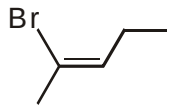
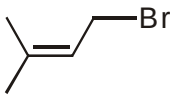
STEREO ISOMERISM

EXERCISE # I (MAINS ORIENTED)

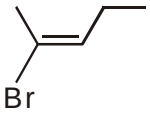
1. Which one of the following statements concerning compounds **V**–**Z** is true :



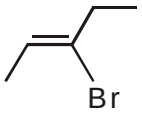
(V)



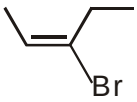
(W)



(X)



(Y)



(Z)

(A) **V** and **X** are conformational isomers
(B) **Y** and **Z** are constitutional isomers
(C) **X** and **Y** are constitutional isomers
(D) **V** and **Y** are stereoisomers

SE0001

2. Which of the following compound has no isomer?

(A) $CH_3CH_2CH_2Cl$ (B) CH_3CHO

(C) CH_2=CH–Cl (D) $ClCH_2CH_2Cl$

SE0002

3. Compound CH_2Cl_2 contain :

(A) Plane of symmetry (B) Centre of symmetry

(C) Axis of symmetry (D) Both (A) & (C)

SE0003

4. Number of POS present in CH_4 :

(A) 3 (B) 4 (C) 5 (D) 6

SE0004

5. How many stereoisomers of the following molecule are possible ?

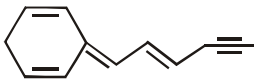
HOOC.CH=C=CH.COOH

(A) Two optical isomers (B) Two geometrical isomers

(C) Two optical and two geometrical isomers (D) None

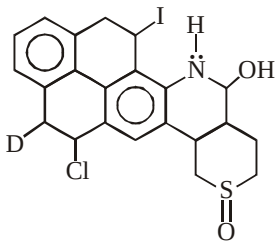
SE0005

6. The number of cis-trans isomer possible for the following compound.



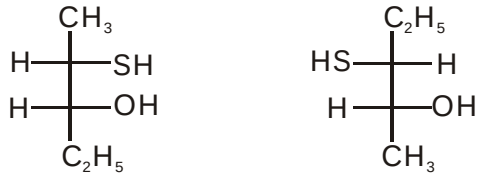
(A) 2 (B) 4 (C) 6 (D) 8

SE0006

7.  has 'x' chiral centre then find the value of x :

(A) 7 (B) 8 (C) 6 (D) 5

SE0007

8. 

(A) Diastereomers (B) Enantiomers (C) Identical (D) Constitutional isomers

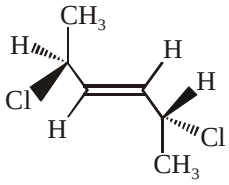
SE0008

9. The number of optically active compounds in the isomers of C_4H_9Br is :

(A) 1 (B) 2 (C) 3 (D) 4

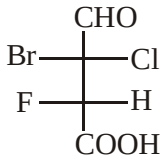
SE0009

10. Compound have :



(A) Plane of symmetry (B) Centre of symmetry
(C) Axis of symmetry (D) None

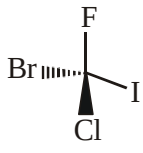
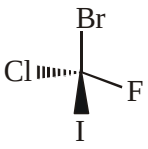
SE0010

11. 

Configuration of compound is :

(A) 2S, 3S (B) 2R , 3S (C) 2R , 3R (D) 2S , 3R

SE0011

12.  &  have configuration respectively :

(A) R, S (B) S, S (C) S, R (D) R, R

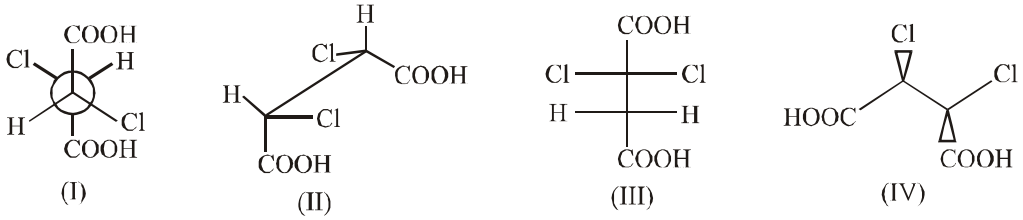
SE0012

13. Minimum molecular weight of a hydrocarbon containing minimum number of C-atom to show optical isomerism :

(A) 100 (B) 80 (C) 68 (D) 70

SE0013

14. For the given configuration :

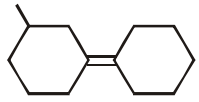
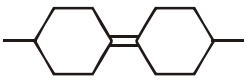


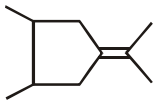
Which of the compound/configuration are optically active :

(A) I (B) II (C) III (D) IV

SE0014

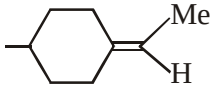
15. Compounds which can show both optical as well as geometrical isomerism :

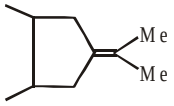
(A)  (B) 

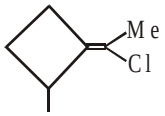
(C)  (D) 

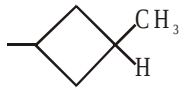
SE0015

16. Which of the following will not show optical isomerism :

(A) 

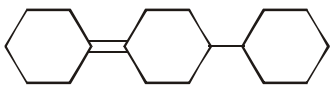
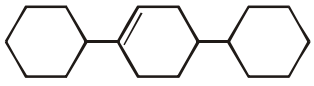
(B) 

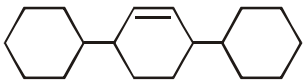
(C) 

(D) 

SE0016

17. Optical & geometrical isomerism both can be shown by :-

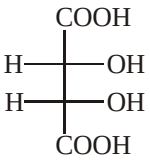
(A)  (B) 

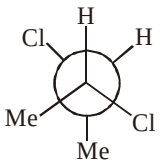
(C)  (D) 

SE0017

18. Which of the following will not show optical isomerism :

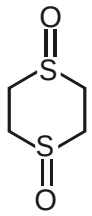
(A) Cl–CH=C=C=CH–Cl (B) Cl–CH=C=C=C=CH–Cl

(C) 

(D) 

SE0018

19. The correct statement for the given compound is



(A) It can shows geometrical isomerism (B) It can show optical isomerism
(C) It contain chiral centre (D) None of these

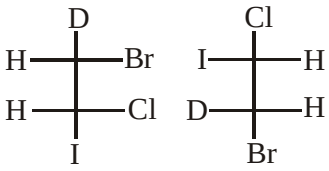
SE0019

20. Meso-tartaric acid and d-tartaric acid are :-

(A) Positional isomers (B) Enantiomers (C) Diastereomers (D) Racemic mixture

SE0020

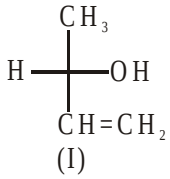
21. The two compounds given below are :



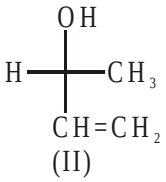
(A) Enantiomers (B) Diastereomers (C) Optically inactive (D) Identical

SE0021

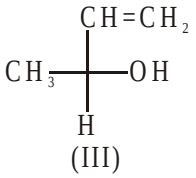
22. Which of the following combinations amongst the four Fischer projections represents the same absolute configurations ?



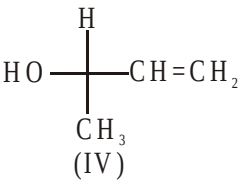
(I)



(II)



(III)

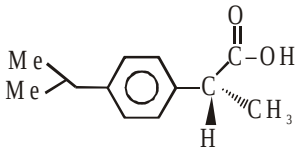


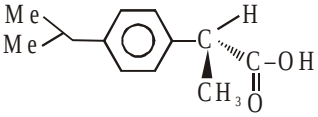
(IV)

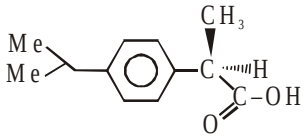
(A) (II) and (III) (B) (I) and (IV) (C) (II) and (IV) (D) (III) and (IV)

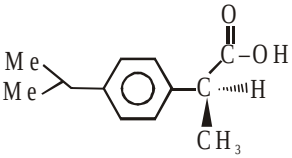
SE0022

23. The S-ibuprofen is responsible for its pain relveing property. Which one of the structure shown is S-ibuprofen :

(A) 

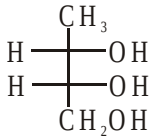
(B) 

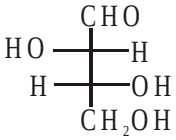
(C) 

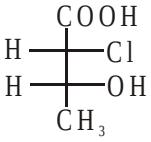
(D) 

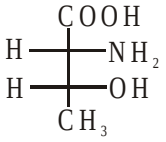
SE0023

24. Which of the following is a 'threo' isomer :

(A) 

(B) 

(C) 

(D) 

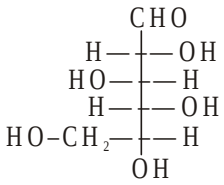
SE0024

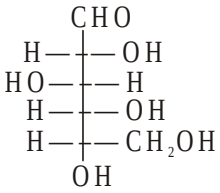
25. Number of possible stereoisomers of glucose are :-

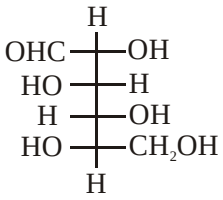
(A) 10 (B) 8 (C) 16 (D) 20

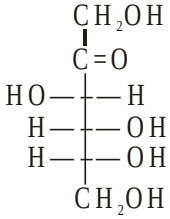
SE0025

26. Which of the following is not D sugar :

(A) 

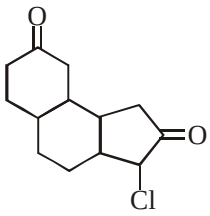
(B) 

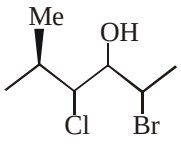
(C) 

(D) 

SE0026

27. Number of chiral centres in [X] & [Y] is a & b respectively. The value of (a–b) is :

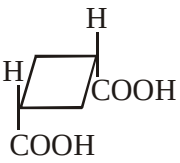
[X] = 

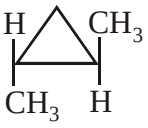
[Y] = 

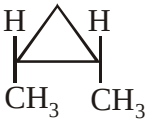
(A) 1 (B) 2 (C) 3 (D) 4

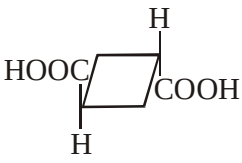
SE0027

28. Which one of the following is resolvable :

(A) 

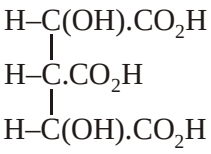
(B) 

(C) 

(D) 

SE0028

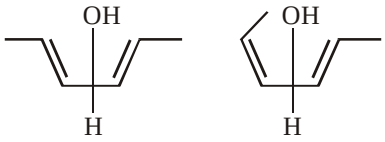
29. How many stereoisomers can exist for the following acid.



(A) Two (B) Four (C) Eight (D) Six

SE0029

30. Incorrect relationship between given compounds are

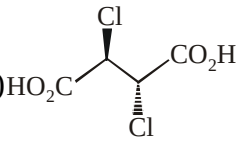


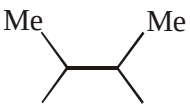
(A) Both are geometrical isomers (B) Both are stereo isomers

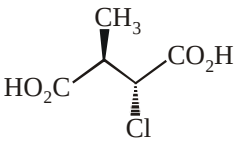
(C) Both are enantiomers (D) Both are diastereomers

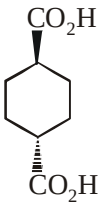
SE0030

31. Identify meso compound.

(A) 

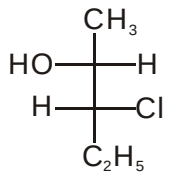
(B) 

(C) 

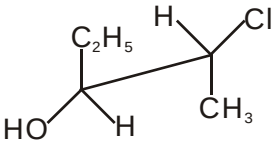
(D) 

SE0031

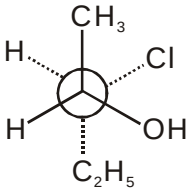
32. The two projection formulae that represent a pair of enantiomers are :-



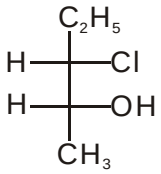
(I)



(II)



(III)



(IV)

(A) I and II (B) III and IV

(C) I and III (D) II and IV

SE0032

33. A pure sample of 2-chlorobutane shows rotation of PPL by 30° in standard conditions. When above sample is made impure by mixing its opposite form, so that the composition of the mixture becomes 87.5% d-form and 12.5% ℓ-form, then what will be the observed rotation for mixture.

(A) – 22.5° (B) + 22.5° (C) + 7.5° (D) – 7.5°

SE0033

34. When an optically active compound is placed in a 10 dm tube is present 20 gm in a 200 ml solution rotates the PPL by 30°. Calculate the angle of rotation & specific angle of rotation if above solution is diluted to 1 Litre.

(A) 16° & 36° (B) 6° & 30° (C) 3° & 30° (D) 6° & 36°

SE0034

35. Identify % optical purity if 6 gm (+)-2-butanol is mixed with 2 gm (–)-2-butanol.

(A) 50 % (B) 66.6 % (C) 33.3 % (D) 75 %

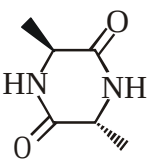
SE0035

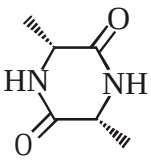
36. A mixture of d and ℓ, 2-bromobutane contain 75% d-2-bromobutane. Calculate enantiomeric excess.

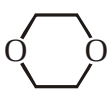
(A) 75% (B) 25% (C) 50% (D) 100%

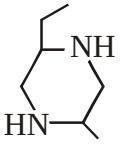
SE0036

37. Which of the following is example of meso compound?

(A) 

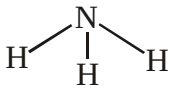
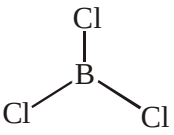
(B) 

(C) 

(D) 

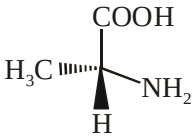
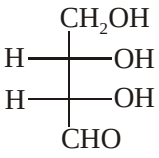
SE0037

38. Which of the following has C_2 & C_3 axis of symmetry ?

(A)  (B) H_2CCl_2 (C) $H_3C–Cl$ (D) 

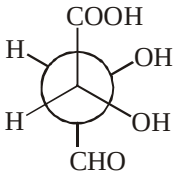
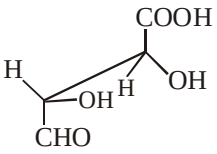
SE0038

39. Configuration of I & II respectively will be :

(A) D, D (B) L , D (C) D , L (D) L, L

SE0039

40.   , compound related as :

(A) Enantiomers (B) Conformation (C) Identicle (D) Diastereomers

SE0040

EXERCISE # II (JEE-ADVANCE ORIENTED LEVEL-I)

Single correct Option Type :

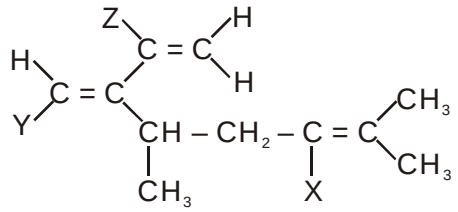
1. Molecular formula $C_5H_{10}O$ can have :

(A) 6-Aldehyde, 4-Ketone (B) 5-Aldehyde, 3-Ketone

(C) 4-Aldehyde, 3-Ketone (D) 5-Aldehyde, 2-Ketone

SE0041

2. In the given halogenoalkene M, atoms X, Y and Z represents hydrogen or bromine or chlorine. To show cis-trans isomerism, what could be the identities of atoms X, Y and Z?

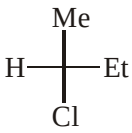


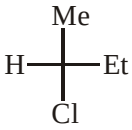
(M)

	X	Y	Z
1	Cl	H	Br
2	H	Br	Cl
3	Cl	Br	H

(A) 1, 2 and 3 (B) 1 and 2 only (C) 2 and 3 only (D) 1 and 3 only

SE0042

3. **Statement–1 :**  is a chiral resolvable molecule.

Statement–2 :  is non-superimposable on its mirror image.

(A) Statement–1 is true, Statement–2 is true; Statement–2 is not the correct explanation of Statement–1

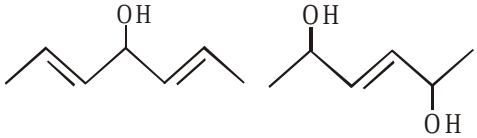
(B) Statement–1 is true, Statement–2 is true ; Statement–2 is the correct explanation of Statement–1

(C) Statement–1 is true, Statement–2 is false

(D) Statement–1 is false, Statement–2 is true

SE0043

4. Total number of stereoisomer of following compounds are respectively :-

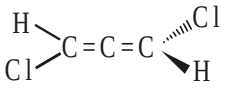
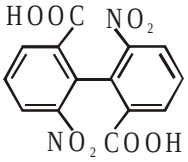


(A) 4, 6 (B) 8 (C) 6,6 (D) 8, 8

SE0044

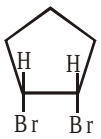
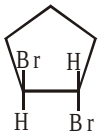
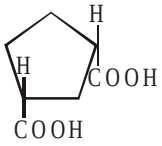
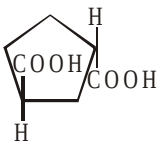
5. Which of the following compounds are optically active ?

(A) $CH_3.CHOH.CH_2.CH_3$ (B) $H_2C=CH.CH_2.CH=CH_2$

(C)  (D) 

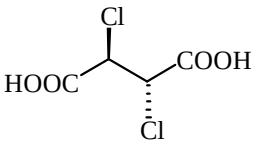
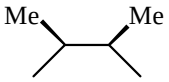
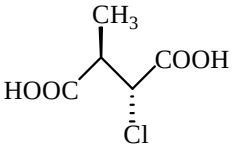
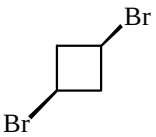
SE0045

6. Which out the following are Non-resolvable :

(A)  (B)  (C)  (D) 

SE0046

7. Identify compound(s) which is/are not meso :

(A)  (B)  (C)  (D) 

SE0047

8. Which of the following statements for a meso compound is/are correct :

(A) The meso compound has either a plane or centre of symmetry

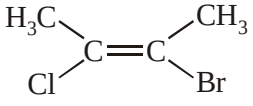
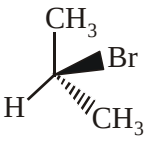
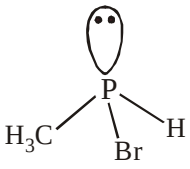
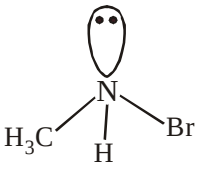
(B) The meso compound is optically inactive due to internal compensation.

(C) The meso compound is achiral

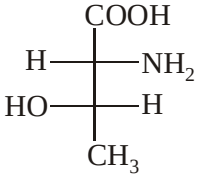
(D) The meso compound is formed when equal amounts of two enantiomers are mixed

SE0048

9. Among the following the non- resolvable compound is/are :

(A)  (B)  (C)  (D) 

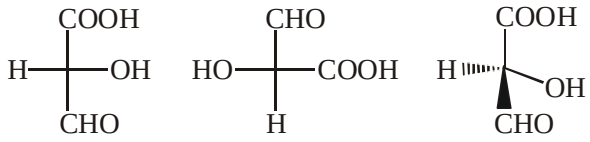
SE0049

10. Compound  is/are ?

(A) (2R, 3S), L (B) L, Erythreo (C) Threo , D (D) (2R, 3S), D

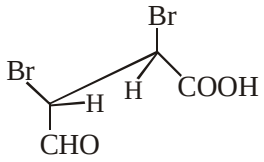
SE0050

11. Relation between compounds are :

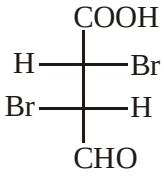


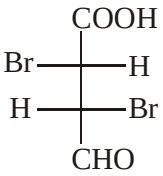
(A) I & II = Enantiomers
(B) II & III = Enantiomers
(C) I & II = Identical
(D) II & III = Identical

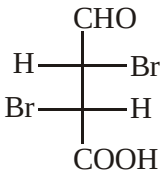
SE0051

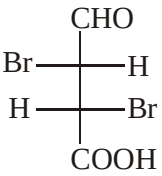
12. 

has fisher diagram ?

(A) 

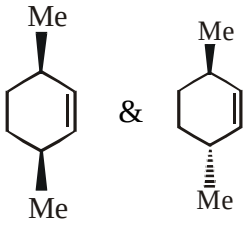
(B) 

(C) 

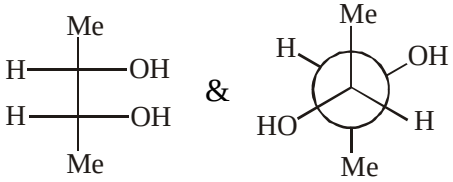
(D) 

SE0052

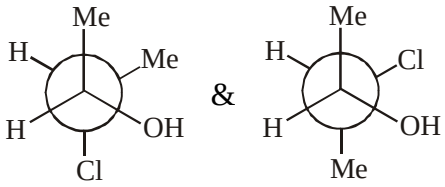
13. Identify correct relation between pair of compounds ?

(A) 

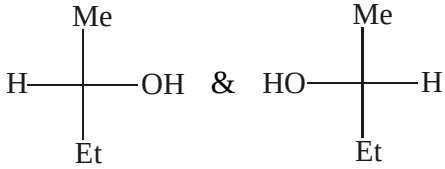
Diastereomers

(B) 

Identical

(C) 

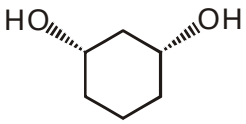
Diastereomers

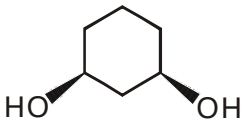
(D) 

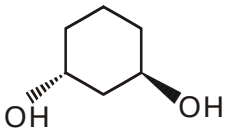
Enantiomers

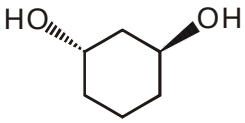
SE0053

14. Which two of the following compounds represents a pair of enantiomers?

(I) 

(II) 

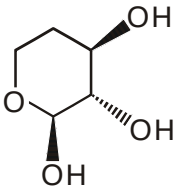
(III) 

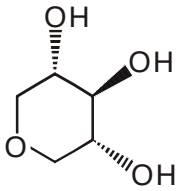
(IV) 

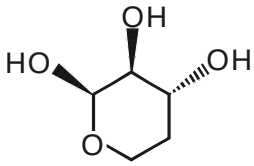
(A) I & II (B) II & III (C) III & IV (D) II & IV

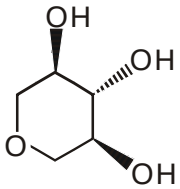
SE0054

15. Which two of the following compounds are diastereomers?

(I) 

(II) 

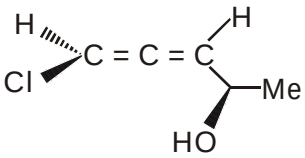
(III) 

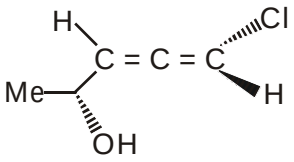
(IV) 

(A) I & II (B) II & IV (C) III & IV (D) I & III

SE0055

16. The correct relation between the following compounds is :



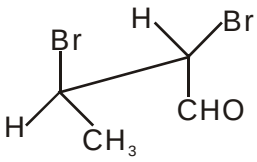


(A) Enantiomers (B) Diastereomers

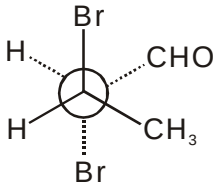
(C) Homomers (Identical) (D) Constitutional isomers

SE0056

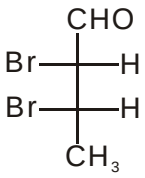
17. Identify the correct statement regarding following molecules?



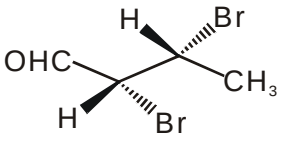
(M)



(N)



(O)



(P)

(A) **M** and **O** are diastereomers

(B) **N** and **P** are enantiomers

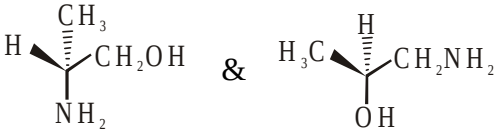
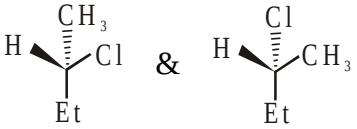
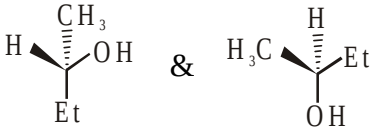
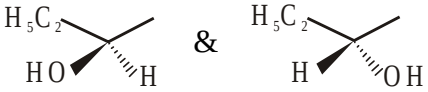
(C) **M** and **N** are identical

(D) **O** and **P** are diastereomers

SE0057

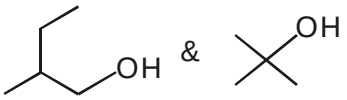
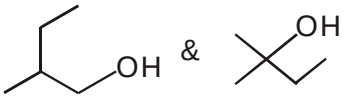
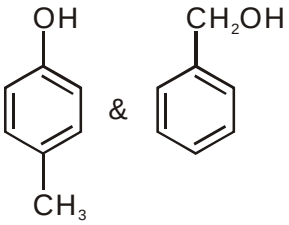
Matrix Match Type :

18.

Column I	**Column II**
(A) 	(P) Structural
(B) 	(Q) Identical
(C) 	(R) Enantiomers
(D) 	(S) Diastereomers

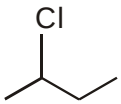
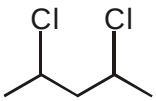
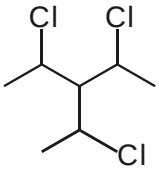
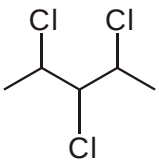
SE0058

19. Match the column :-

	Column-I		Column-II
(1)		(P)	Position isomers
(2)		(Q)	Chain isomers
(3)		(R)	Homologues
(4)		(S)	Functional isomers

SE0059

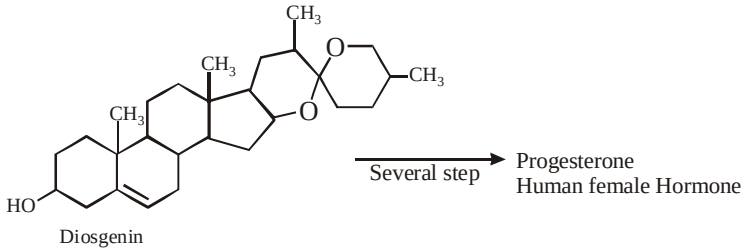
20. Match the column–I :-

	Column-I (Compounds)		Column-II (Total number of stereoisomers)
(1)		(P)	8
(2)		(Q)	4
(3)		(R)	3
(4)		(S)	2

SE0060

Subjective Type :

21.



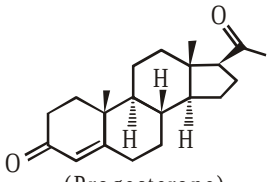
Diosgenin

What is number of chiral centres present in Diosgenen is :

SE0061

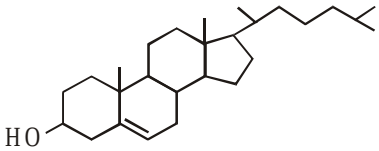
22. Calculate the total number of chrial carbon atoms in.

(i)



(Progesterone)

(ii)

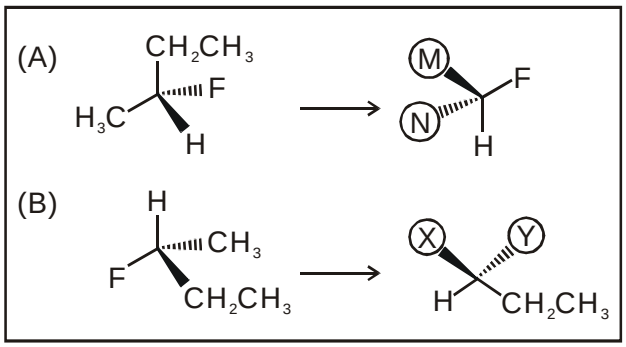


SE0062

23. Total number of isomeric (including stereo) bromochlorofluoroiodo propadiene.

SE0063

24. Re-orient the molecule at the left to match the partially drawn perspective at the right. Find the two missing substituents at their correct positions.



(A) **M** = CH_3CH_2- **N** = CH_3-

(B) **X** = CH_3- **Y** = $F-$

(C) **M** = CH_3- **N** = CH_3CH_2-

(D) **X** = $F-$ **Y** = CH_3-

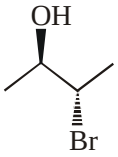
SE0064

25. Find out the total number of cyclic isomers of C_6H_{12} which are optically active ?

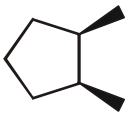
SE0065

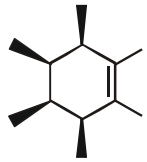
26. How many of the given compounds are chiral :

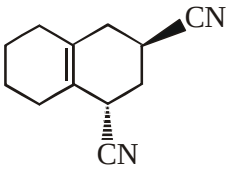
(i) 

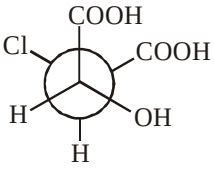
(ii) 

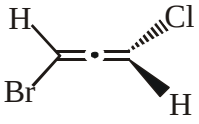
(iii) 

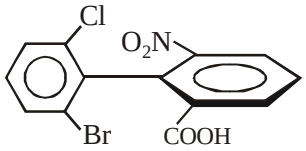
(iv) 

(v) 

(vi) 

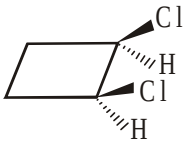
(vii) 

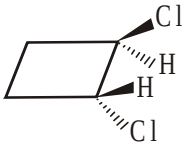
(viii) 

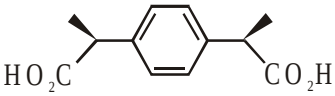
(ix) 

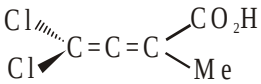
SE0066

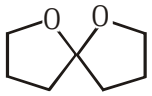
27. With reasons, state whether each of the following compounds I to VIII is chiral

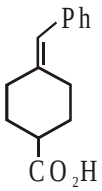
(I) 

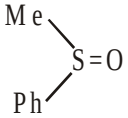
(II) 

(III) 

(IV) 

(V) 

(VI) 

(VII) 

SE0067

28. How many cyclopentane structures (including stereo) are possible for C_7H_{14}.

SE0068

29. The number of diastereoisomers (excluding enantiomers) for 1-bromo-2-chloro-3-iodocyclopropane.

SE0069

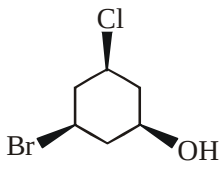
30. Identify total number of stereoisomers for the following compound :

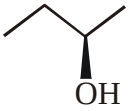
CH_2-CH(OH)-CH(Cl)-CH=CH-CH_3

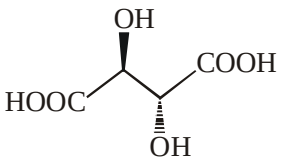
SE0070

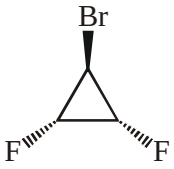
31. How many of the given molecule / species are chiral :

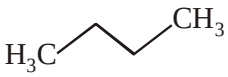
(I) 

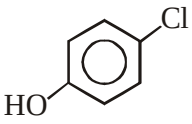
(II) 

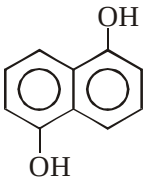
(III) 

(IV) 

(V) 

(VI) 

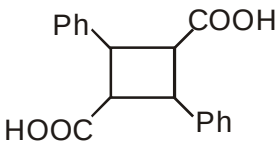
(VII) 

(VIII) 

(IX) CH_4

SE0071

32. Total geometrical isomers possible for :



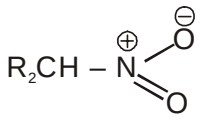
(A) 3 (B) 4 (C) 5 (D) 8

SE0072

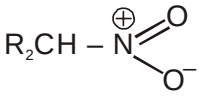
EXERCISE # III (JEE-ADVANCE ORIENTED LEVEL # II)

Single Correct Type :

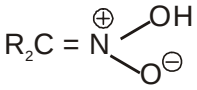
1. The correct statements describing the relationship between :



(X)



(Y)

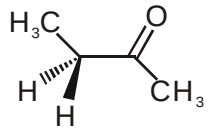


(Z)

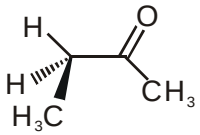
(A) **X** and **Y** are resonance structures and **Z** is a tautomer
(B) **X** and **Y** are tautomers and **Z** is resonance structure
(C) **X**, **Y** and **Z** are all resonance structures
(D) **X**, **Y** and **Z** all are tautomers

SE0073

2. The correct statements about conformations X and Y of 2-butanone are :



(X)



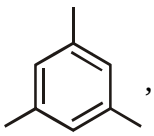
(Y)

(a) **X** is more stable than **Y**
(b) **Y** is more stable than **X**
(c) Methyl groups in **X** are anti
(d) Methyl groups in **Y** are gauche

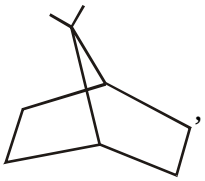
(A) a and d (B) a and c (C) b and c (D) a, c and d

SE0074

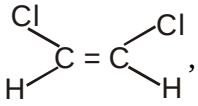
3. Among the following, the number of molecules that possess C_2–axis of symmetry is :



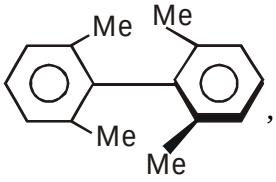
,



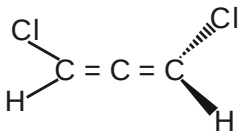
, CH_4,



, BF_3,

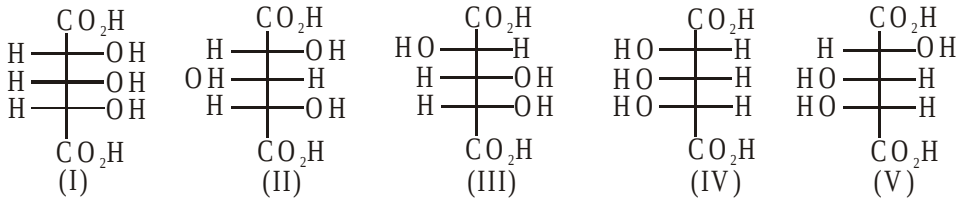


, $CHCl_3$, 2,5-dimethylthiophene,



SE0075

4. Observe the given compounds and answer the following questions.



(i) Which of the above formulae represent identical compounds ?

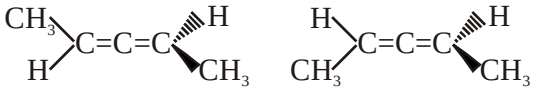
(A) I and II (B) I and IV (C) II and IV (D) III and IV

(ii) Which of the above compounds are enantiomers ?

(A) II and III (B) III and IV (C) III and V (D) I and V

SE0076

5. Which of the following option is correct regarding the given compounds :

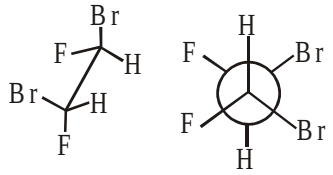


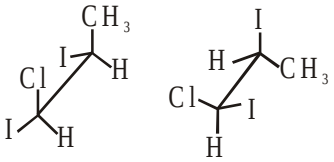
(A) Both are identical (B) Both are optically inactive

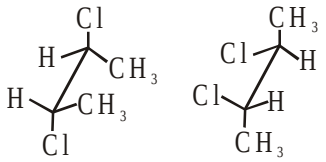
(C) Both are enantiomers (D) Geometrical isomer

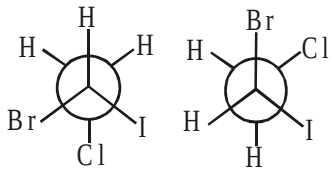
SE0077

6. Which of the following pairs of compound is/are identical ?

(A) 

(B) 

(C) 

(D) 

SE0078

Multiple Correct Type :

7. Which of the following statements is/are not correct for D-(+) glyceraldehyde :

(A) The symbol D indicates the dextrorotatory nature of the compound

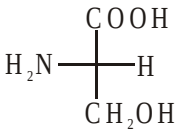
(B) The sign(+) indicates the dextrorotatory nature of the compound

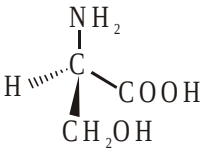
(C) The symbol D indicates that (–OH) group lies left to the chiral centre in the conventionally correct Fischer projection diagram

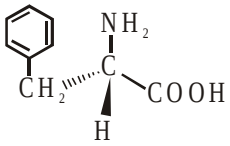
(D) The symbol D indicates that (–OH) group lies right to the chiral centre in the conventionally correct Fischer projection diagram

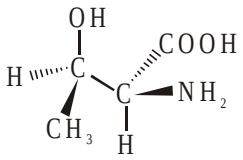
SE0079

8. Which of the following are correct representation of L-amino acids :

(A) 

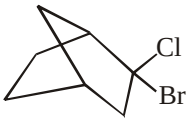
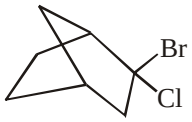
(B) 

(C) 

(D) 

SE0080

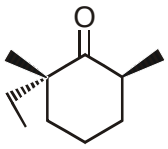
9. Identify relation between these two compounds :

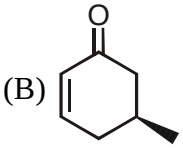



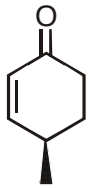
(A) Homomers (B) Enantiomers (C) Diastereomers (D) Positional Isomers

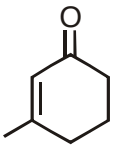
SE0081

10. Which of the following undergoes racemisation in alkaline medium?

(A) 

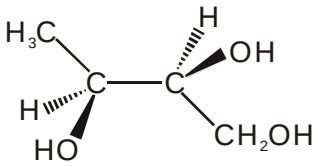
(B) 

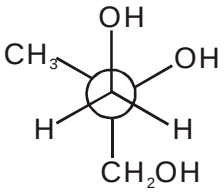
(C) 

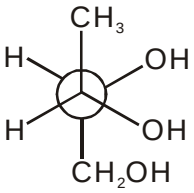
(D) 

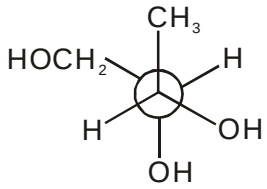
SE0082

11. Which compound is different from the others?

(A) 

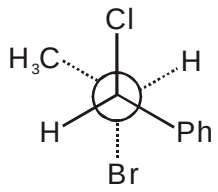
(B) 

(C) 

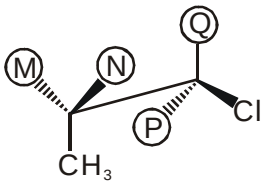
(D) 

SE0083

12.



(X)



(Y)

What would be the correct match to get (**Y**) as a diastereomers of (**X**)?

(A) **M** = – H **Q** = – Ph
N = – Br **P** = –H

(B) **M** = – H **Q** = – H
N = – Br **P** = –Ph

(C) **M** = – Br **Q** = – Ph
N = – H **P** = –H

(D) **M** = – Br **Q** = – H
N = – H **P** = –Ph

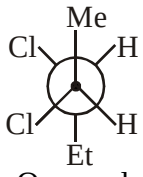
SE0084

Comprehension Type :

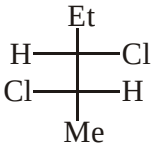
Paragraph for Question 13 and 14

Four compounds are given below 'S' is a stereoisomer of P.

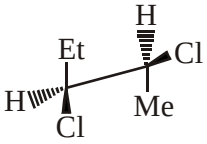
(P)



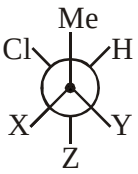
(Q)



(R)



(S)



13. P & Q are related as :

(A) Identical (B) Enantiomer (C) Diastereomer (D)Positional isomerism

SE0085

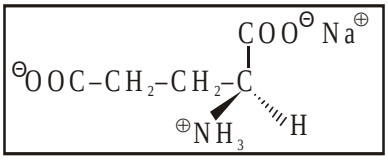
14. Which of the above structures represented is Sawhorse projection :-

(A) P (B) Q (C) R (D) S

SE0086

Paragraph for Question 15 to 17

S(+) Mono sodium Glutamate (MSG) is a flavour enhancer used in many foods. Fast foods often contain substantial amount of MSG and is widely used in Chinese food. If one mole of above MSG was placed in 845 ml solution and passed through 200 mm tube, the observed rotation was found to be + 9.6°.



15. Find out the specific rotation of (–) MSG :

(A) + 24° (B) +56.8º (C) –48° (D) None of these

SE0087

16. Find out the approximate percentage composition of (–) MSG in a mixture containing (+) MSG and (–) MSG whose specific optical rotation is –20° :

(A) 83.3% (B) 16.7% (C) 91.6% (D) 74%

SE0088

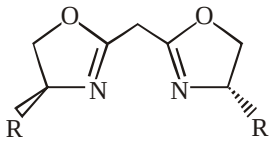
17. If 33.8 g of (+) MSG was put in 338 ml solution and was mixed with 16.9g of (–) MSG put in 169 ml solution and the final solution was passed through 400 mm tube. Find out observed rotation of the final solution :

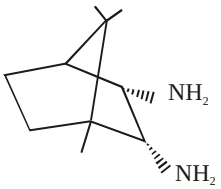
(A) +1.6° (B) +4.8° (C) +3.2° (D) None of these

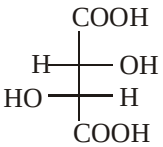
SE0089

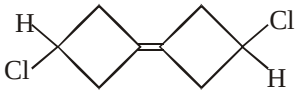
Paragraph for Q.18 and Q.19

Among the following structures ?

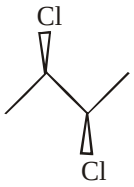
(I) 

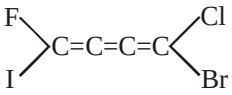
(II) 

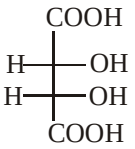
(III) 

(IV) 

(V) 

(VI) 

(VII) 

(VIII) 

18. Optically active compound is -

(A) III (B) IV (C) V (D) VII

SE0090

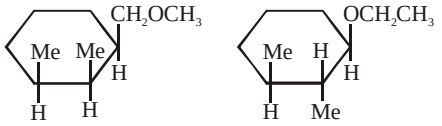
19. Which of the following will not show optical isomerism -

(A) I (B) II (C) V (D) VIII

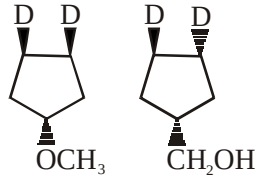
SE0091

Matrix Match Type :

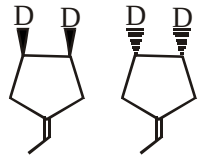
20. **Column-I (Compounds)** | **Column-II (Relation)**

(A) 

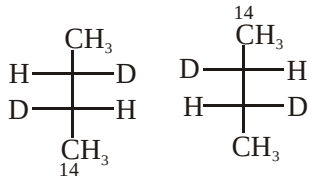
(P) Metamers

(B) 

(Q) Functional Isomer

(C) 

(R) Geometrical isomer

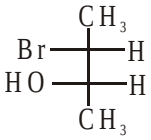
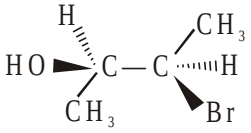
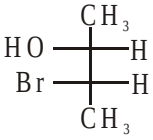
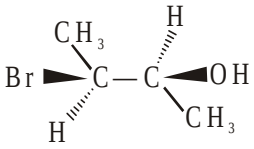
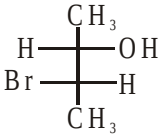
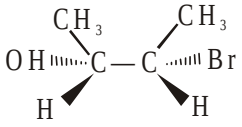
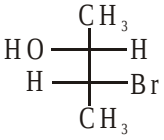
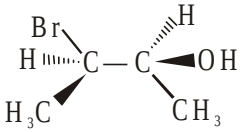
(D) 

(S) Enantiomer

(T) Diastereomer

SE0092

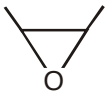
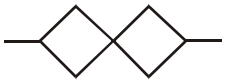
21. Match List-I, II, III with each other :

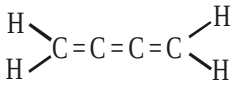
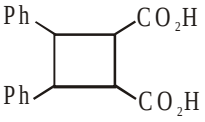
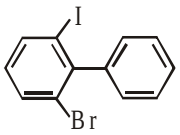
List - I	**List - II**	**List - III**
(A) 	(1) 	(i) (2R, 3R)
(B) 	(2) 	(ii) (2S,3S)
(C) 	(3) 	(iii) (2S,3R)
(D) 	(4) 	(iv) (2R,3S)

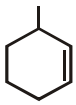
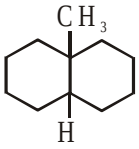
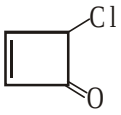
SE0093

Subjective Type :

22. In what stereoisomeric forms would you expect the following compounds to exist ?

(a) $EtCH(CO_2H)Me$ (b) $MeCH(CO_2Et)CO_2H$ (c)  (d) 

(e)  (f) Et(Me)C=C=C(Me)Et (g)  (h) 

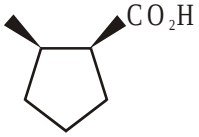
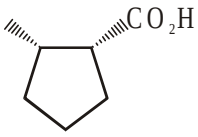
(i)  (j)  (k) 

SE0094

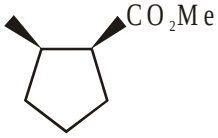
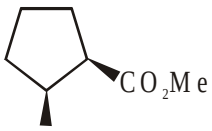
23. Calculate the number of Benzenoid isomers possible for C_6H_3ClBrI.

SE0095

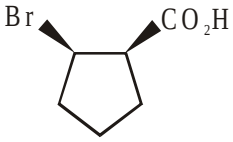
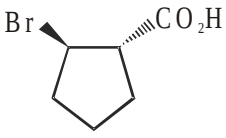
24. What are the relationships between the following pairs of isomers ?

(a)  and 

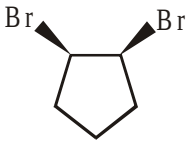
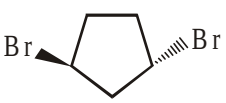
SE0096

(b)  and 

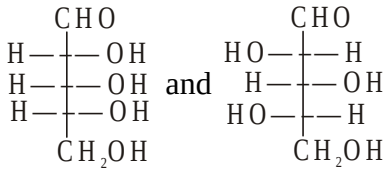
SE0096

(c)  and 

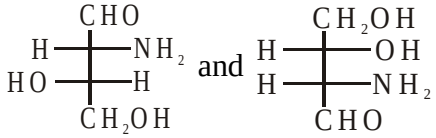
SE0096

(d)  and 

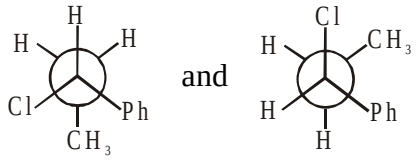
SE0096

(e) 

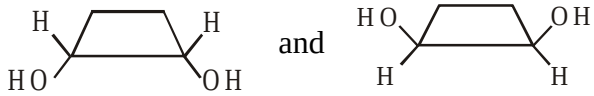
SE0097

(f) 

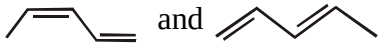
SE0097

(g) 

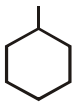
SE0098

(h) 

SE0098

(i) 

SE0098

25. X $\xrightarrow[pt]{2H_2}$ 

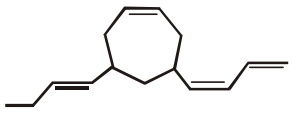
Find out total number of structures of X.

SE0099

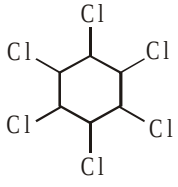
26. Calculate the number of chiral center in the molecule Ethyl 2,2-dibromo-4-ethyl-6-methoxy cyclohexane carboxylate.

SE0100

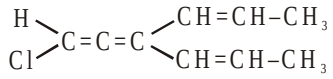
27. Calculate the total number of stereoisomers possible for

(i) 

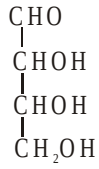
SE0101

(ii) 

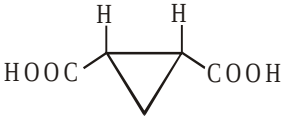
SE0102

(iii) 

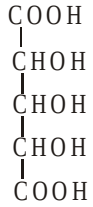
SE0103

(iv) 

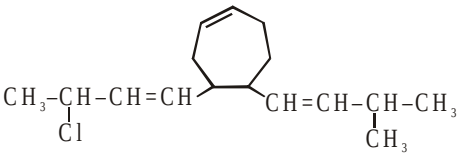
SE0104

(v) 

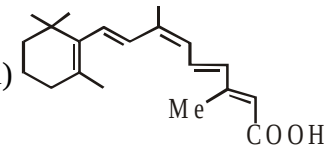
SE0105

(vi) 

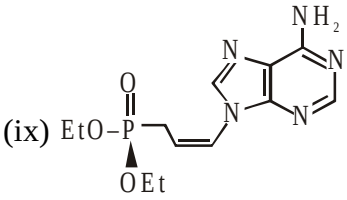
SE0105

(vii) 

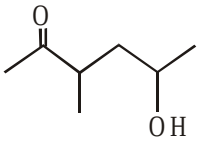
SE0105

(viii) 

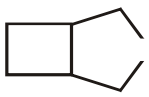
SE0105

(ix) 

SE0106

(x) 

SE0106

(xi) 

SE0106

28. How many different chloroethanes are there from the formula $C_2H_{6-n}Cl_n$ (where n can be any integer from 1 to 6)?

SE0107

EXERCISE # IV (A) (J-MAINS)

1. Recemic mixture is formed by mixing two : **[AIEEE-2002]**

(1) Isomeric compounds (2) Chiral compounds

(3) Meso compounds (4) Enantiomers with chiral carbon

SE0108

2. Following types of compounds I and II **[AIEEE-2002]**

(I) $CH_3CH=CHCH_3$

(II) $CH_3—\underset{\displaystyle CH_2CH_3}{\underset{|}{CH}}—OH$, are studied in terms of isomerism in-

(1) Chain isomerism (2) Position isomerism

(3) Conformers (4) Stereo isomerism

SE0109

3. Among the following four structures I to IV **[AIEEE-2003]**

$C_2H_5—\underset{\displaystyle CH_3}{\underset{|}{CH}}—C_3H_7$ (I)

$C_2H_5—\underset{\displaystyle O}{\underset{||}{C}}—\underset{\displaystyle CH_3}{\underset{|}{CH}}—C_2H_5$ (II)

$H—\overset{\displaystyle H}{\overset{|}{\underset{\displaystyle H}{\underset{|}{C^{\oplus}}}}}$ (III)

$C_2H_5—\underset{\displaystyle CH_3}{\underset{|}{CH}}—C_2H_5$ (IV)

It is true that-

(1) All four are chiral compounds (2) Only I and II are chiral compounds

(3) Only III is a chiral compound (4) Only II and IV are chiral compounds

SE0110

4. Which of the following will have a meso-isomer also- **[AIEEE-2004]**

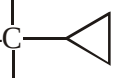
(1) 2–chlorobutane (2) 2,3–dichlorobutane

(3) 2,3–dichloropentene (4) 2–hydroxy propanoic acid

SE0111

5. Amongst the following compounds, the optically active alkane having lowest molecular mass is

(1) $CH_3—CH_2—C \equiv CH$ (2) $CH_3—CH_2—\underset{\displaystyle CH_3}{\underset{|}{CH}}—CH_3$ **[AIEEE-2004]**

(3) $CH_3—\overset{\displaystyle H}{\overset{|}{\underset{\displaystyle C_2H_5}{\underset{|}{C}}}}$  (4) $CH_3—CH_2—CH_2—CH_3$

SE0112

6. Which of following compounds is not chiral **[AIEEE-2005]**

(1) 1–chloropentane (2) 2–chloropentane

(3) 1–chloro–2–methyl pentane (4) 3–chloro–2–methyl pentane

SE0113

7. Of the five isomeric hexanes, the isomer which can give two monochlorinated compounds is :

(1) 2-methyl pentane (2) 2,2–dimethyl butane **[AIEEE-2005]**

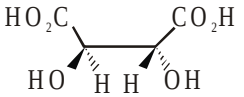
(3) 2,3–dimethyl butane (4) n-hexane

SE0114

8. Which types of isomerism is shown by 2,3–dichloro butane- **[AIEEE-2005]**

(1) Structural (2) Geometric (3) Optical (4) Diastereo

SE0115

9. The absolute configuration of  is : **[AIEEE-2008]**

(1) S, S (2) R, R (3) R, S (4) S, R

SE0116

10. The number of stereoisomers possible for a compound of the molecular formula CH_3–CH=CH–CH(OH)–Me is :- **[AIEEE-2009]**

(1) 4 (2) 6 (3) 3 (4) 2

SE0117

11. Out of the following, the alkene that exhibits optical isomerism is :- **[AIEEE-2010]**

(1) 2-methyl-2-pentene (2) 3-methyl-2-pentene

(3) 4-methyl-1-pentene (4) 3-methyl-1-pentene

SE0118

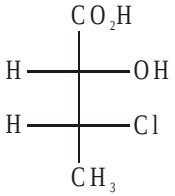
12. The optically inactive compound from the following is :- **[JEE-MAIN-2015]**

(1) 2-chloropropanal (2) 2-chlorobutane

(3) 2-chloro-2-methylbutane (4) 2-chloropentane

SE0119

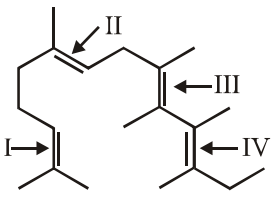
13. The absolute configuration of : **[JEE-MAIN-2016]**



(1) (2R, 3R) (2) (2R, 3S) (3) (2S, 3R) (4) (2S, 3S)

SE0120

14. In the following structure, the double bonds are marked as I, II, III and IV **[JEE-MAIN-2017]**



Geometrical isomerism is **not** possible at site (s)

(1) III (2) I (3) III and IV (4) I and III

SE0121

15. Which of the following compounds will show the maximum enol content?

(1) $CH_3COCH_2COCH_3$ (2) CH_3COCH_3 **[JEE-MAIN-April 2019]**

(3) $CH_3COCH_2CONH_2$ (4) $CH_3COCH_2COOC_2H_5$

SE0122

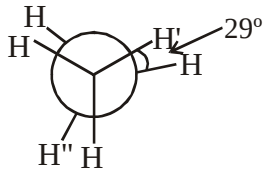
16. Which of these factors does not govern the stability of a conformation in acyclic compounds ?

(1) Torsional strain (2) Angle strain **[JEE-MAIN-April 2019]**

(3) Steric interactions (4) Electrostatic forces of interaction

SE0123

17. In the following skew conformation of ethane, H'–C–C–H" dihedral angle is :

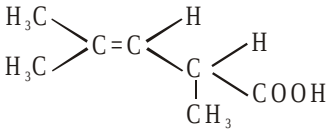


[JEE-MAIN-April 2019]

(1) 120° (2) 58° (3) 149° (4) 151°

SE0124

EXERCISE # IV (B) (J-ADVANCE OBJECTIVE)

1. The  shows : **[IIT-1995]**

(A) Geometrical isomerism (B) Optical isomerism

(C) Geometrical & optical isomerism (D) tautomerism

SE0125

2. How many optically active stereoisomers are possible for butane –2,3–diol : **[IIT-1997]**

(A) 1 (B) 2 (C) 3 (D) 4

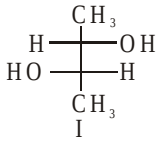
SE0126

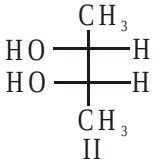
3. The number of possible enantiomeric pairs that can be produced during monochlorination of 2–methyl butane is : **[IIT-1997]**

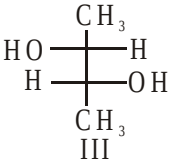
(A) 2 (B) 3 (C) 4 (D) 1

SE0127

4. Identify the pairs of enantiomers and diastereomers from the following compounds I, II and III


I


II


III

[IIT-2000]

SE0128

5. Which of the following compounds exhibits stereoisomerism– **[IIT-2002]**

(A) 2–Methylbutene–1 (B) 3–Methylbutyne–1

(C) 3–Methylbutanoic acid (D) 2–Methylbutanoic acid

SE0129

6. On monochlorination of 2-methylbutane, the total number of chiral compounds formed is :

(A) 2 (B) 4 (C) 6 (D) 8 **[IIT-2004]**

SE0130

7. **Statement-I :** Molecules that are not superimposable on their mirror images are chiral

Because

Statement-II : All chiral molecules have chiral centres. **[IIT-2007]**

(A) Statement-1 is True, Statement-2 is True ; Statement-2 is a correct explanation for Statement-1

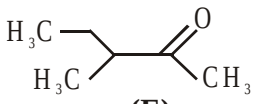
(B) Statement-1 is True, Statement-2 is True ; Statement-2 is NOT a correct explanation for Statement-1

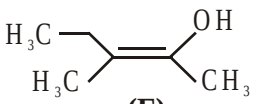
(C) Statement-1 is True, Statement-2 is False.

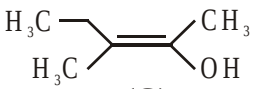
(D) Statement-1 is False, Statement-2 is True.

SE0131

8. The correct statement(s) concerning the structures E, F and G is (are) **[IIT-2008]**


(E)


(F)

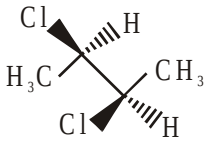

(G)

(A) **E, F** and **G** are resonance structures (B) **E, F** and **E, G** are tautomers

(C) **F** and **G** are geometrical isomers (D) **F** and **G** are diastereomers

SE0132

9. The correct statement(s) about the compound given below is (are) : **[IIT-2008]**



(A) The compound is optically active

(B) The compound possesses centre of symmetry

(C) The compound possesses plane of symmetry

(D) The compound possesses axis of symmetry

SE0133

10. The correct statement(s) about the compound $H_3C(HO)HC - CH = CH - CH(OH)CH_3$ **(X)** is (are) :

(A) The total number of stereoisomers possible for X is 6 **[IIT-2009]**

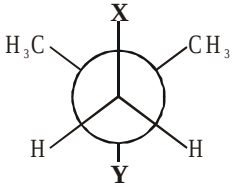
(B) The total number of diastereomers possible for X is 3

(C) If the stereochemistry about the double bond in X is trans, the number of enantiomers possible for X is 4

(D) If the stereochemistry about the double bond in X is cis, the number of enantiomers possible for X is 2

SE0134

11. In the Newman projection for 2,2–dimethylbutane **[IIT-2010]**

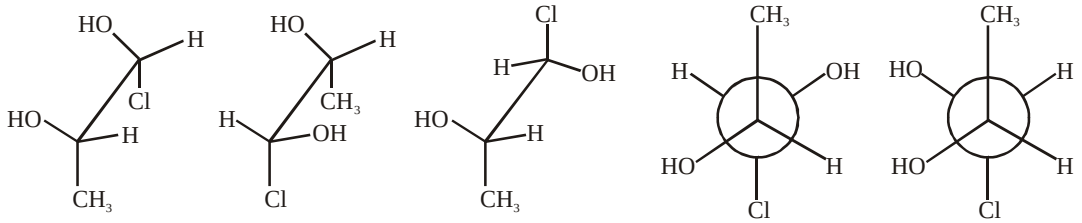


X and **Y** can respectively be –

(A) H and H (B) H and C_2H_5 (C) C_2H_5 and H (D) CH_3 and CH_3

SE0135

12. Which of the given statement(s) about N,O,P and Q with respect to M is (are) correct ? **[JEE-2012]**



(A) M and N are non-mirror image stereoisomers

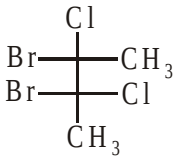
(B) M and O are identical

(C) M and P are enantiomers

(D) M and Q are identical

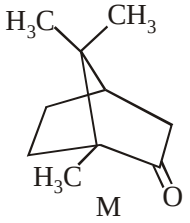
SE0136

13. The total number(s) of **stable** conformers with **non-zero** dipole moment for the following compound is (are) **[JEE-2014]**



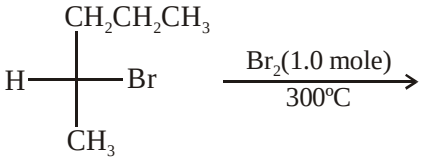
SE0137

14. The total number of stereoisomers that can exist for M is : **[JEE-2015]**



SE0138

15. In the following monobromination reaction, the number of possible chiral products is : **[JEE-2016]**



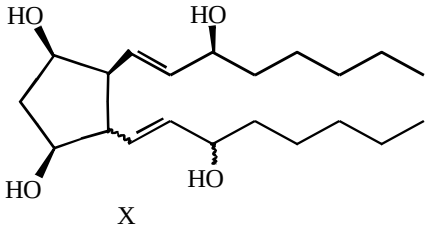
(1.0 mole)

(enatiomerically pure)

SE0139

16. For the given compound X, the total number of optically active stereoisomers is____.

[IIT-JEE 2018]



X

This type of bond indicates that the configuration at the specific carbon and the geometry of the double bond is fixed

This type of bond indicates that the configuration at the specific carbon and the geometry of the double bond is NOT fixed

SE0140

17. Total number of isomers, considering both structural and stereoisomers, of cyclic ethers with the molecular formula C_4H_8O is ___ **[IIT-JEE 2019]**

SE0141

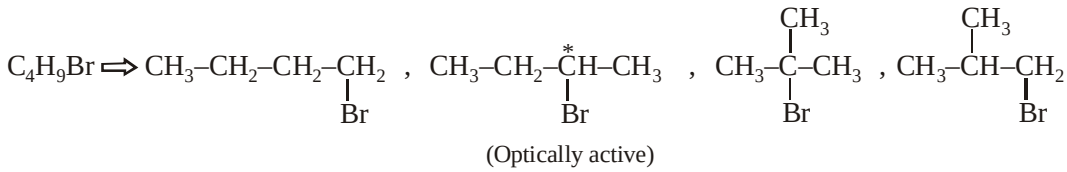
ANSWER - KEY

EXERCISE # I (MAINS ORIENTED)

1. Ans.(C) **2. Ans.(C)** **3. Ans.(D)** **4. Ans.(D)**

5. Ans.(A) **6. Ans.(A)** **7. Ans.(A)** **8. Ans.(D)**

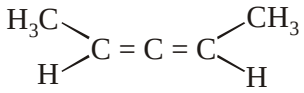
9. Ans.(B)



Optically active isomers ⇒ 2

10. Ans.(B) **11. Ans.(D)** **12. Ans.(A)**

13. Ans.(C)



14. Ans.(B) **15. Ans.(C)** **16. Ans.(D)**

17. Ans.(C)

18. Ans.(A)

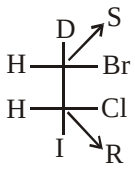
Cl–CH=C=C=CH–Cl is a planar structure

19. Ans.(A)

20. Ans.(C)

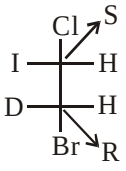
Meso tartaric acid and d-fartaric acid and not mirror image of each other so they are diastereomers.

21. Ans.(A)



(I)

and

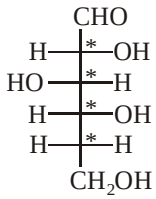


(II)

Enantiomers (I & II are mirror image of each other)

22. Ans.(C) **23. Ans.(D)** **24. Ans.(B)**

25. Ans.(C)



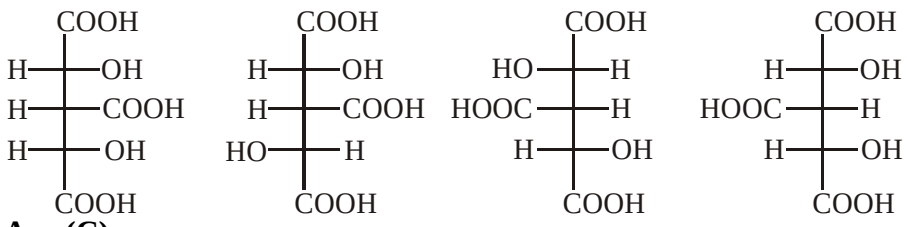
$2^n \Rightarrow 2^4 \Rightarrow 16$

26. Ans.(B) **27. Ans.(B)**

28. Ans.(B)

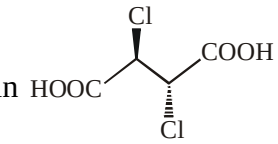
Optically active compounds are resolvable.

29. Ans.(B)



30. Ans.(C)

31. Ans.(A)

POS is present in 

32. Ans.(C)

33. Ans.(B)

e.e = 87.5 – 12.5 $\Rightarrow$ 75 % of

$$ee = \frac{\text{Rotation by mixture}}{\text{Rotation by pure isomer}} \times 100$$

$$75 = \frac{X}{30} \times 100$$

$$X = \frac{75 \times 30}{100} = +22.5^{o}$$

34. Ans.(B)

ℓ = 10 dm

c = 20 gm/200 ml

$\alpha = 30^{o}$

$$[\alpha]_{specific} = \frac{\alpha_{obs}}{c.l} = \frac{30}{\frac{20}{200} \times 10} \Rightarrow 30^{o}$$

$\alpha_{obs.}$ after dilution

$\alpha_{obs} = \alpha_{sp}$ c.p.

$$\alpha_{obs} = 30 \times \frac{20}{1000} \times 10 \Rightarrow 6^{o}$$

35. Ans.(A)

$$\% \text{ optical purity} = \frac{|d - \ell|}{d + \ell} \times 100 = \frac{4}{8} \times 100 = 50\%$$

36. Ans.(C) **37. Ans.(A)** **38. Ans.(D)** **39. Ans.(C)** **40. Ans.(A)**

EXERCISE-II (JEE-ADVANCE ORIENTED LEVEL-I)

Single correct Option Type :

1. Ans.(B)

$C_5H_{10}O$: **Ketones**

(i) $CH_3–CH_2–CH_2–CH_2–\underset{\underset{O}{\|}}{C}–H$ (i) $CH_3–\overset{\overset{O}{\|}}{C}–CH_2–CH_2–CH_3$

(ii) $CH_3–CH_2–\underset{*}{\overset{\overset{CH_3}{|}}{CH}}–\underset{\underset{O}{\|}}{C}–H$ Optical active (Two) (ii) $CH_3–CH_2–\overset{\overset{O}{\|}}{C}–CH_2–CH_3$

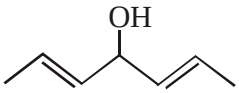
(iii) $CH_3–\underset{\underset{CH_3}{|}}{CH}–CH_2–\underset{\underset{O}{\|}}{C}–H$ (iii) $CH_3–\overset{\overset{O}{\|}}{C}–\underset{\underset{CH_3}{|}}{CH}–CH_3$ (iv) $CH_3–\overset{\overset{CH_3}{|}}{\underset{\underset{CH_3}{|}}{C}}—\underset{\underset{O}{\|}}{C}–H$

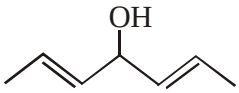
Total $\Rightarrow$ 5 aldehyde Total $\Rightarrow$ 3 ketones

2. Ans.(C)

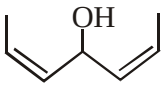
3. Ans.(D)

4. Ans.(A)

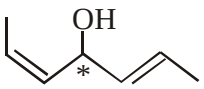


$\Rightarrow$ (i) 

(Trans, Trans)

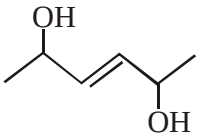
(ii) 

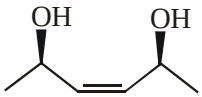
(Cis , Cis)

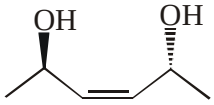
(iii) 

(Cis , Trans) Two $\Rightarrow$ R + S

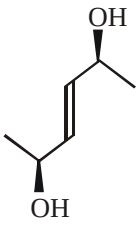
Total is isomers = 4



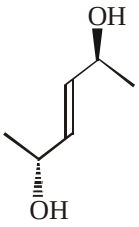
$\Rightarrow$ (i) 

(ii) 

($\pm$) Two

(iii) 

($\pm$) Two

(iv) 

Total = 6 isomer

5. Ans.(A,C,D)

6. Ans.(A,C)

Optically active compounds are resolvable and A & C are optically inactive

7. Ans.(B,C,D) **8. Ans.(A,B,C)** **9. Ans.(A,B,D)**

10. Ans.(C,D) **11. Ans.(A,D)** **12. Ans.(A,C)**

13. Ans.(A,B,C,D) **14. Ans.(C)** **15. Ans.(D)**

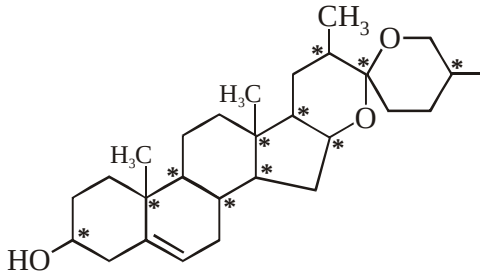
16. Ans.(C) **17. Ans.(D)**

18. Ans.(A)$\rightarrow$P ; (B)$\rightarrow$R ; (C)$\rightarrow$Q ; (D)$\rightarrow$R

19. Ans.(1$\rightarrow$R, 2$\rightarrow$P, 3$\rightarrow$Q, 4$\rightarrow$S)

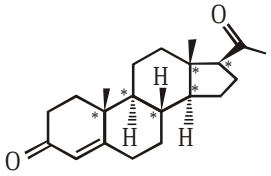
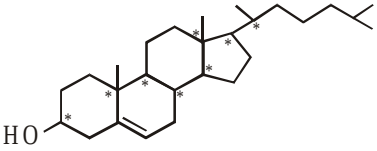
20. Ans.(1$\rightarrow$S, 2$\rightarrow$R, 3$\rightarrow$Q, 4$\rightarrow$Q)

21. Ans.(11)

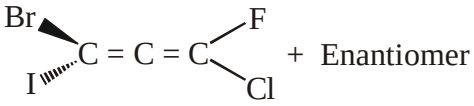
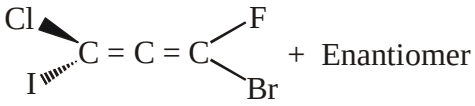


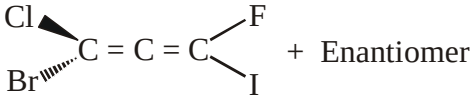
22. Ans. (i) 6, (ii) 8

Explanation

(i)  (ii) 

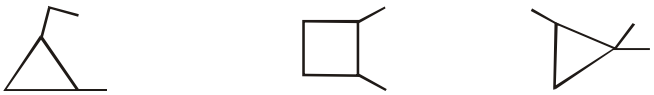
23. Ans.(6)

 + Enantiomer  + Enantiomer

 + Enantiomer

24. Ans.(A,B)

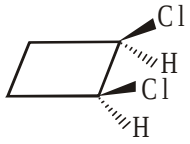
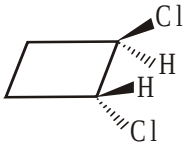
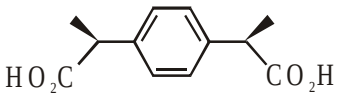
25. Ans.(8)

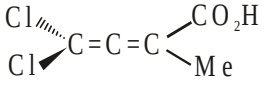
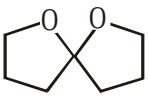
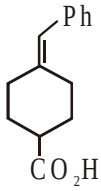
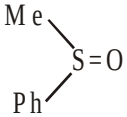


4 Optically Active Isomers 2 Optically Active 2 Optically Active

2 + 2 + 4 = 8

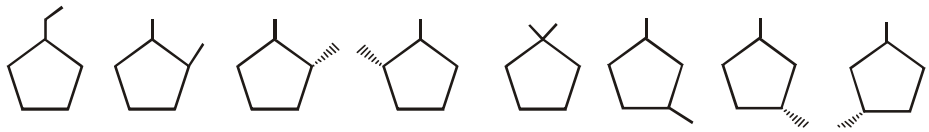
26. Ans.(6)

(I)  (II)  (III) 

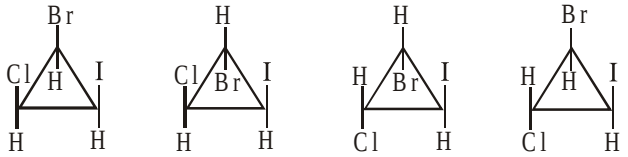
(IV)  (V)  (VI)  (VII) 

27. Ans. Achiral : I, III , IV ; Chiral : II,V, VI, VII

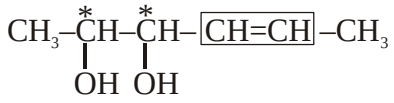
28. Ans.(8)



29. Ans.(4)



30. Ans.(8)



Stereogenic centre = 3

Total number of stereoisomer = $2^3 = 8$

31. Ans.(3)

32. Ans.(C)

EXERCISE#III (JEE-ADVANCE ORIENTED LEVEL # II)

Single Correct Type :

1. Ans.(A) **2. Ans.(D)** **3. Ans.(8)**

4. Ans.(i)-(B) ; (ii)-(C) **5. Ans.(C)** **6. Ans.(C)**

Multiple Correct Type :

7. Ans.(A,C) **8. Ans.(A,C,D)** **9. Ans.(C)**

10. Ans.(C) **11. Ans.(B)** **12. Ans.(A,D)**

Comprehension Type :

13. Ans.(B) **14. Ans.(C)**

15. Ans.(D)

M.W. of MSG = 169

$$C = \frac{169 \text{ gm}}{845 \text{ ml}}$$

ℓ = 200 mm = 2 dm

α_{obs} = +9.6°

$$[\alpha]_{sp} = \frac{\alpha_{obs}}{C.\ell.} = \frac{9.6}{\frac{169}{845} \times 2} = -24^\circ$$

16. Ans.(C)

$$ee = \frac{[\alpha]_{mixture}}{[\alpha]_{pure}} \times 100 = \frac{-20^\circ}{-24^\circ} \times 100 = 83.3^\circ$$

$\therefore$ RM = 100 – 83.3 $\Rightarrow$ 16.7 % → d = 8.35, l = 8.35

Total (–) MSG = 83.3 + 8.35

= 91.6 %

17. Ans.(C)

$$C = \frac{33.8-16.9\ g}{338+169\ ml} = \frac{16.9\ g}{507\ ml}$$

ℓ = 400 mm = 4 dm

$$\alpha_{obs} = [\alpha]_{sp.}\ c.\ell = 24\times\frac{16.9}{507}\times 4$$

$$= +\ 3.2^{o}$$

18. Ans.(A) **19. Ans.(C)**

Matrix Match Type :

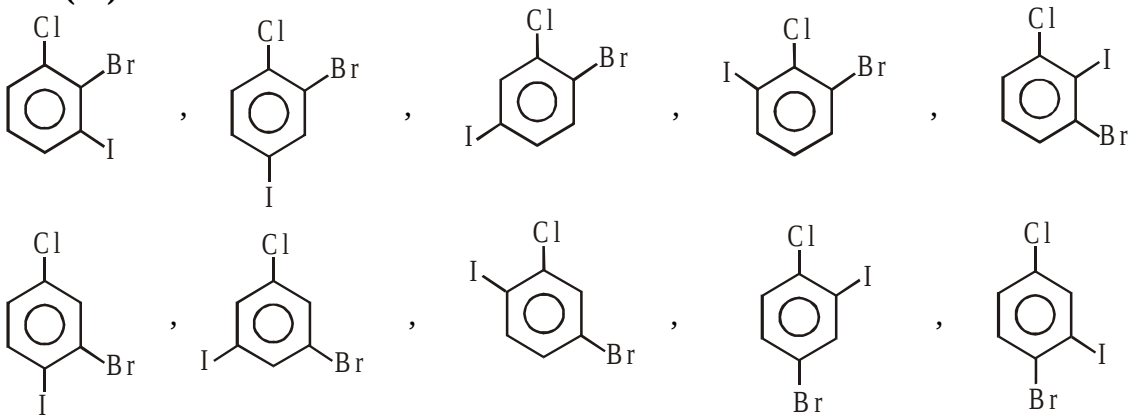
20. Ans.(A)→P ; (B)→Q ; (C)→R,S ; (D)→S

21. Ans.(A)→4→iii ; (B)→3→iv ; (C)→2→ii ; (D)→1→i

Subjective Type :

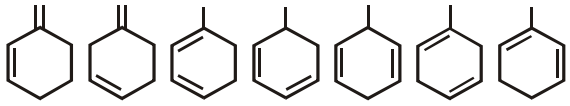
22. Ans.Optical : a, b, c, d, f, g, i, j, k ; Geometrical isomer : c, g, j ; None : e, h

23. Ans.(10)



24. Ans. (a) Enantiomers, (b) Enantiomers, (c) Geometrical isomers & Diastereomers, (d) Positional, (e) Optical, (Diastereomers), (f) Diastereomers (g) Enantiomers, (h) Identical, (i) Geometrical isomers (Diastereomers)

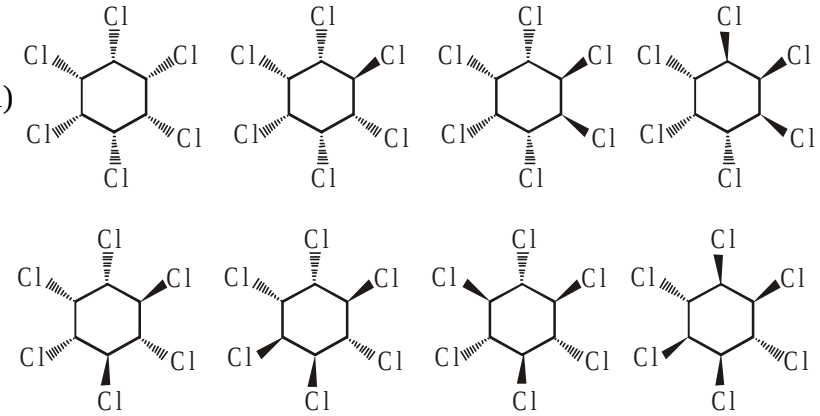
25. Ans.(7)



26. Ans.(3)

27. Ans.(i) 2^4 (ii) 9 (iii) 4 (iv) 4 (v) 3, (vi) 4 (vii) 2^5, (viii) 2^4, (ix) 2, (x) 4, (xi) 3

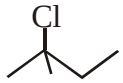
(ii)



28. Ans.(9)

EXERCISE # IV (A) (J-MAINS)

1. Ans. (4) **2. Ans. (4)** **3. Ans. (2)** **4. Ans. (2)**
5. Ans. (3) **6. Ans. (1)** **7. Ans. (3)** **8. Ans. (3)**
9. Ans. (2) **10. Ans. (1)** **11. Ans. (4)**
12. Ans. (3)

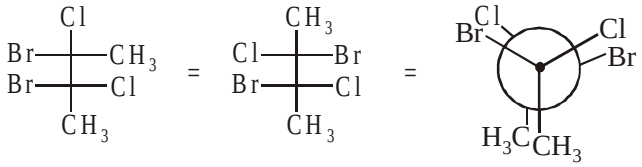
Sol. 

It achiral \ optically inactive

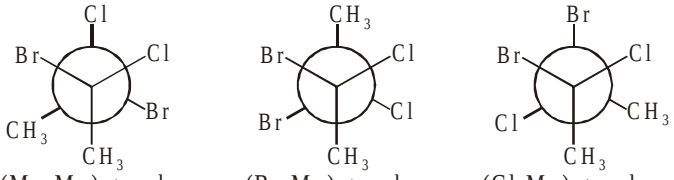
13. Ans. (3) **14. Ans. (2)** **15. Ans. (1)** **16. Ans. (2)** **17. Ans. (4)**

EXERCISE # IV (B) (J-ADVANCE OBJECTIVE)

1. Ans. (B) **2. Ans. (B)** **3. Ans. (A)**
4. Ans. Enantiomers - I and III ; Diastereomers - I & II and II & III
5. Ans. (D) **6. Ans. (B)** **7. Ans. (C)**
8. Ans. (B,C,D) **9. Ans. (A,D)** **10. Ans. (A,D)**
11. Ans. (B,D) **12. Ans. (A,B,C)**
13. Ans. (3)



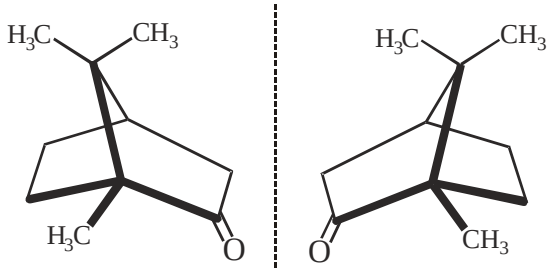
Stable conformer (with $\mu \neq 0$)



(Me-Me) gauche (Br-Me) gauche (Cl-Me) gauche

14. Ans. (2)

Sol. M is a organic compound known as camphor. M contains two **<u>rigid</u>** chiral centre so it can exist only in **<u>two</u>** enantiomeric forms.



15 Ans. (5) **16. Ans. (7)**

17. Ans. (10.00)

Sol. 

(1) (2) (1) (2) (3) (1)
(R + S) (R + S)
R,R
R,S
S,S