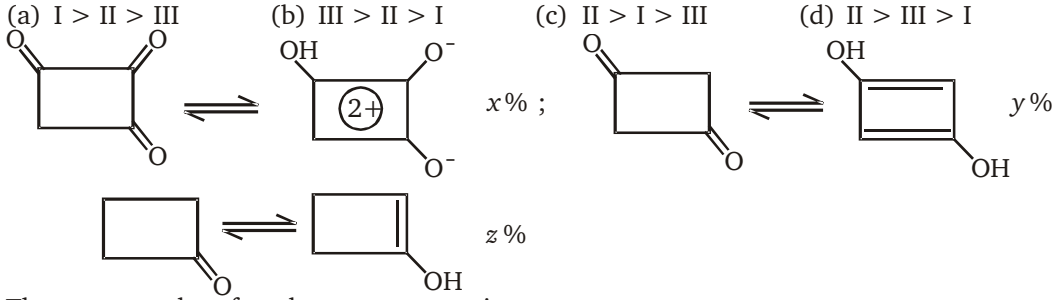


(I) (II) (III)

Correct stability order of the given tautomers is :

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

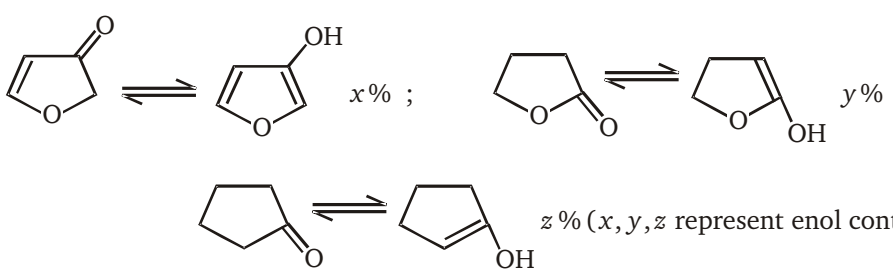
133.



The correct order of enol contents x, y, z is :

(a) $x > y > z$ (b) $z > y > x$ (c) $y > x > z$ (d) $x > z > y$

134.

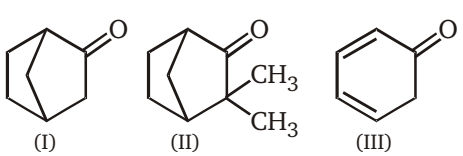


z % (x, y, z represent enol content)

The correct order of x, y, z is :

(a) $x > y > z$ (b) $z > y > x$ (c) $y > x > z$ (d) $x > z > y$

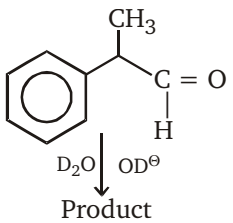
135.



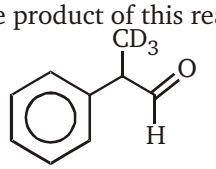
(I) (II) (III)

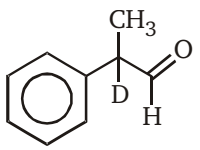
Among the given ketones, the one which does not enolize is :

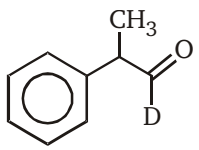
(a) I (b) II (c) III (d) none of these

136. 

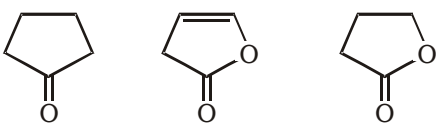
The product of this reaction should be :

(a) 

(b) 

(c) 

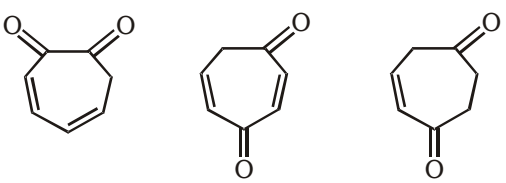
(d) All of these

137. 

(I) (II) (III)

Among the given compounds, the correct order of enol content is :

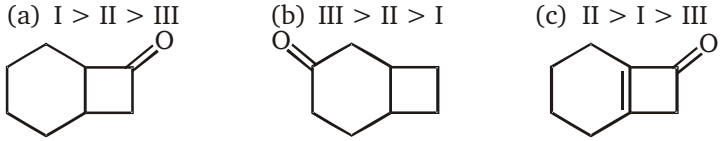
(a) I > II > III (b) III > II > I (c) II > I > III (d) II > III > I

138. 

(I) (II) (III)

Among the given compounds, the correct order of enol content is :

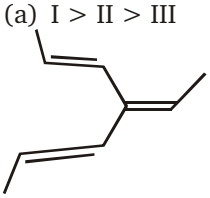
(a) I > II > III (b) III > II > I (c) II > I > III (d) II > III > I

139. 

(I) (II) (III)

Among the given compounds, the correct order of enol content is :

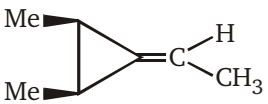
(a) I > II > III (b) III > II > I (c) III > I > II (d) II > I > III

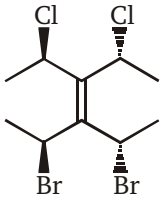
140. 

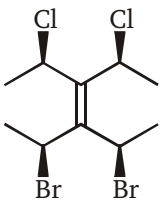
How many geometrical isomers are possible for the above compound ?

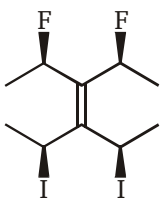
(a) 3 (b) 4 (c) 6 (d) 8

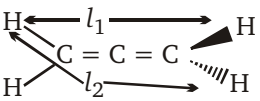
141. Which of the following compound will not show geometrical isomerism across the -bond ?

(a) 

(b) 

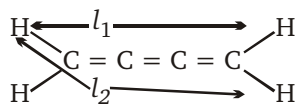
(c) 

(d) 

142. 

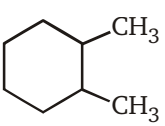
Choose the correct relation between l_1 and l_2 ?

(a) l_1 l_2 (b) l_1 l_2 (c) l_1 l_2 (d) l_2 $2l_1$

143. 

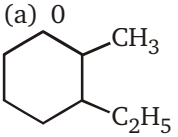
Choose the correct relation between l_1 and l_2 ?

(a) l_1 l_2 (b) l_1 l_2 (c) l_1 l_2 (d) l_2 $2l_1$

144. 

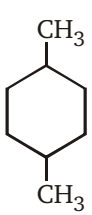
How many geometrical isomers are possible for the above compound ?

(a) 0 (b) 2 (c) 3 (d) 4

145. 

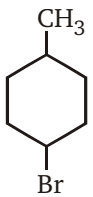
How many geometrical isomers are possible for the above compound ?

(a) 0 (b) 2 (c) 3 (d) 4

146. 

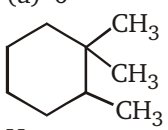
How many geometrical isomers are possible for the above compound ?

(a) 0 (b) 2 (c) 3 (d) 4

147. 

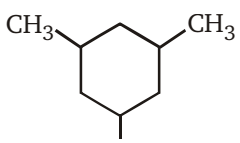
How many geometrical isomers are possible for the above compound ?

(a) 0 (b) 2 (c) 3 (d) 4

148. 

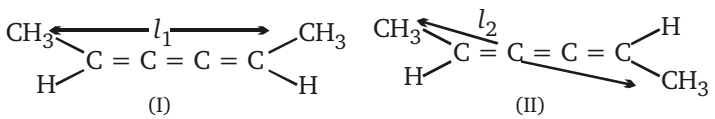
How many geometrical isomers are possible for the above compound ?

(a) 0 (b) 2 (c) 3 (d) 4

149. 

How many geometrical isomers are possible for the above compound ?

(a) 0 (b) 2 (c) 3 (d) 4

150. 

(I) (II)

I and II are geometrical isomers of each other because

(a) l_1 l_2 (b) l_1 l_2

(c) l_2 l_1 (d) l_1 and l_2 cannot be compared.

151. CH_2 CH CH CH CH CH_2

How many geometrical isomers are possible for this compound ?

(a) 2 (b) 3 (c) 4 (d) 8

152. CH_3 CH C(Br) C(Cl) CH CH_3

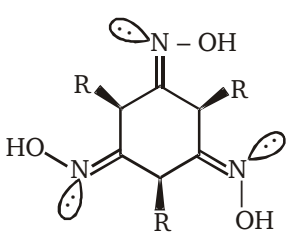
How many geometrical isomers are possible for this compound?

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

153. CH_3 CH C(Br) C(Br) CH CH_3

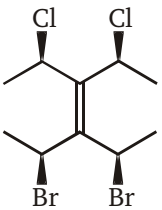
How many geometrical isomers of this compound are possible ?

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

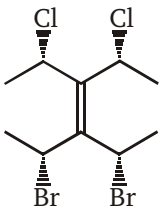
154. 

(a) chiral
(b) C_3 axis of symmetry
(c) Optically active
(d) All of these

155.



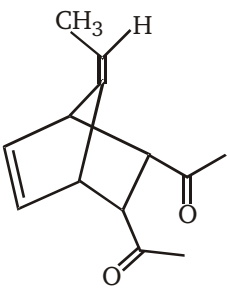
(A)



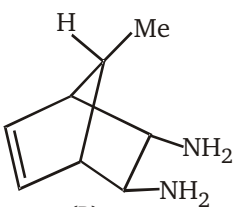
(B)

Relationship between above pair (A) & (B) is :
(a) Enantiomer
(b) Diastereomers
(c) Identical
(d) Structural isomer

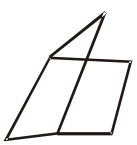
156.

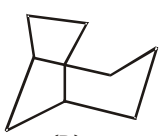


(A)



(B)

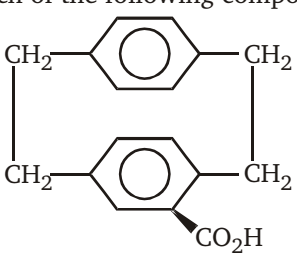

(C)


(D)

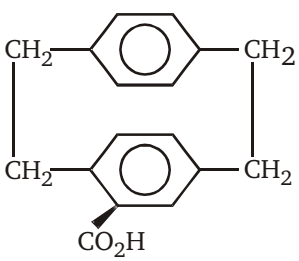
From the above compound (*A*), (*B*), (*C*) & (*D*) chiral compound is :
(a) *A* (b) *B* (c) *C* (d) *D*

157. Which of the following compound is achiral ?

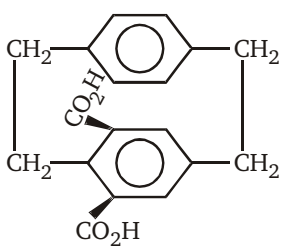
(a)



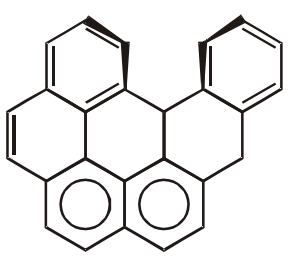
(b)



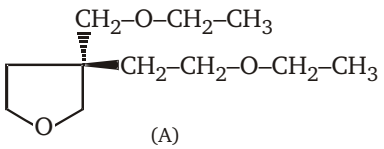
(c)



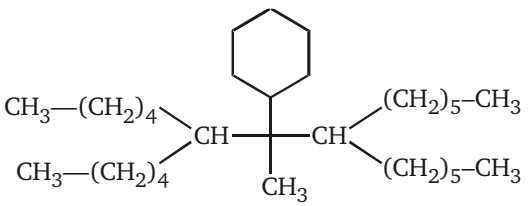
(d)



158.



(A)



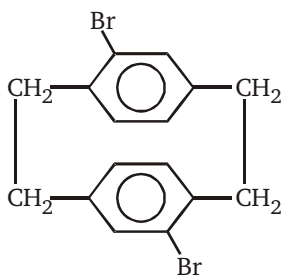
(B)

R and S configuration of compound (A) & (B) will be :

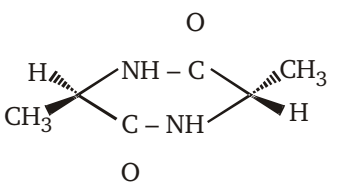
(a) R, R (b) R, S (c) S, R (d) S, S

159. Which of following compound has center of symmetry?

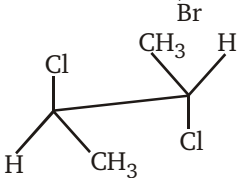
(a)



(b)



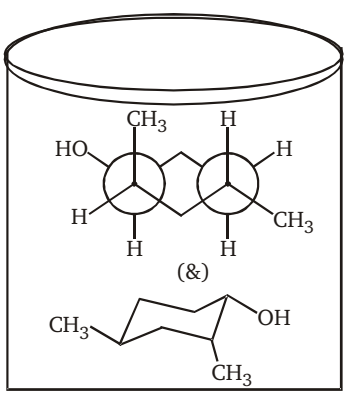
(c)



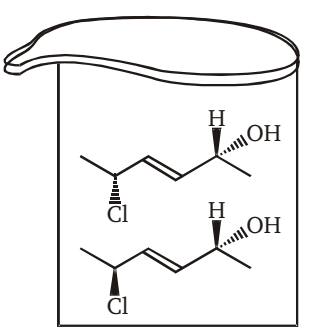
(d) All of these

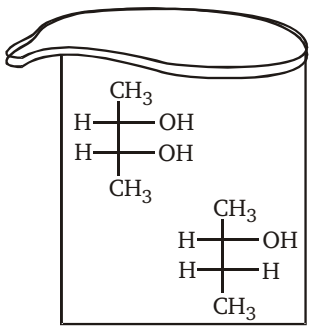
160. Which mixture of structure in each beaker would rotate plane polarized light ?

(a)



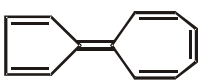
(b)

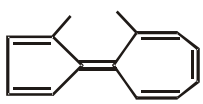


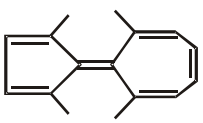
(c) 

(d) All of these

161. Which of following compound will rotate the plane polarized light at room temperature?

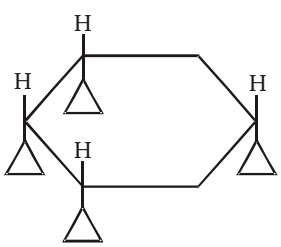
(a) 

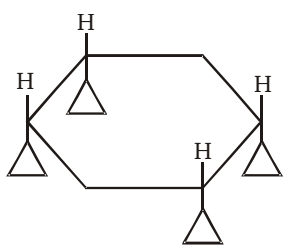
(b) 

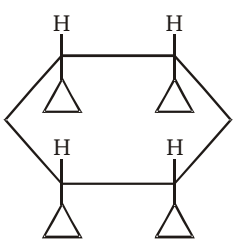
(c) 

(d) 

162. Which of the following having plane of symmetry ?

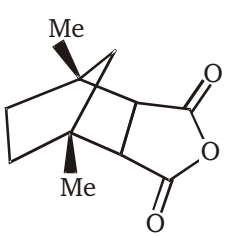
(a) 

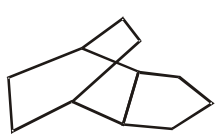
(b) 

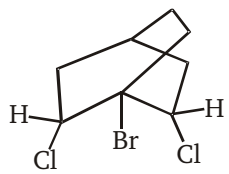
(c) 

(d) All of these

163. Which of following compound is achiral ?

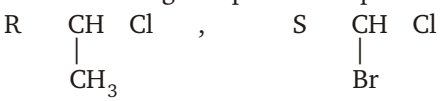
(a) 

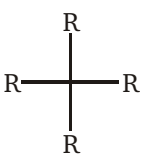
(b) 

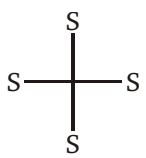
(c) 

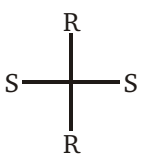
(d) All of these

164. Which of the following compound has plane of symmetry ?



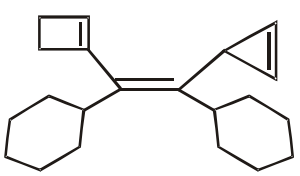
(a) 

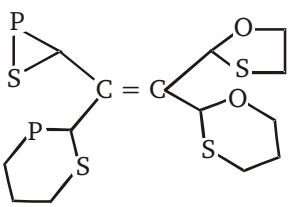
(b) 

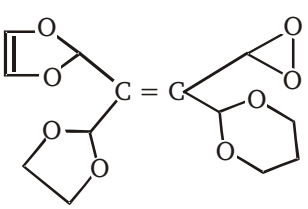
(c) 

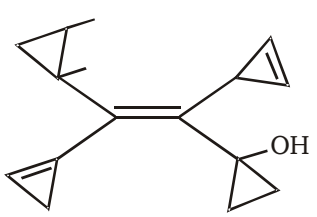
(d) None of these

165. Which of following is E isomer ?

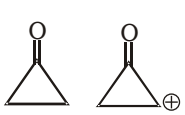
(a) 

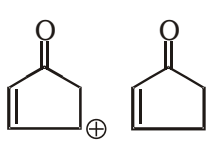
(b) 

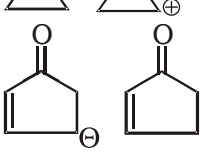
(c) 

(d) 

166. Among the given pairs, in which pair second compound has less enol content than first compound?

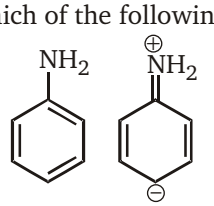
(a) 

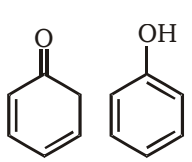
(b) 

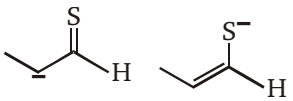
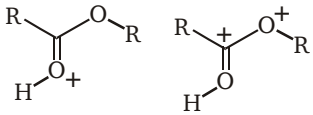
(c) 

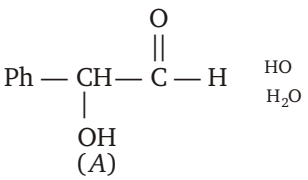
(d) none of these

167. Which of the following is incorrect relation between given pairs ?

(a)  = Resonance

(b)  = Tautomers

(c)  = Resonance (d)  = Tautomers

168.  (*B*) ; (*A*) and (*B*) are isomer and isomerization effectively carried out by trace of base (*B*). Identify (*B*).

(a) 

(b) 

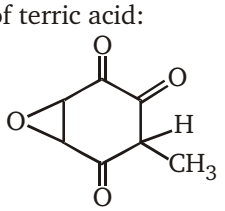
(c) 

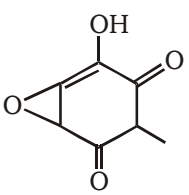
(d) 

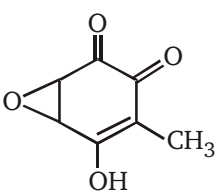
169. $CH_3 - CH$ $CH - CH$ $CH - CH_3$; total number of geometrical isomer is :

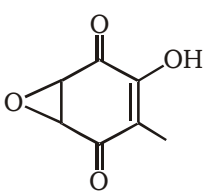
(a) 2 (b) 3 (c) 4 (d) 6

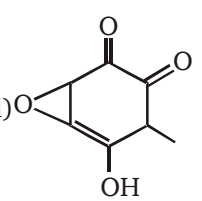
170. Identify most stable enol form of terric acid:



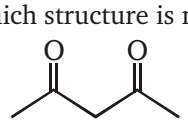
(a) 

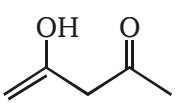
(b) 

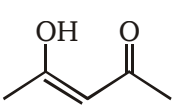
(c) 

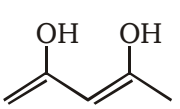
(d) 

171. Which structure is most stable ?

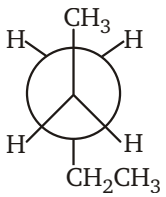
(a) 

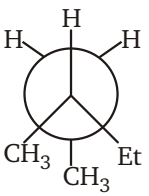
(b) 

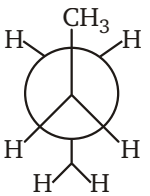
(c) 

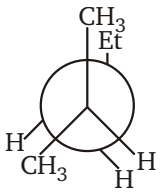
(d) 

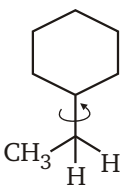
172. Identify conformer of 2-methly pentane :

(a) 

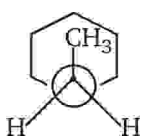
(b) 

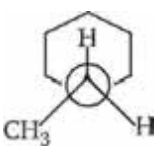
(c) 

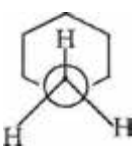
(d) 

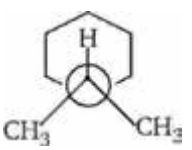
173. The lowest energy conformer of 

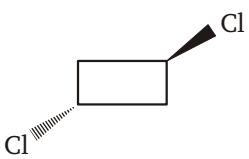
is:

(a) 

(b) 

(c) 

(d) 

174. 

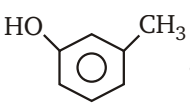
How many atoms will be bisect during plane of symmetry ?

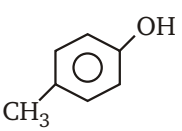
(a) 2 (b) 4 (c) 6 (d) 8

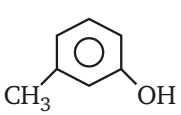
175. The number of all types of isomers of chlorobutane is :

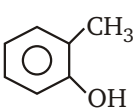
(a) 2 (b) 4 (c) 6 (d) 5

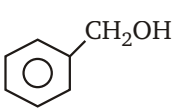
176. Which of the following pairs of compounds are not positional isomers ?

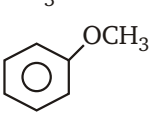
(a) 

and 

(b) 

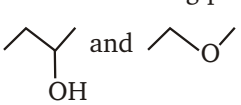
and 

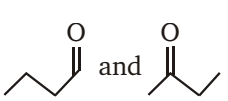
(c) 

and 

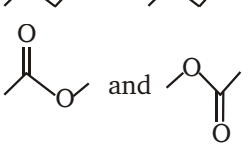
(d) All of these

177. Which of the following pairs of compounds are functional isomers ?

(a) 

(b) 

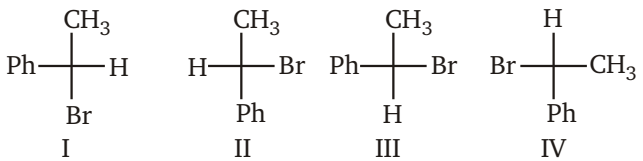
(c) 

(d) 

178. The isomeric alcohol which has a chiral carbon atom is:

(a) *n*-butyl alcohol (b) *iso*-butyl alcohol (c) *sec*-butyl alcohol (d) *tert*-butyl alcohol

179. The pair of enantiomers among the following compound is:

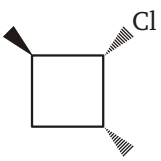


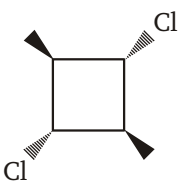
(a) I and IV (b) II and IV (c) II and III (d) I and II

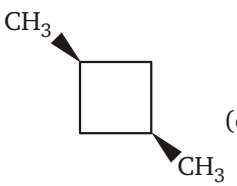
180. Which of the following is chiral?

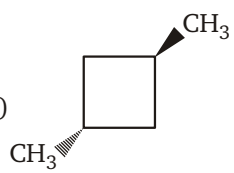
(a) Cell phone (b) Spiral staircase (c) Scissor (d) All of these

181. In which of the following compound, possess plane of symmetry as well as centre of symmetry?

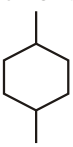
(a) 

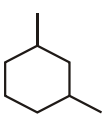
(b) 

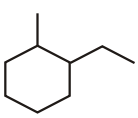
(c) 

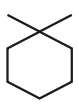
(d) 

182. Which of the following compound has one of the stereoisomers as a meso compound?

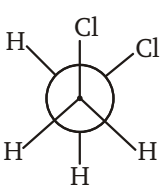
(a) 

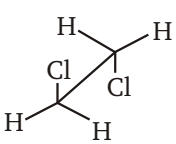
(b) 

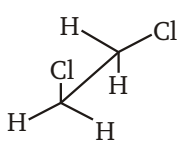
(c) 

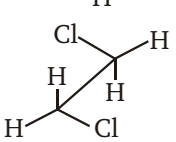
(d) 

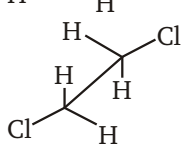
183. For the following Newman projection



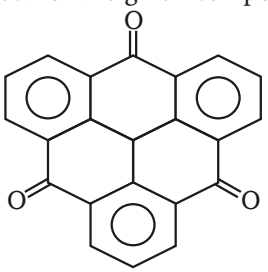
(a) 

(b) 

(c) 

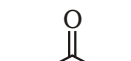
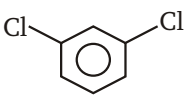
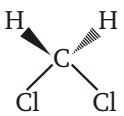
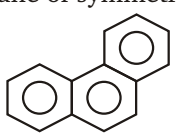
(d) 

184. Which of the following is correct for the given compound?



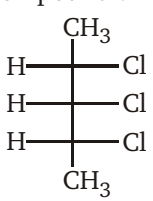
(a) It possess centre of symmetry
(b) It possess C_4 axis of symmetry
(c) It possess plane of symmetry
(d) Compound is chiral

185. Which of the following molecules has axis of symmetry and a coaxial plane of symmetry?

(a) 
(b) 
(c) 
(d) 

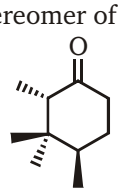
(e) All of these

186. Number of diastereomer of given compound :

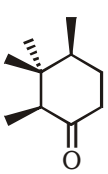
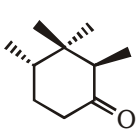
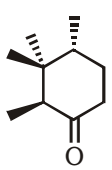
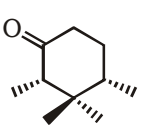
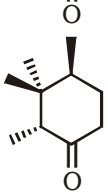


(a) 2 (b) 3 (c) 4 (d) 6

187. Which of the structures is/are diastereomer of **A** ?

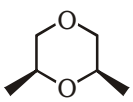


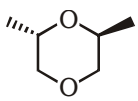
(A)

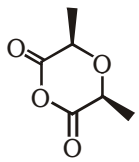
(1) 
(2) 
(3) 
(4) 
(5) 

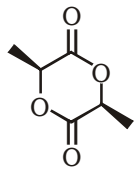
(a) 3 (b) 1 and 4 (c) 2 and 3 (d) 5

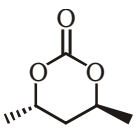
188. Identify which of the structures below are meso structures ?

(1) 

(2) 

(3) 

(4) 

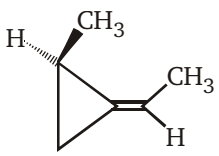
(5) 

(a) 1 and 3 (b) 1,3 and 4 (c) 1,3 and 4 (d) 2 and 5

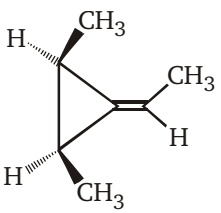
189. How many enol form is possible for $CH_3 - CH_2 - \overset{\overset{O}{\|}}{C} - CH_2 - CH_2 - CH_3$ (including stereoisomers) will be ?

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

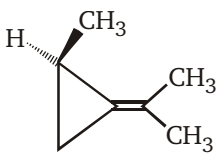
190. Find the sum of all the stereocenters that are present in below compounds :



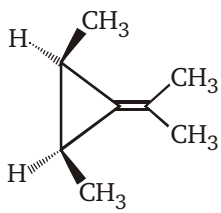
(I)



(II)



(III)



(IV)

(a) 8 (b) 9 (c) 10 (d) 11

191. A pair of stereoisomers might be classified in various ways. Which of the following statement are true with respect to pairs of stereoisomers ?

(a) They might be configurational isomers (b) They might be diastereomers
(c) They might be constitutional isomers (d) They might be tautomers
(e) They might be conformational isomers (f) They might be enantiomers
(g) They might be positional isomers

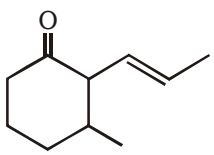
(a) a, b, c, e (b) b, d, e, f, g (c) a, b, f (d) a, b, c, f

192. Ignoring specific markings, which of the following objects are chiral ?

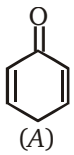
(I) a shoe (II) a book (III) a pencil
(IV) a pair of shoes (consider the pair as one object)
(V) a pair of scissors

(a) I only (b) I & V (c) I, IV, V (d) III, IV, V

193. Calculate the total number of stereoisomers when alkene having trans configuration :



(a) 2 (b) 3 (c) 4 (d) 8

194.  $\xrightarrow[\text{Prolonged treatment}]{D_2O/DO}$ (B)

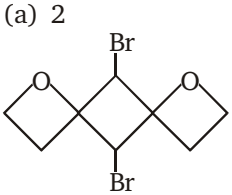
(A)

After prolonged treatment of (A) by D_2O/DO , the difference in molecular weights of compounds (A) and (B) is :

(a) 2 (b) 3 (c) 4 (d) 8

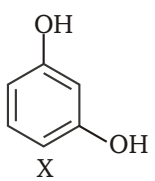
195.  $\xrightarrow[h]{Cl_2}$ A mixture of all isomers possible from the mono-chlorination of the structure is subjected to fractional distillation, then how many fractions will be obtained?

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

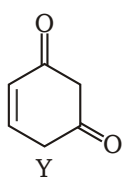
196.  Number of optically active isomer is/are :

(a) 0 (b) 1 (c) 2 (d) 3

197. At normal temperature, X and Y



X

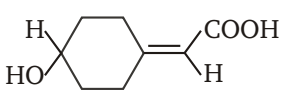


Y

(a) resonance structures (b) tautomers

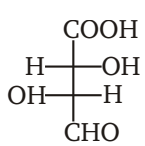
(c) functional isomers (d) positional isomers

198. Two possible stereoisomers for

 are

(a) enantiomers (b) diastereomers (c) conformers (d) rotamers

199. The configurations of the carbon atoms C_2 and C_3 in the following compound are respectively



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

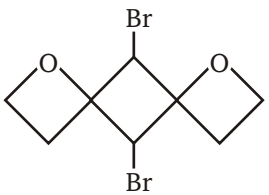
200. The compound that is chiral is

(a) 3-methyl-3-hexene (b) 4-chloro-1-methycyclohexane

(c) 2-phenylpentane (d) 1, 3-disopropylbenzene

201. Number of optically active tartaric acid is/are possible :

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

202. 

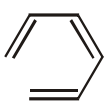
Number of optically active isomer is/are :

(a) 0 (b) 1 (c) 2 (d) 3

203. Correct relationship b/w pair of compounds.

(1)  and 

(2)  and 

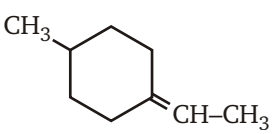
(3)  and 

(a) 1-Conformer ; 2-Conformer ; 3-Conformer

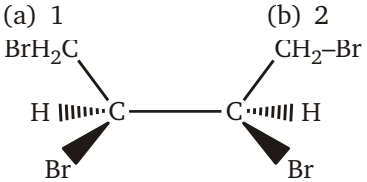
(b) 1-Conformer ; 2-Stereoisomers (GI) ; 3-Stereoisomers (GI)

(c) 1-Conformer ; 2-Stereoisomers (GI) ; 3-Conformer

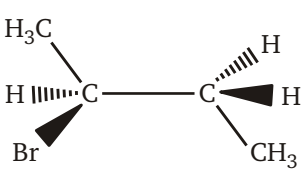
(d) 1-Stereoisomerism (GI) ; 2-Stereoisomerism (GI) ; 3-Conformer

204. Number of diastereomers possible for 

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

205. 

No. of enantiomer = *X*



No. of diastereomers = *Y*

Sum *X* *Y* ?

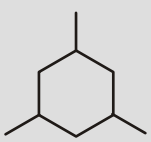
(a) 1 (b) 3 (c) 4 (d) 0

ANSWERS – LEVEL 1

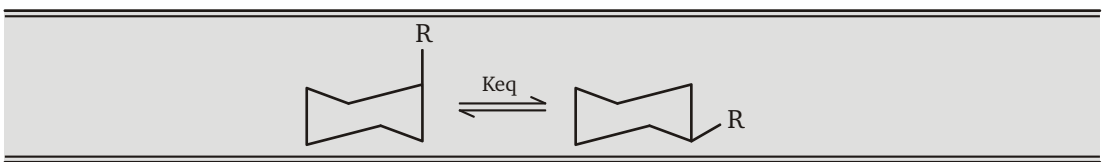
1.	(b)	**2.**	(c)	**3.**	(b)	**4.**	(c)	**5.**	(a)	**6.**	(b)	**7.**	(c)	**8.**	(d)
9.	(c)	**10.**	(d)	**11.**	(b)	**12.**	(c)	**13.**	(a)	**14.**	(b)	**15.**	(b)	**16.**	(d)
17.	(c)	**18.**	(a)	**19.**	(b)	**20.**	(b)	**21.**	(d)	**22.**	(b)	**23.**	(c)	**24.**	(d)
25.	(a)	**26.**	(b)	**27.**	(d)	**28.**	(b)	**29.**	(a)	**30.**	(c)	**31.**	(c)	**32.**	(a)
33.	(b)	**34.**	(c)	**35.**	(c)	**36.**	(d)	**37.**	(c)	**38.**	(d)	**39.**	(b)	**40.**	(a)
41.	(a)	**42.**	(d)	**43.**	(a)	**44.**	(d)	**45.**	(a)	**46.**	(b)	**47.**	(c)	**48.**	(b)
49.	(c)	**50.**	(c)	**51.**	(d)	**52.**	(d)	**53.**	(e)	**54.**	(a)	**55.**	(d)	**56.**	(c)
57.	(d)	**58.**	(b)	**59.**	(a)	**60.**	(a)	**61.**	(c)	**62.**	(d)	**63.**	(e)	**64.**	(d)
65.	(b)	**66.**	(b)	**67.**	(d)	**68.**	(d)	**69.**	(d)	**70.**	(d)	**71.**	(d)	**72.**	(a)
73.	(b)	**74.**	(a)	**75.**	(b)	**76.**	(b)	**77.**	(a)	**78.**	(b)	**79.**	(c)	**80.**	(b)
81.	(d)	**82.**	(a)	**83.**	(b)	**84.**	(a)	**85.**	(a)	**86.**	(d)	**87.**	(a)	**88.**	(d)
89.	(a)	**90.**	(b)	**91.**	(a)	**92.**	(a)	**93.**	(b)	**94.**	(a)	**95.**	(b)	**96.**	(b)
97.	(a)	**98.**	(d)	**99.**	(b)	**100.**	(a)	**101.**	(c)	**102.**	(c)	**103.**	(c)	**104.**	(d)
105.	(d)	**106.**	(a)	**107.**	(c)	**108.**	(b)	**109.**	(d)	**110.**	(a)	**111.**	(c)	**112.**	(c)
113.	(a)	**114.**	(d)	**115.**	(b)	**116.**	(b)	**117.**	(c)	**118.**	(d)	**119.**	(b)	**120.**	(c)
121.	(a)	**122.**	(b)	**123.**	(d)	**124.**	(b)	**125.**	(b)	**126.**	(c)	**127.**	(c)	**128.**	(b)
129.	(d)	**130.**	(a)	**131.**	(c)	**132.**	(d)	**133.**	(d)	**134.**	(d)	**135.**	(b)	**136.**	(b)
137.	(c)	**138.**	(a)	**139.**	(d)	**140.**	(b)	**141.**	(b)	**142.**	(a)	**143.**	(c)	**144.**	(b)
145.	(b)	**146.**	(b)	**147.**	(b)	**148.**	(a)	**149.**	(b)	**150.**	(c)	**151.**	(a)	**152.**	(c)
153.	(b)	**154.**	(d)	**155.**	(c)	**156.**	(a)	**157.**	(c)	**158.**	(d)	**159.**	(d)	**160.**	(d)
161.	(b)	**162.**	(d)	**163.**	(d)	**164.**	(d)	**165.**	(d)	**166.**	(c)	**167.**	(d)	**168.**	(c)
169.	(b)	**170.**	(c)	**171.**	(c)	**172.**	(d)	**173.**	(b)	**174.**	(c)	**175.**	(d)	**176.**	(c)
177.	(b)	**178.**	(c)	**179.**	(c)	**180.**	(d)	**181.**	(d)	**182.**	(b)	**183.**	(b)	**184.**	(c)
185.	(e)	**186.**	(b)	**187.**	(b)	**188.**	(a)	**189.**	(c)	**190.**	(c)	**191.**	(c)	**192.**	(b)
193.	(c)	**194.**	(c)	**195.**	(b)	**196.**	(a)	**197.**	(b)	**198.**	(a)	**199.**	(a)	**200.**	(c)
201.	(b)	**202.**	(a)	**203.**	(c)	**204.**	(d)	**205.**	(d)						

Level - 2

1. Match the Column (I) and (II).

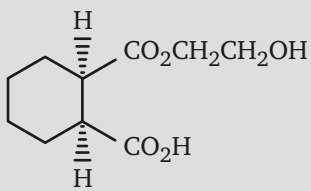
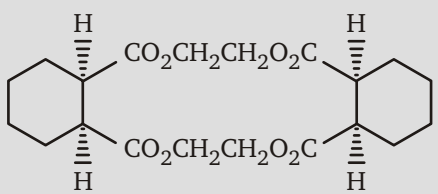
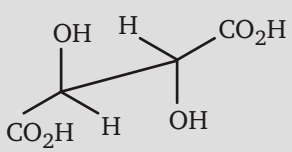
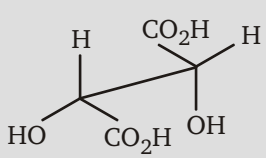
Column (I)		Column (II)	
Reaction		**Stereoisomers**	
(a)	CH_3 — CH CH — CH N — OH	**(p)**	2
(b)		**(q)**	4
(c)	CH_3 — CH CH — CH CH — CH CH — CH_3	**(r)**	6
(d)	CH_3 — CH CH — CH CH — CH CH Ph	**(s)**	8

2. Match the Column (I) and (II).

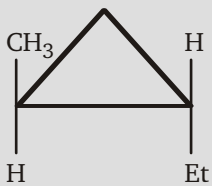
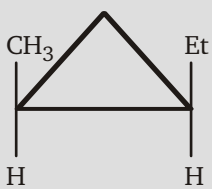
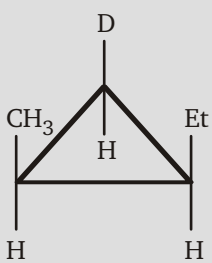
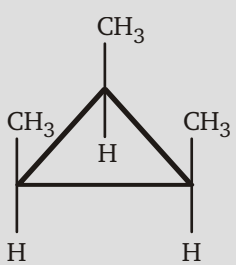


Column (I)		Column (II)	
Group		**Equilibrium Constant**	
(a)	R — H	**(p)**	38
(b)	R — CH_3	**(q)**	23
(c)	R — Et	**(r)**	18
(d)	R — CH(— CH_3)— CH_3	**(s)**	1

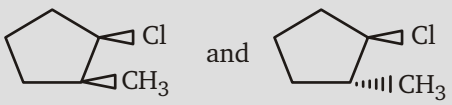
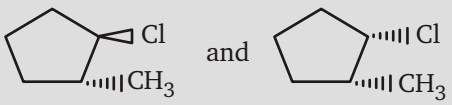
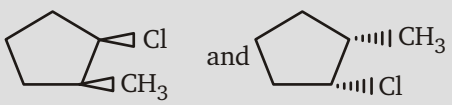
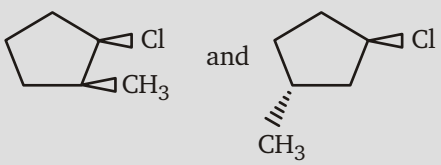
3. Match the Column (I) and (II). (Matrix)

Column (I)		Column (II)	
Molecule		**Nature**	
(a)		**(p)**	Chiral
(b)		**(q)**	Achiral
(c)		**(r)**	Meso
(d)		**(s)**	Compound containing even number of chiral centers

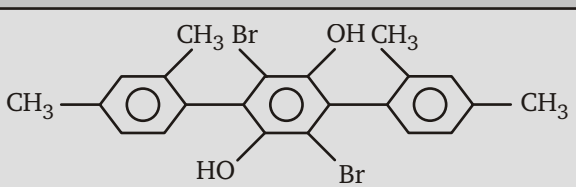
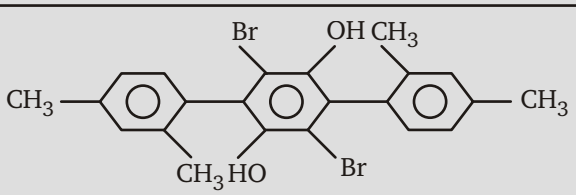
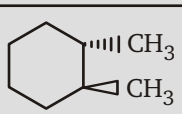
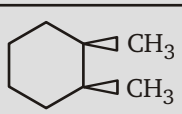
4. Match the Column (I) and (II). (Matrix)

Column (I)		Column (II)	
Compound		Isomerism	
(a)		**(p)**	Geometrical isomerism
(b)		**(q)**	Optical isomerism
(c)		**(r)**	Compound containing plane of symmetry
(d)		**(s)**	Compound containing center of symmetry

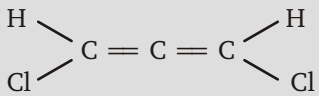
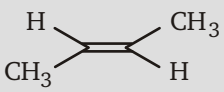
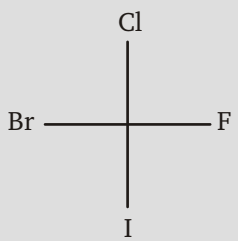
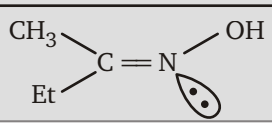
5. Match the Column (I) and (II).

Column (I)		Column (II)	
Molecules		**Relationship**	
(a)		**(p)**	Identical
(b)		**(q)**	Enantiomer
(c)		**(r)**	Diastereomer
(d)		**(s)**	Structural Isomerism

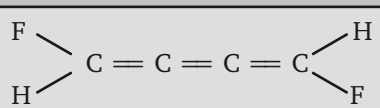
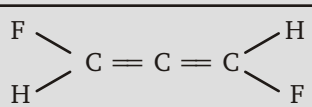
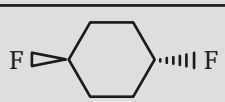
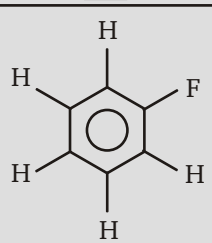
6. Match the Column (I) and (II). (Matrix)

Column (I)		Column (II)	
Compound		**Nature**	
(a)		**(p)**	*cis*-compound
(b)		**(q)**	*trans*-compound
(c)		**(r)**	Optically active
(d)		**(s)**	Optically inactive

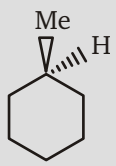
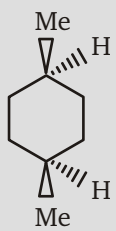
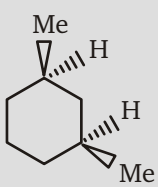
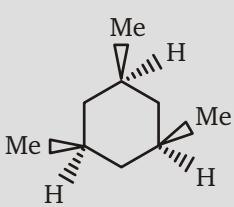
7. Match the Column (I) and (II). (Matrix)

Column (I)		Column (II)	
Molecule		**Property**	
(a)		**(p)**	Chiral centers containing compound
(b)		**(q)**	Presence of stereocenter
(c)		**(r)**	Optically active compound
(d)		**(s)**	Compound containing plane of symmetry

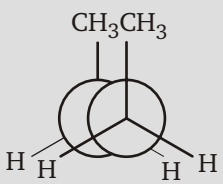
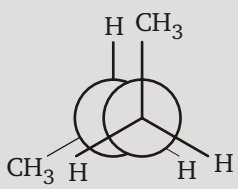
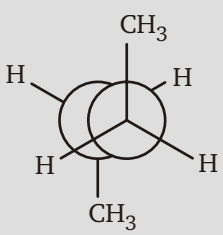
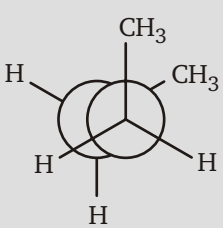
8. Match the Column (I) and (II). (Matrix)

Column (I)		Column (II)	
Molecule		**Property**	
(a)		**(p)**	Polar molecule
(b)		**(q)**	Optically active
(c)		**(r)**	Optically inactive
(d)		**(s)**	Plane of symmetry

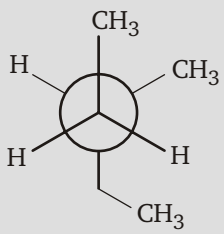
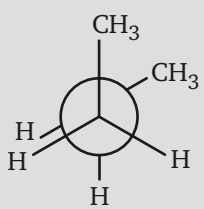
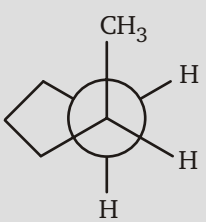
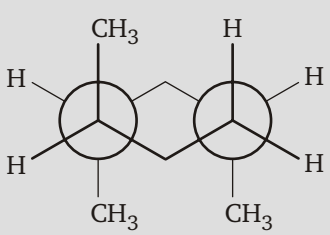
9. Match the Column (I) and (II). (Matrix)

Column (I)		Column (II)	
Molecule		**Property**	
(a)		**(p)**	Meso compound
(b)		**(q)**	Achiral
(c)		**(r)**	Chiral compound
(d)		**(s)**	Compound will show geometrical isomerism

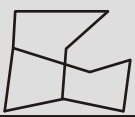
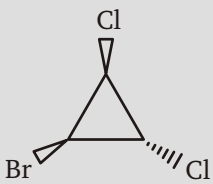
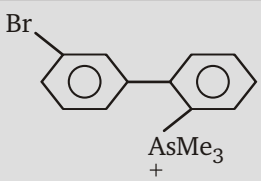
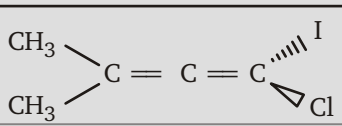
10. Match the Column (I) and (II).

Column (I)		Column (II)	
Modified Newmann Projection		**Conformers**	
(a)		**(p)**	Fully eclipsed
(b)		**(q)**	Partially eclipsed
(c)		**(r)**	Gauche
(d)		**(s)**	Staggered

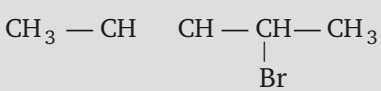
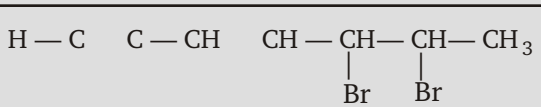
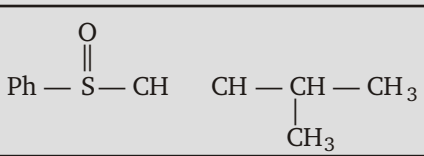
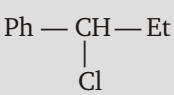
11. Match the Column (I) and (II).

Column (I)		Column (II)	
Newmann Projection		Name of the Compound	
(a)		**(p)**	3-methyl pentane
(b)		**(q)**	*n*-butane
(c)		**(r)**	Methyl-cyclopentane
(d)		**(s)**	1,2,4-trimethyl cyclohexane

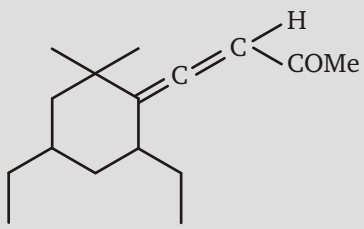
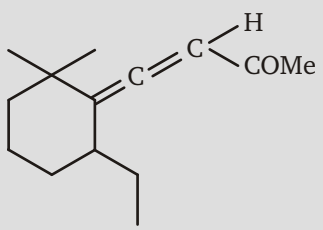
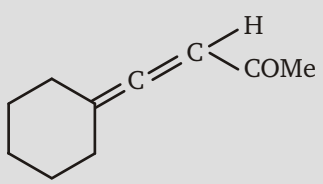
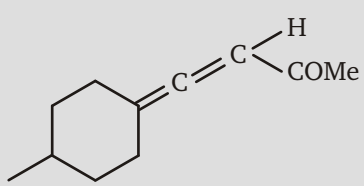
12. Match the Column (I) and (II). (Matrix)

Column (I)		Column (II)	
Molecule		**Property**	
(a)		**(p)**	Rotates plane polarized light
(b)		**(q)**	Cannot rotate plane polarized light
(c)		**(r)**	Plane of symmetry
(d)		**(s)**	Centre of symmetry

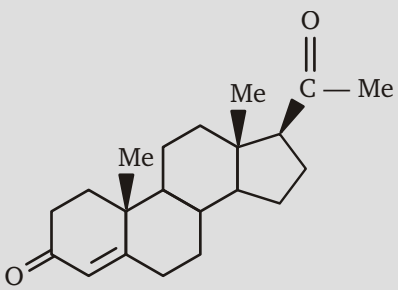
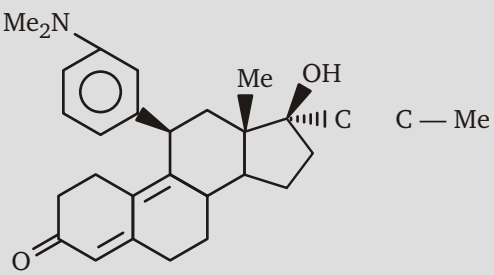
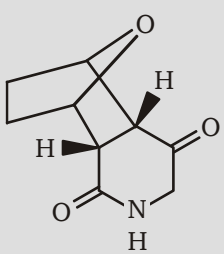
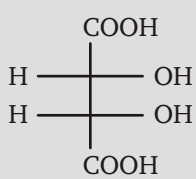
13. Match the Column (I) and (II).

Column (I)		Column (II)	
Molecule		**Stereocenters**	
(a)		**(p)**	1
(b)		**(q)**	2
(c)		**(r)**	3
(d)		**(s)**	4

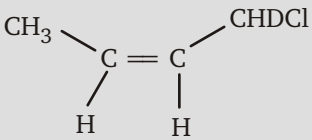
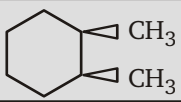
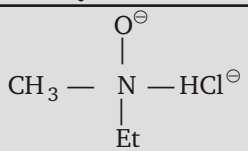
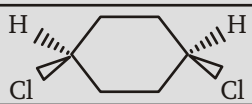
14. Match the Column (I) and (II).

Column (I)		Column (II)	
Molecule		**Stereoisomers**	
(a)		**(p)**	2
(b)		**(q)**	0
(c)		**(r)**	4
(d)		**(s)**	8

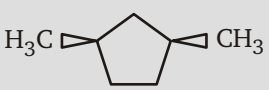
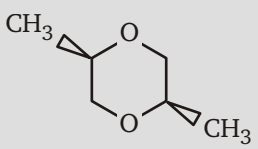
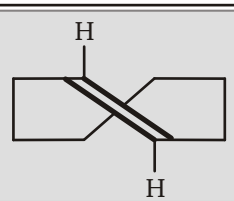
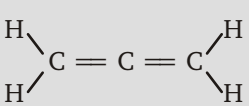
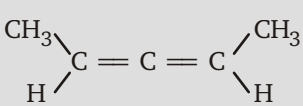
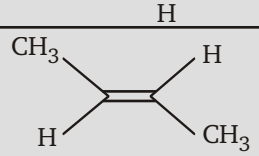
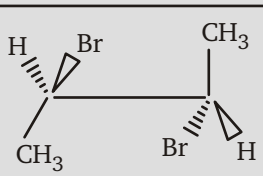
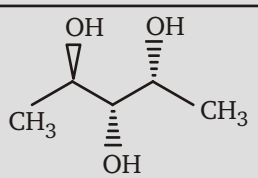
15. Match the Column (I) and (II). (Matrix)

Column (I)		Column (II)	
Molecule		**Property**	
(a)		**(p)**	Meso Compound
(b)		**(q)**	Compound having even no. of chiral centres
(c)		**(r)**	Optically active compound
(d)		**(s)**	Compound having odd no. of chiral centres.

16. Match the Column (I), (II) and (III). (Matrix)

Column (I)		Column (II)		Column (III)	
Property		Molecule		No. of Chiral Center	
(a)		**(p)**	Optically active	**(w)**	0
(b)		**(q)**	Optically inactive	**(x)**	1
(c)		**(r)**	Plane of symmetry	**(y)**	2
(d)		**(s)**	Centre of symmetry	**(z)**	3

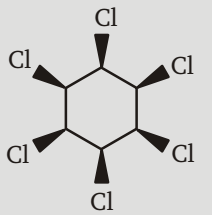
17.

(a)		**(b)**		**(c)**	
(d)		**(e)**		**(f)**	
(g)		**(h)**			

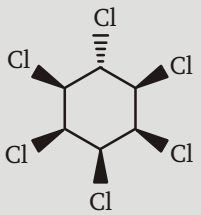
From the above compounds select :

(A)	two of which are chiral and contain chiral centre :	
(B)	two of which are achiral and contains chiral centre :	
(C)	two of which are chiral and does not contain chiral centre :	
(D)	two of which are achiral and does not contain chiral centre :	

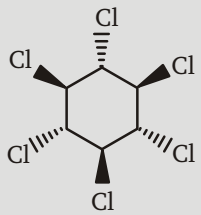
18. Comprehension



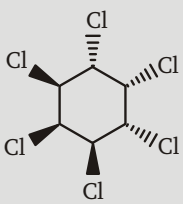
(P)



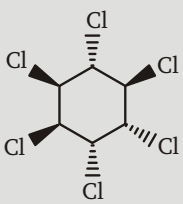
(Q)



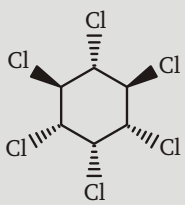
(R)



(S)



(T)



(U)

Consider the given structures and answer A, B & C.

A. Which of the compound is optically active ?

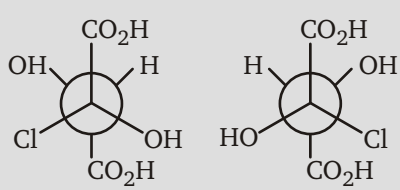
(a) *P* (b) *R* (c) *S* (d) *T*

B. Which of the isomer is most stable ?

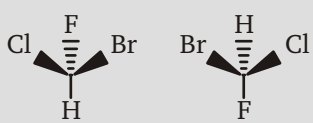
(a) *R* (b) *S* (c) *T* (d) *U*

19. Identify relationship between following pairs :

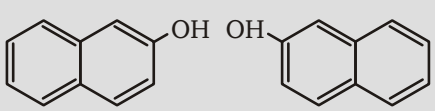
(a)



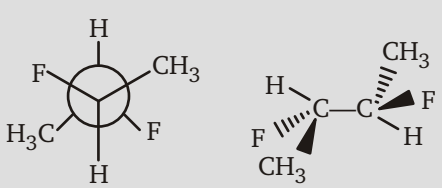
(b)



(c)



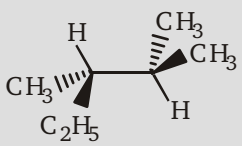
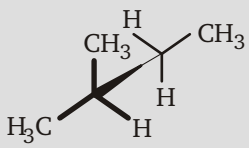
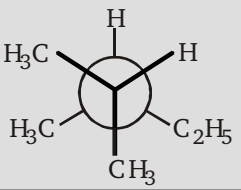
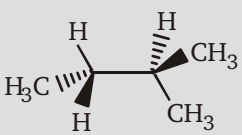
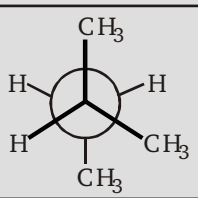
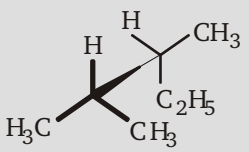
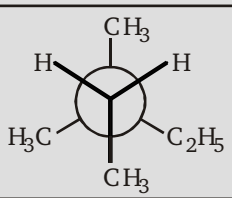
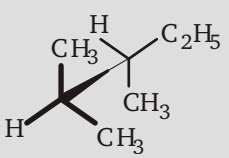
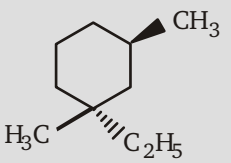
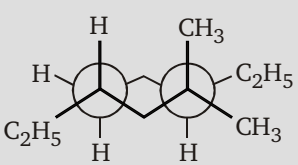
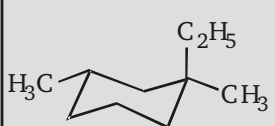
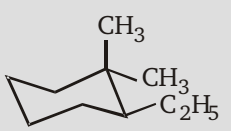
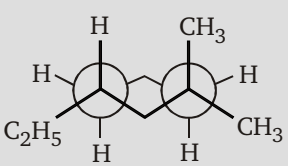
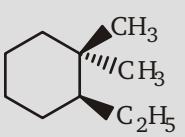
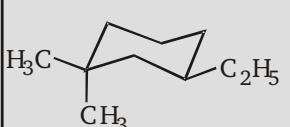
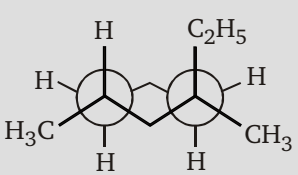
(d)



If they are enantiomer answer will be 1, if they are diastereomers answer will be 2, if they are constitutional isomers answer will be 3 and if they are identical present 4 as the answer. Sum of answer of each part $a + b + c + d$ is : . . . . . .

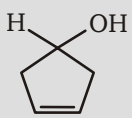
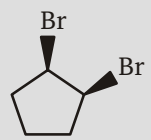
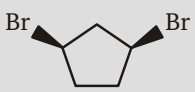
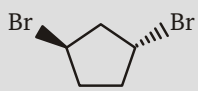
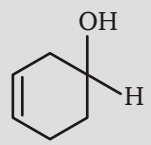
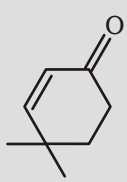
20. In each of the following three questions a hydrocarbon is named. For each select from among the sixteen conformational structures (a through p) all structures that represent possible conformers of that compound. Write letters (a through p), corresponding to your selections, in each answer box.

A.	2-methylbutane	
B.	2,3-dimethylpentane	
C.	1-ethyl-1, 3-dimethyl cyclohexane	

(a)		**(b)**		**(c)**	
(d)		**(e)**		**(f)**	
(g)		**(h)**		**(i)**	
(j)		**(k)**		**(l)**	
(m)		**(n)**		**(o)**	
(p)					

21. Examine structures a through j, shown below, with respect to their symmetry or lack of it. Assume that the five-membered rings and the ring in compound g are planar. The wedge-hatched bonds in b, c, d & e designate specific configurations. Also, for the acyclic compounds assume stable anti conformations. Answer each of the following questions by writing letters (a through j), corresponding to your selections, in each answer box. If there is no structure that fits the description enter an x in the answer box.

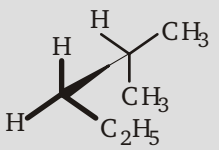
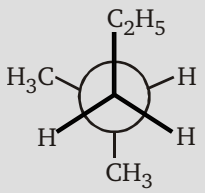
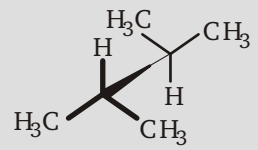
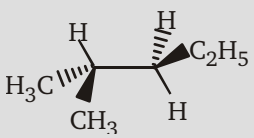
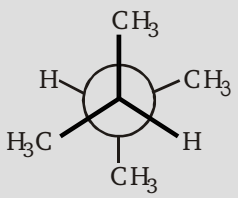
A.	Which structures are chiral ?	
B.	Which structures have a plane of symmetry ?	
C.	Which structures have a center of symmetry ?	

(a)		**(b)**		**(c)**	
(d)		**(e)**		**(f)**	
(g)		**(h)**	$C_2H_5CHCl_2$	**(i)**	$C_2H_5CHClC_2H_5$
(j)	$C_2H_5CHClCH_3$				

22. **(i) 1,2-dichlorocyclopropane** ***w***
(ii) 1,3-dimethyl-cyclobutane ***x***
(iii) 2-bromo-3-chlorobutane ***y***
(iv) 1,3-dimethyl cyclohexane ***z***
Calculate total number of stereoisomer of the above compounds.
Sum of *w* *x* *y* *z* .....

23. Examine the following formulas and select those pairs that satisfy the following conditions :

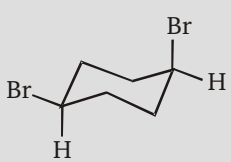
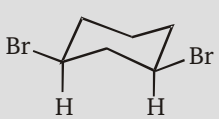
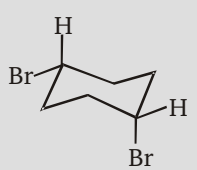
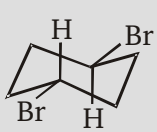
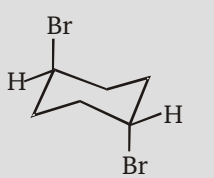
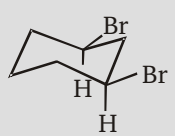
Be sure to write two letters (and only two) in each answer box, unless you select f. In the second and third parts more than one answer is possible.

(a)		**(b)**		**(c)**	
(d)		**(e)**		**(f)**	No formulas meet the designated condition

A.	Which are identical in all respects?	
B.	Which are conformational isomers?	
C.	Which are constitutional isomers?	

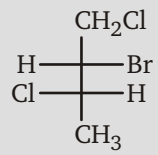
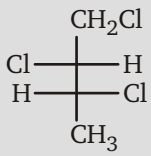
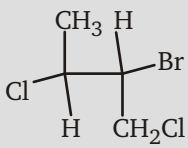
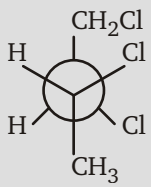
24. Examine the following formulas and select those pairs that satisfy the following conditions :

Be sure to write two letters (and only two) in each answer box. In the second and fourth parts more than one answer is possible.

(a)		**(b)**		**(c)**	
(d)		**(e)**		**(f)**	

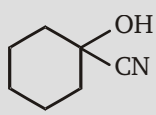
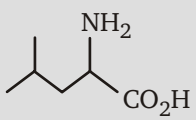
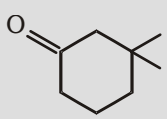
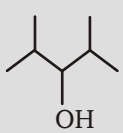
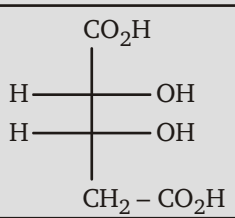
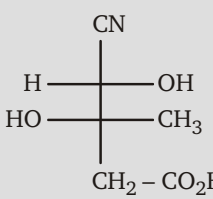
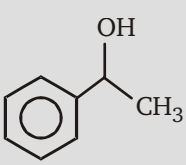
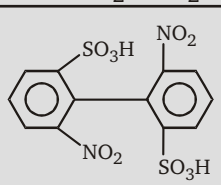
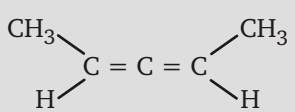
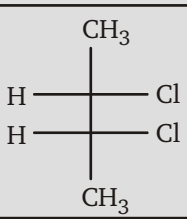
A.	Which are identical in all respects?	
B.	Which are configuration isomers?	
C.	Which are conformational isomers?	

25. Consider the following statements regarding the given projection (True or False).

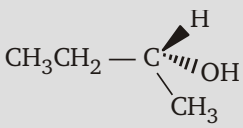
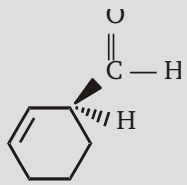
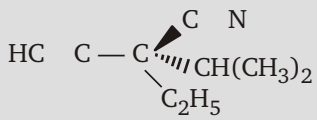
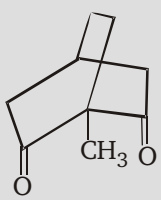
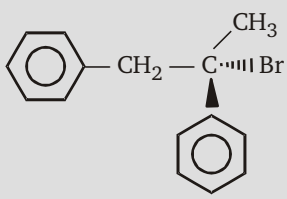
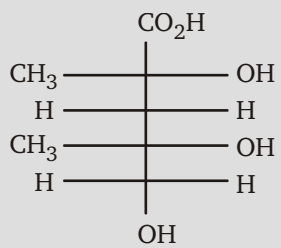
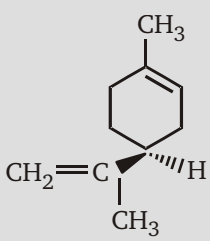
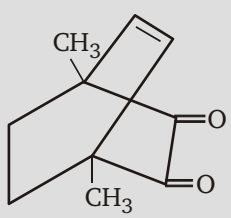
(W)		**(X)**	
(Y)		**(Z)**	

(a)	W and Y are diastereomers	
(b)	Z is the projection of X	
(c)	W, X, Y and Z are optically active	
(d)	Y and Z are isomer	

26. Examine the following structural formulas and select those that are chiral.

(a)		**(b)**		**(c)**	
(d)		**(e)**		**(f)**	
(g)		**(h)**		**(i)**	
(j)					
Write your choice here					

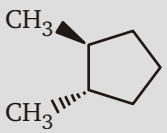
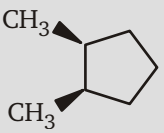
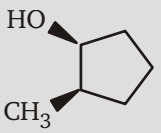
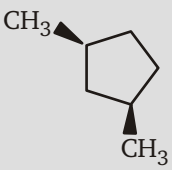
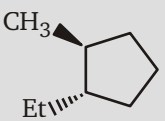
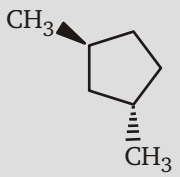
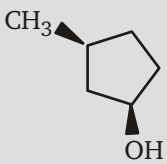
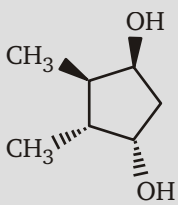
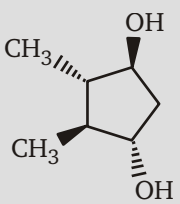
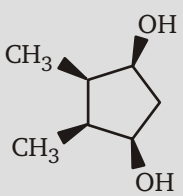
27. The configuration of eight compounds, a through h are shown below, using various kind of stereo representations. To answer the question given below, write (a through h) indicating your choice.

(a)		**(b)**		**(c)**	
(d)		**(e)**		**(f)**	
(g)		**(h)**			

A.	Which of these configuration are achiral?	
B.	Which configuration has no stereogenic center?	
C.	Which configuration has more than one stereogenic center?	
D.	Which of these configuration are meso compound?	

28. The structural formula of ten compounds, (I) through (X) are drawn below, you may select any one of these structure.

Answer the following question about that compound.

I		**II**		**III**	
IV		**V**		**VI**	
VII		**VIII**		**IX**	
X					

A. How many chiral centre are present in this compound ?

(a) 0 (b) 1 (c) 2 (d) 3
(e) 4 (f) 5

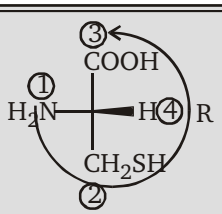
B. Is this compound chiral or achiral ?

(a) Chiral (b) Achiral

C. What symmetry element are present in this compound ?

(a) None (b) Plane of symmetry (c) Center of symmetry

29. The structure of one of the enantiomers of the amino acid cysteine is shown below.

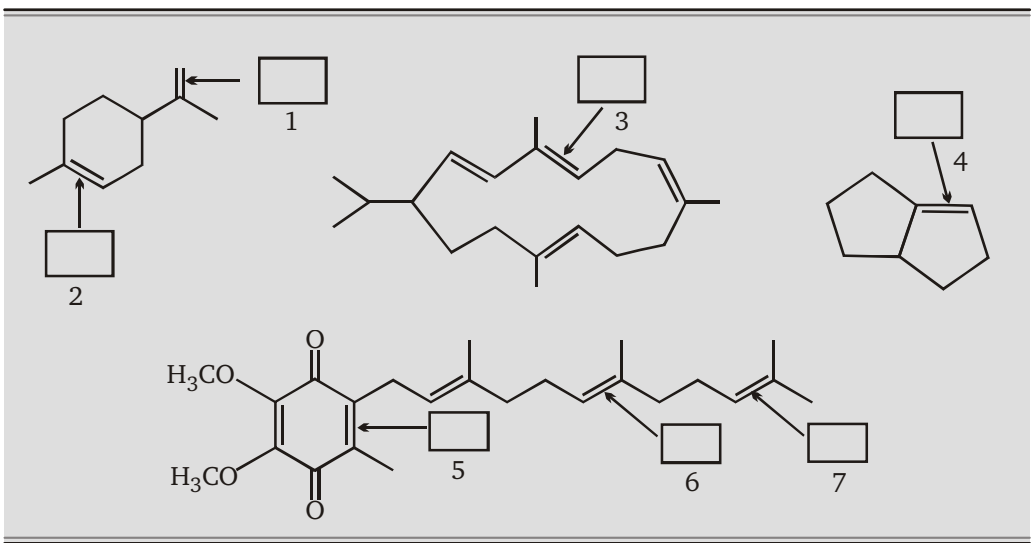


Classify this structure as :

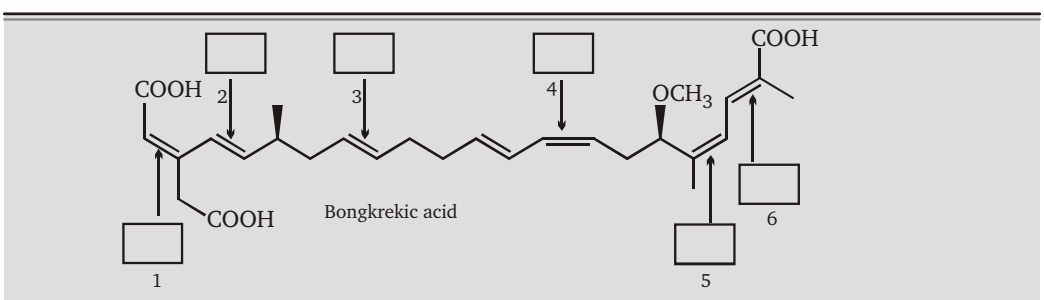
(a) R or S (b) D or L

30. Identify the following double bonds either E, Z or None (N) in the compounds given below either.

A.



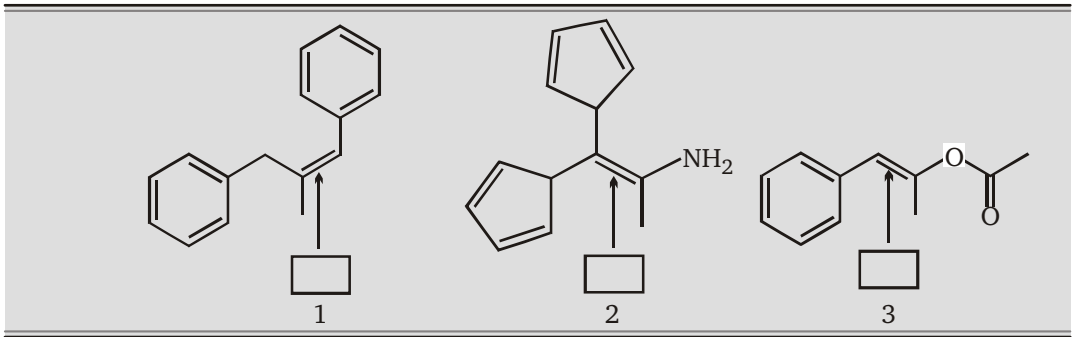
B. (a) Bongkrekic acid is a toxic compound produced by Pseudomonas cocovenenans, and isolated from a mold that rows on bongkrek, a fermented Indonesian coconut dish. (a) Label each double bond as E, Z or neither (N).



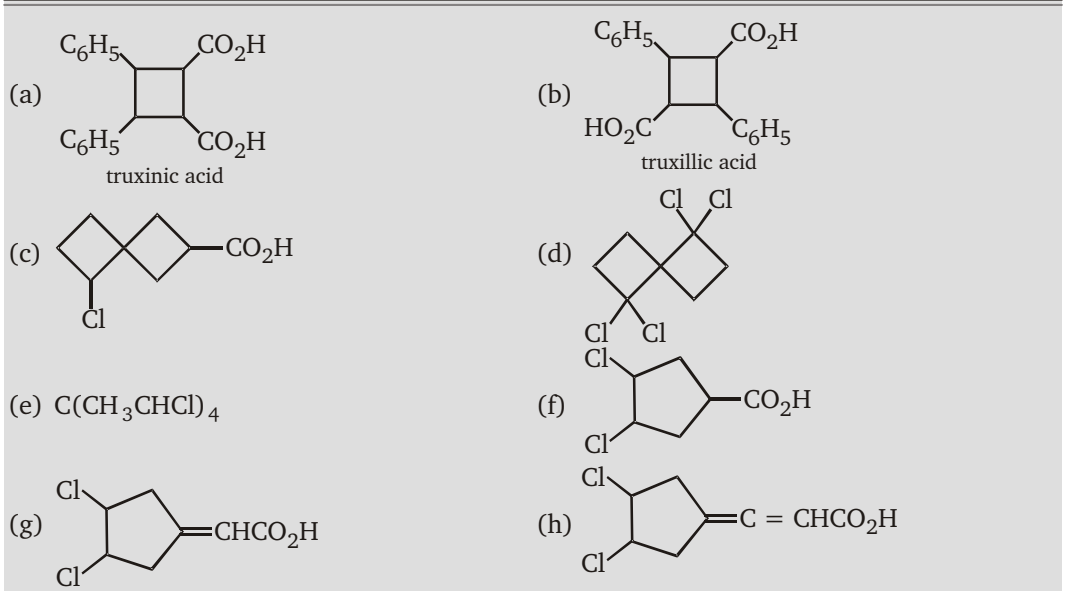
(b) How many total stereoisomers (including all types) are possible for bongkrekic acid ?
.....

(c) How many sites of unsaturation are present in bongkrekic acid ? .....

31. Designate the following double bonds as E, Z or none (N) configuration in the boxes provided below.



32. The following compounds may exist as two or more stereoisomers. These may be classified as enantiomer pairs or meso compounds.



Answer the following question about the above structure.

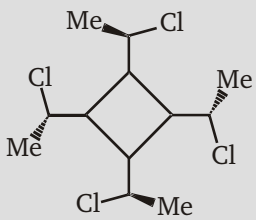
(A) Total number of stereoisomers :

(B) Number of enantiomeric pairs :

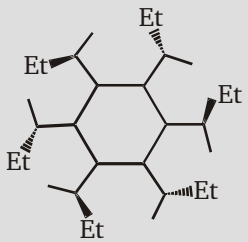
(C) Number of meso compounds :

33. Identify axis of symmetry in the given compound.

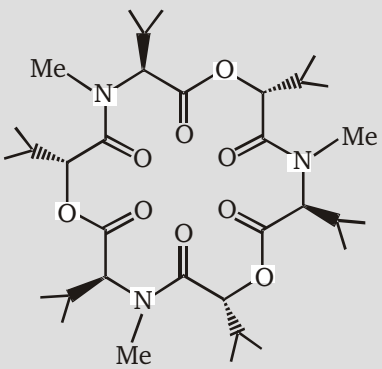
(1)



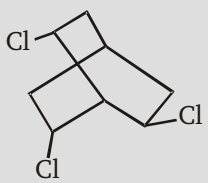
(2)



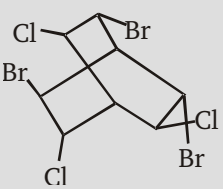
(3)



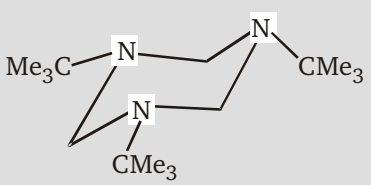
(4)



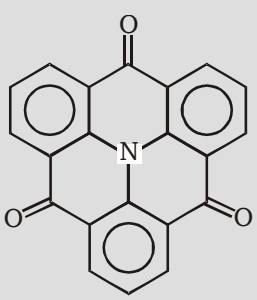
(5)



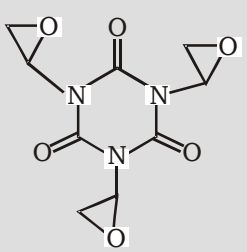
(6)



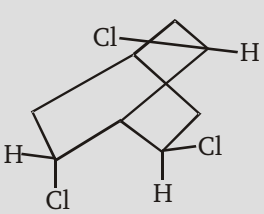
(7)



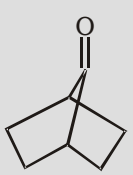
(8)

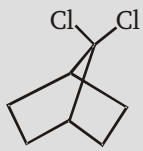


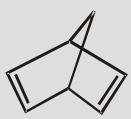
(9)

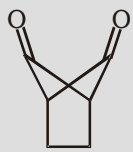


(10)

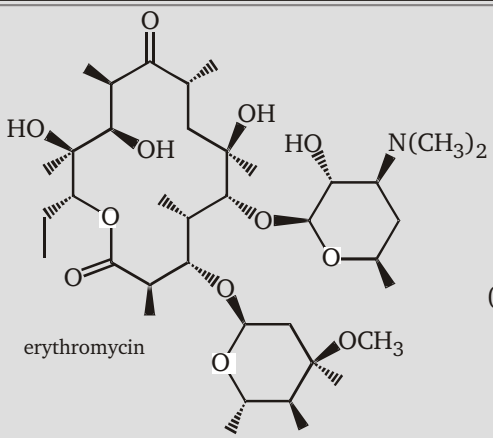


(11) 

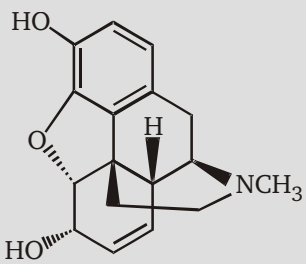
(12) 

(13) 

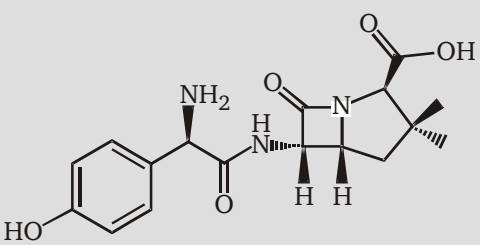
34. For each of the following pharmaceutical compounds, identify all stereogenic (*i.e.*, all asymmetric carbon atoms) and label the configuration of each as being either (R) or (S).

(1) 

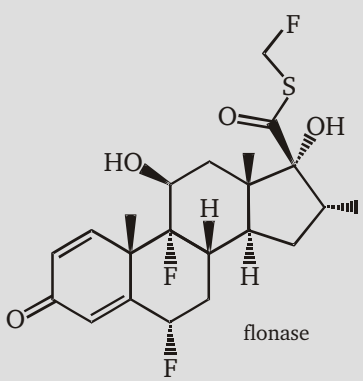
erythromycin

(2) 

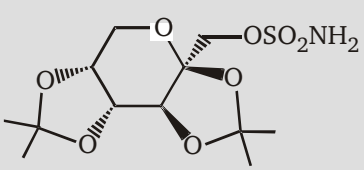
morphine

(3) 

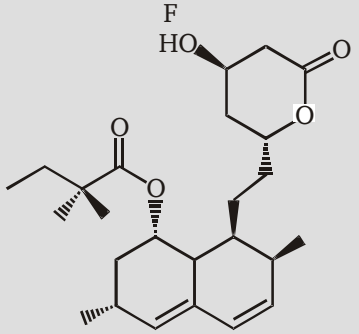
amoxicillin

(4) 

flonase

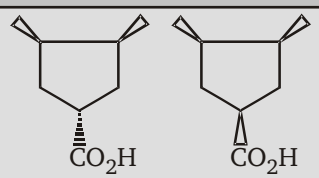
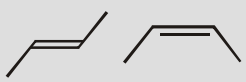
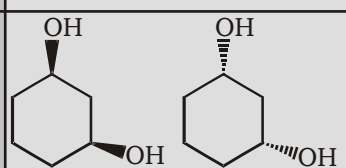
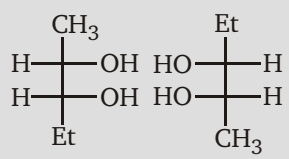
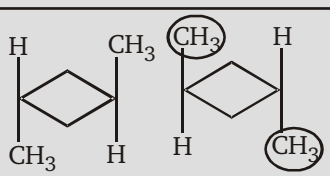
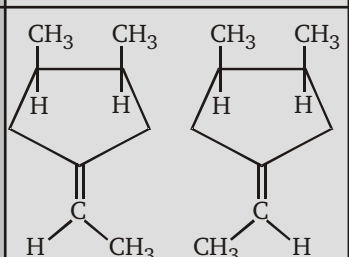
(5) 

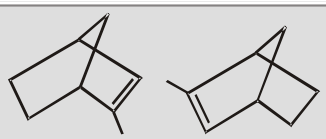
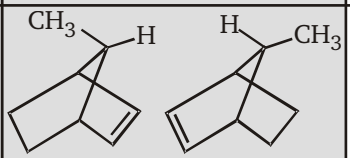
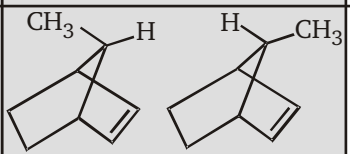
topomax

(6) 

zocor

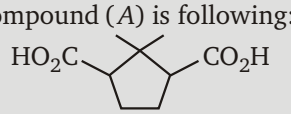
35. Find relationship between given pair :

		Identical	Enantiomer	Diastereomer	Constitutional Isomer
1.					
2.					
3.					
4.					
5.					
6.					
7.					

8.					
9.					
10.					

36. Comprehension

Structural formula of compound (*A*) is following:



A. The correct statement(s) about the compound (*A*) is/are:

(a) The total number of stereoisomers possible for (*A*) is 3

(b) The total number of mesoisomer possible for (*A*) is 1

(c) The total number of pair of enantiomer possible for (*A*) is 1

(d) All of these

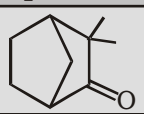
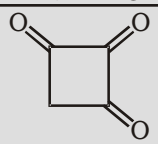
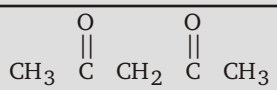
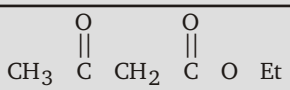
B. Number of plane of symmetry in *cis*-form of compound (*A*) is:

(a) 0 (b) 1 (c) 2 (d) 3

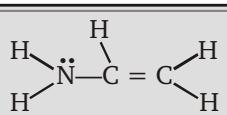
37. Match the column. **(Matrix)**

Column (I)		Column (II)	
No. of Carbon		**No. of structural isomer**	
(a)	C_4H_{10}	**(p)**	
(b)	C_5H_{12}	**(q)**	3
(c)	C_6H_{14}	**(r)**	5
(d)	C_7H_{16}	**(s)**	9

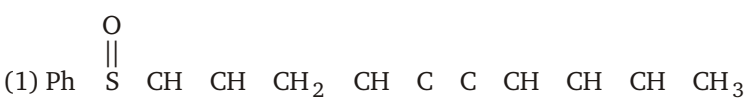
38. Match the column. **(Matrix)**

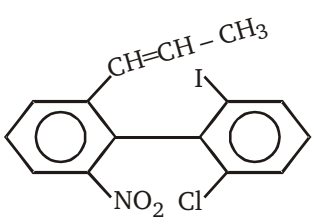
Column (I)		Column (II)	
Compound		**% of enol content**	
(a)		**(p)**	100 %
(b)		**(q)**	76 %
(c)		**(r)**	8%
(d)		**(s)**	Keto-Enol is not possible

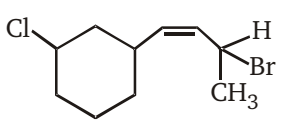
39. Draw a most stable conformation (N – C) bond in the following compound.

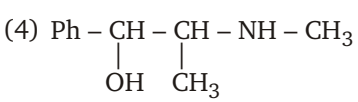


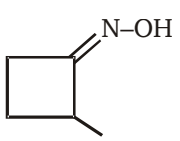
40. Find total number of stereoisomers for each compound given below :

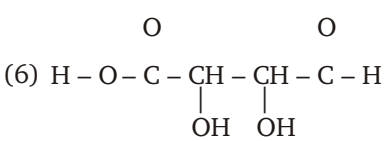
(1) 

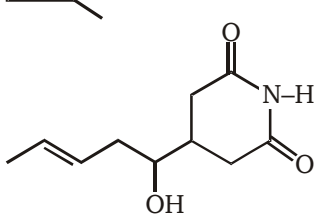
(2) 

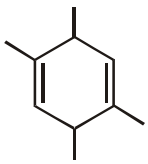
(3) 

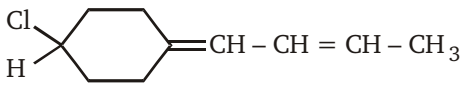
(4) 

(5) 

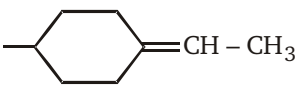
(6) 

(7) 

(8) 

(9) 

(10) $CH_3 - CH = CH - \underset{\displaystyle Br}{\underset{|}{CH}} - CH_3$

(11) 

41. Find the total number of stereoisomer for each compound :

(1) 

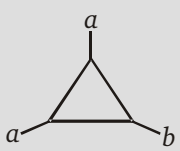
a

(2) 

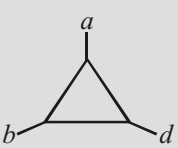
b

(3) 

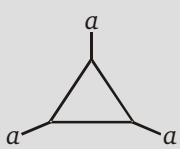
c

(4) 

d

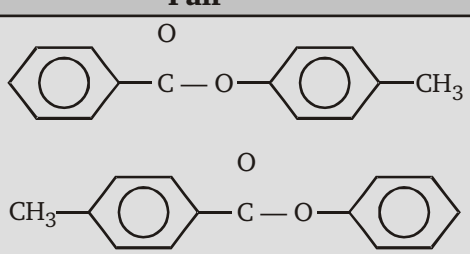
(5) 

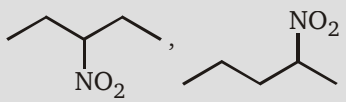
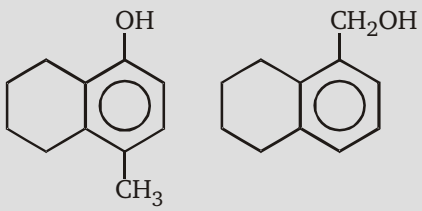
e

(6) 

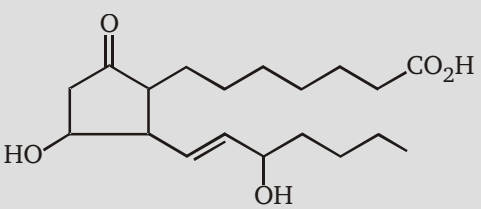
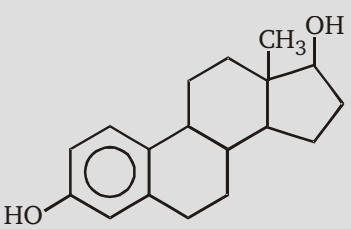
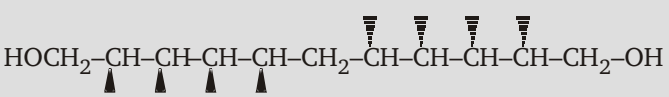
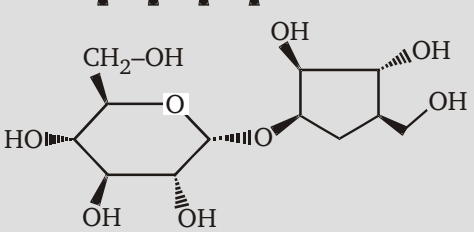
f

42. Match the column :

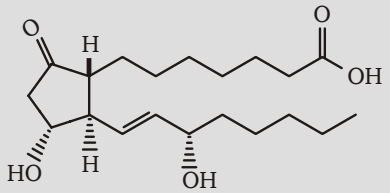
Column (I)		Column (II)	
Pair		**Isomeric Relationship**	
(a)		**(p)**	Chain
(b)	$CH_3\ CH_2\ CH_2\ \overset{\displaystyle O}{\overset{\|\|}{C}}\ OH\ ,\ CH_3\ \underset{\displaystyle CO_2H}{\underset{\|}{CH}}\ CH_3$	**(q)**	Positional

(c)		**(r)**	Functional
(d)		**(s)**	Metamers

43. Find sum of stereoisomer of following compound.

	Number of stereoisomers
(a) 	(*a*)
(b) 	(*b*)
(c) 	(*c*)
(d) 	(*d*)

44.



1 Prostaglandin E_1

Prostaglandin E_1 1 is a compound produced by the body to regulate a variety of processes including blood clotting, fever, pain and inflammation.

A. Which of the following functional groups is not contained in 1 ?

(a) A ketone (b) An alcohol (c) A carboxylic acid (d) An alkene (e) A nitrile

B. How many asymmetric (stereogenic) centres are present in compound 1?

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

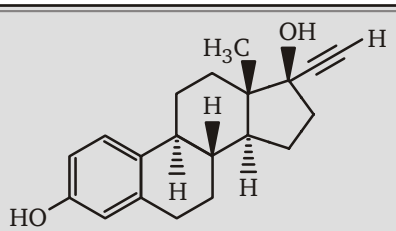
C. How many sp^2 hybridised carbon atoms are present in compound 1 ?

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

D. What is the geometric configuration about the double bond in compound 1?

(a) *E* (b) *Z*

45.



Ethynylestradiol (1)

The synthetic steroid ethynylestradiol (1) is a compound used in the birth control pill.

A. How many sp^3 hybridised carbon atoms are present in compound (1)?

(a) 8 (b) 9 (c) 10 (d) 11 (e) 12

B. How many sp^2 hybridised carbon atoms are present in compound (1) ?

(a) 4 (b) 5 (c) 6 (d) 7 (e) 8

C. How many *sp* hybridised carbon atoms are present in compound (1) ?

(a) 2 (b) 4 (c) 6 (d) 8 (e) 10

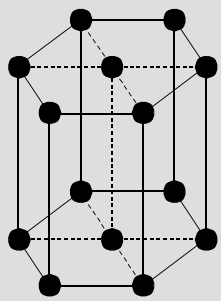
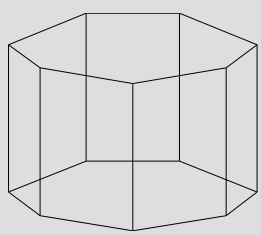
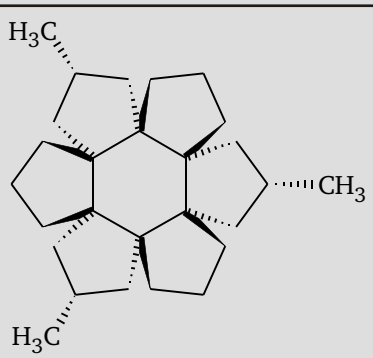
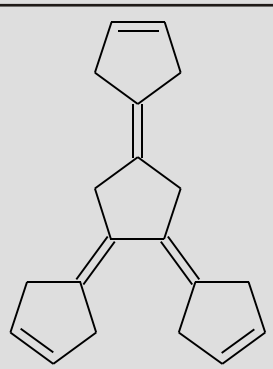
D. Which of the following functional group is contained in compound (1) ?

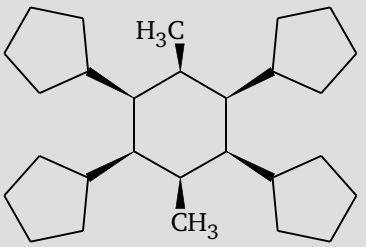
(a) A ketone (b) An alcohol (c) A carboxylic acid (d) An ester

E. How many asymmetric (stereogenic) centres are present in compound (1) ?

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

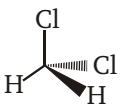
46. Match the column.

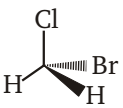
	Column (I)		Column (II)
(a)	C_2-axis of symmetry	**(p)**	
(b)	C_3-axis of symmetry	**(q)**	
(c)	Plane of symmetry	**(r)**	
(d)	Centre of symmetry	**(s)**	

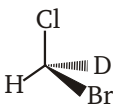
		(t)	

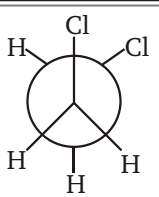
Subjective Problems

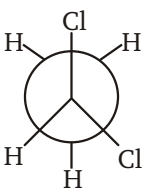
1. Number of chiral isomers are:

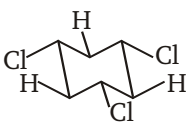
(a) 

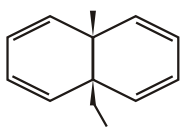
(b) 

(c) 

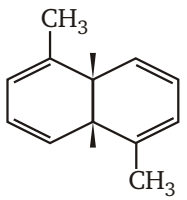
(d) 

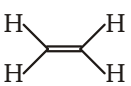
(e) 

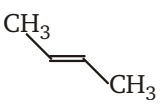
(f) 

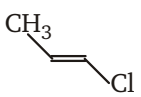
(g) 

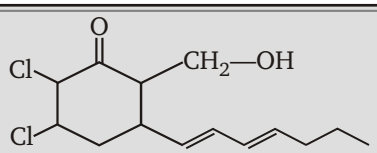
Consider only a conformation with Me group perpendicular to the aromatic ring

(h) 

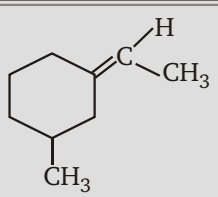
(i) 

(j) 

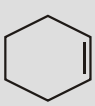
(k) 

2. 

Number of stereoisomer are

3. (i) 

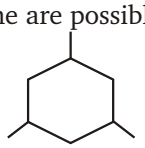
(C)

(ii) 

(*D*)
(Major)

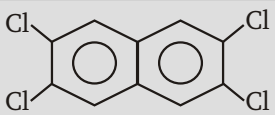
Sum of number of stereoisomer (*C*) Degree of unsaturations in (*D*).

4. How many 5 membered parent chain alkane are possible for C_7H_{16}?

5. Theoretical possible geometrical isomer of 

6. Total number of possible structural isomers of $C_5H_{11}Br$.

7. Total number of plane of symmetry present in given compound is

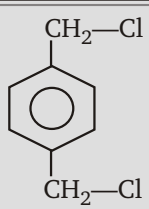


8. Total number of isomers for $C_4H_6Br_2$ containing cyclobutane ring are (including stereoisomer) ?

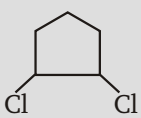
9. Total number of structural isomers of C_9H_{18} containing cyclohexane ring.

10. How many structural isomer are possible for $C_4H_{10}O$ (only alcohol).

11. Number of structural isomer of C_6H_{14} is .

12. (a) 

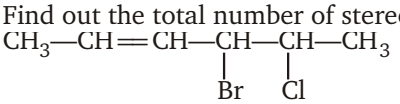
(x) (Number of plane of symmetry)

(b) 

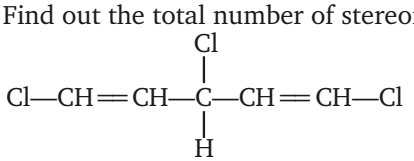
(y) (Number of mesoisomer of 1, 2-dichlorocyclopentane)

Sum of ($x+y$=?)

13. Find out the total number of stereocentre in the given compound.

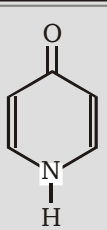


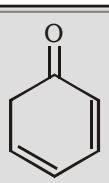
14. Find out the total number of stereoisomers of the given following compound.

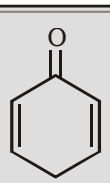


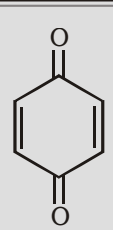
15. Find the total number of isomers of C_7H_{14} (only 5-membered ring).

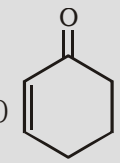
16. x number of compounds which undergoes Tautomerisation to form an Aromatic product.

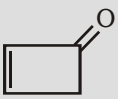
(a) 

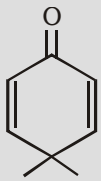
(b) 

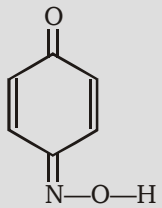
(c) 

(d) 

(e) 

(f) 

(g) 

(h) 

17. If molecule is pyramidal, **X** stereoisomers are possible for :

$$\mathbf{C_{abed}}$$

find the value of **X**.

ANSWERS — LEVEL 2

1. a – q; b – p; c – r; d – s

2. a – s; b – r; c – q; d – p

3. a – p, s; b – q, r, s; c – q, r, s; d – p, s

4. a – p, q; b – p, q; c – p, q; d – p, r

5. a – r; b – r; c – p; d – s

6. a – p, r; b – q, s; c – q, r; d – p, s

7. a – q, r; b – q, s; c – p, q, r; d – q, s

8. a – r, s; b – p, q; c – r, s; d – p, r, s

9. a – q; b – q, s; c – p, q, s; d – q, s

10. a – p; b – q; c – s; d – r

11. a – p; b – q; c – r; d – s

12. a – q, r; b – p; c – p; d – q, r

13. a – r; b – s; c – r; d –p

14. a – s; b – r; c – q; d – p

15. a – q, r; b – r, s; c – q, r; d – p, q

16. (a – p – x); (b – q, r – y); (c – p – x); (d – q, r – w)

17. A – b,h; B – a, g; C – c, e; D – d, f

18. A – d; B – a

19. *a b c d* 13

20. A – b, d, e; B – a, c, f, h; C – i, k, p

21. A – e, f, j; B – a, c, d, g, h, i, b; C – None

22. *w x y z* 12

23. A – (c & e), (b & d); B – (a & b) or (a & d); C – (a & c) or (a & e), (b & c), (b & e), (c & d) and (d & e)

24. A – (a & c) (b & f); B – (a & d) or (c & d), (a & e) (c & d); C – (d & e)

25. a – True; b – True; c – True; d – False

26. b, e, f, g, h, i

27. A – d, h; B – d; C – f, h; D – h

28.

Compound	A	B	C
I	c	a	a
II	c	b	b
III	c	a	a
IV	c	b	b
V	c	a	a
VI	c	a	a
VII	c	a	a
VIII	e	b	b
IX	e	a	a
X	e	b	b

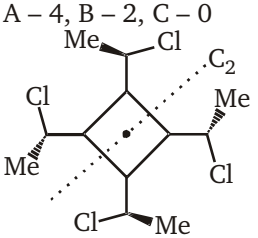
29. (a) (R) (b) (L)

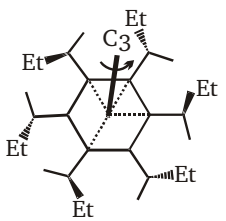
30A. 1 – N; 2 – Z; 3 – E; 4 – Z; 5 – Z; 6 – E; 7 – N

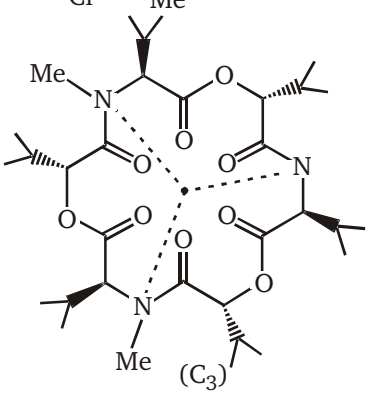
B. (a) 1 – Z; 2 – E; 3 – E; 4 – Z; 5 – Z; 6 – E (b) 2^9 (c) 10

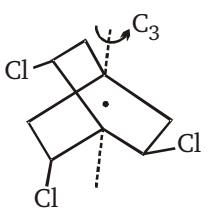
31. 1 – Z; 2 – N; 3 – E

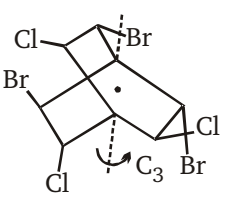
32. (a) A – 10, B – 4, C – 2 (b) A – 5, B – 0, C – 5
(c) A – 4, B – 2, C – 0 (d) A – 2, B – 1, C – 0
(e) A – 5, B – 2, C – 1 (f) A – 4, B – 1, C – 2
(g) A – 4, B – 2, C – 0 (h) A – 4, B – 1, C – 2

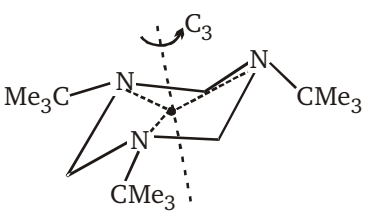
33. (1) 

(2) 

(3) 

(4) 

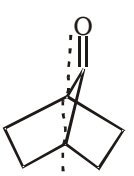
(5) 

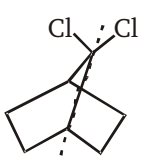
(6) 

(7) C_3 axis, C_2 axis

(8) C_3-axis

(9) C_3 axis

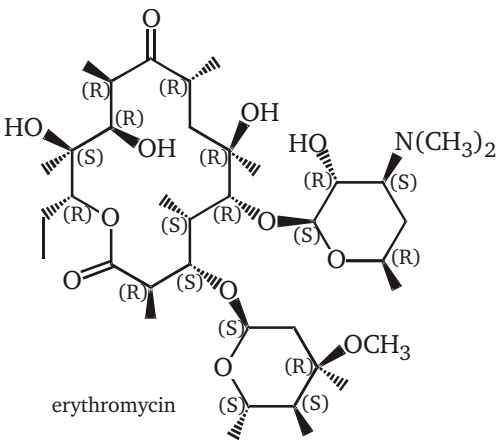
(10) 

(11) 

(12) C_2-axis

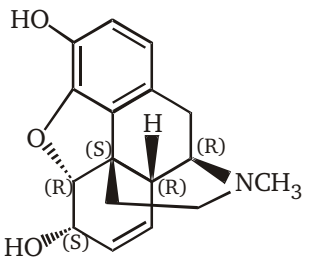
(13) C_2-axis

34. (1)



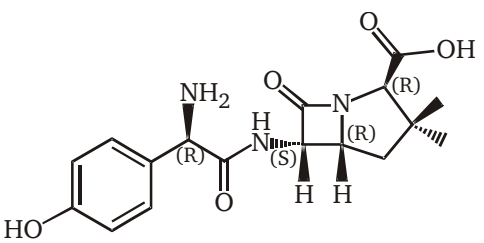
erythromycin

(2)



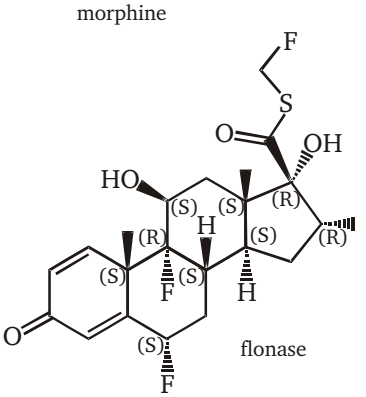
morphine

(3)



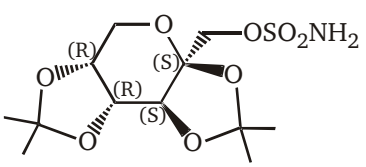
amoxicillin

(4)



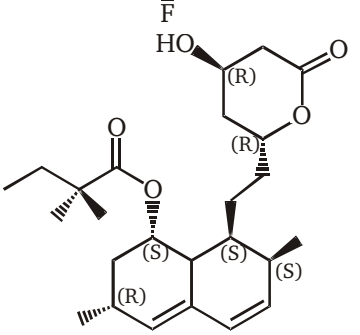
flonase

(5)



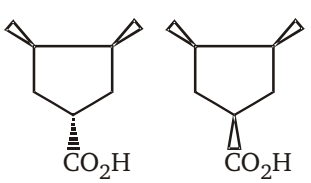
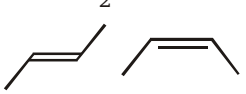
topomax

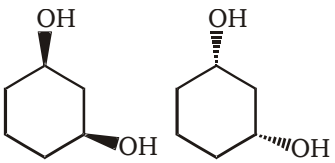
(6)

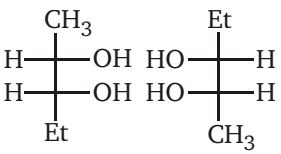


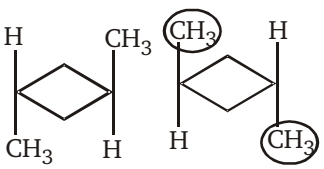
zocor

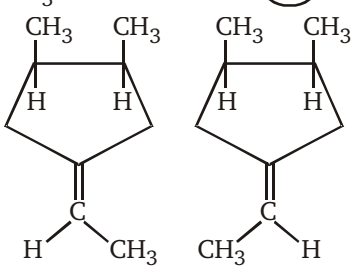
35.

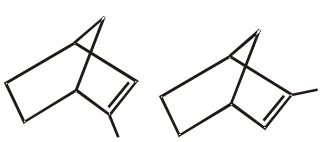
		Identical	Enantiomer	Diastereomer	Constitutional Isomer
(1)		×	×	✓	×
(2)		×	×	✓	×

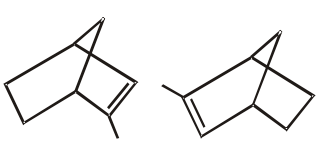
(3)  ✓ × × ×

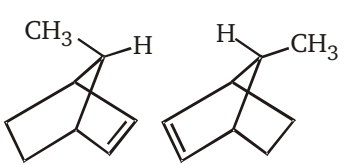
(4)  ✓ × × ×

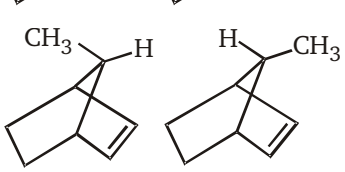
(5)  ✓ × × ×

(6)  × ✓ × ×

(7)  × ✓ × ×

(8)  ✓ × × ×

(9)  ✓ × × ×

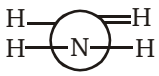
(10)  × × ✓ ×

36. (A) - (d) (B) - (b)

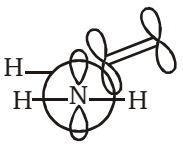
37. a – p; b – q; c – r; d – s

38. a – s; b – p; c – q; d – r

39.



(Resonance)



-(vacant-*p*-orbital)

40. (1) 16 (2) 4 (3) 16 (4) 4 (5) 4
(6) 4 (7) 4 (8) 3 (9) 4 (10) 4
(11) 2

41. a – 2, b – 4, c – 3, d – 4, e – 8, f – 2

42. a – s; b – p; c – q; d – r

43. a – 2^5, b – 2^5, c – 2^7 2^3, d – 2^9

44. A – e; B – b; C – d; D – a

45. A – e; B – c; C – a; D – b; E – d

46. a – p, q, s, t; b – p, r; c – p, q, r, s, t; d – p

Subjective Problems

1. 3 (c, f, h) **2.** 64 **3.** 5 **4.** 5 **5.** 2 **6.** 8. **7.** 3

8. 6 **9.** 12 **10.** 4 **11.** 5 **12.** 4 **13.** 4 **14.** 4 **15.** 8

16. 4 (a, b, c, h) **17.** 6