ISOMERISM

EXERCISE # I (MAINS ORIENTED)

Single Correct Type :

1. Minimum number of carbon atom required by a Hydrocarbon alkane, alkene and alkyne to show chain isomerism respectively are :

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

SR0001

2. C_7H_7Cl shows how many benzenoid aromatic isomers ?

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

SR0002

3. How many structural isomers of primary amines are possible for the formula $C_4H_{11}N$?

(A) 2 (B) 3 (C) 4 (D) 5

SR0003

4. How many benzenoid structure are possible for molecular form C_7H_8O :

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

SR0004

5. Which of the following compound give geometrical isomerism ?

(A) CH_2Cl_2 (B) $CH_2Cl—CH_2Cl$ (C) CHBr = CHCl (D) $CH_2Cl—CH_2Br$.

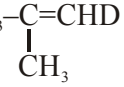
SR0005

6. Maximum potential energy is associated with which of the following conformers of n-butane :

(A) Anti (B) Gauche (C) Eclipsed (D) Partial eclipsed

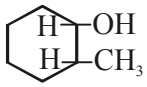
SR0006

7. Which among the following compounds will show geometrical isomerism :

(A) $CH_3–CH=CH_2$ (B)  (C)  (D) $CH_3–CH=CHD$

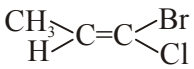
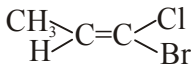
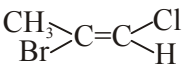
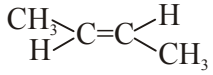
SR0007

8. Which among the following will show geometrical isomerism :

(A)  (B)  (C) $C_6H_5–CH=N–OH$ (D) All of these

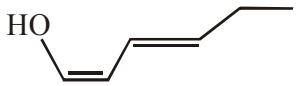
SR0008

9. Which one of the following is Z isomer :

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

SR0009

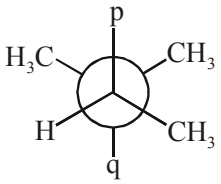
10. The correct stereochemical descriptions for the structure given below are :



(A) 1 Z, 3Z (B) 1Z, 3E (C) 1E, 3E (D) 1E, 3Z

SR0010

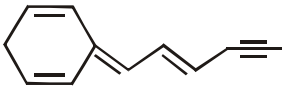
11. What is the value of p & q of following conformer of 2,3-dimethyl butane ?



(A) p = H, q = H (B) p = CH_3, q = CH_3 (C) p = CH_3, q = H (D) p = H, q = CH_3

SR0011

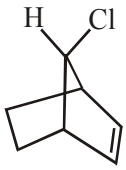
12. The number of cis-trans isomer possible for the following compound.

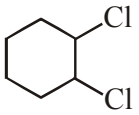


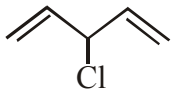
(A) 2 (B) 4 (C) 6 (D) 8

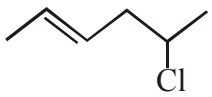
SR0012

13. Which of the following can not show geometrical isomerism :

(A) 

(B) 

(C) 

(D) 

SR0013

14. How many structural formula are possible when one of the hydrogen is replaced by a chlorine atom in benzene & naphthalene respectively ?

(A) 1, 1 (B) 1,2 (C) 2, 2 (D) 2, 1

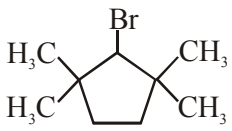
SR0076

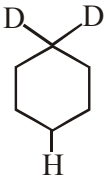
15. The number of structural isomers of C_5H_{10} is :-

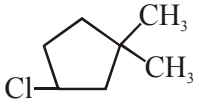
(A) 10 (B) 11 (C) 12 (D) 13

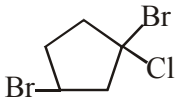
SR0015

16. Which of the following compounds will show geometrical isomerism.

(A) 

(B) 

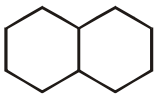
(C) 

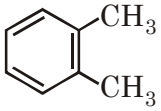
(D) 

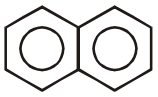
SR0016

17. Which of the following will show geometrical isomerism?

(A)  Benzene

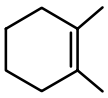
(B)  Decalin

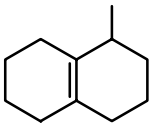
(C)  o–Xylene

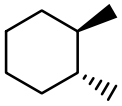
(D)  Naphthalene

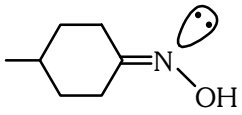
SR0077

18. Which of the following cannot be represent in E or Z

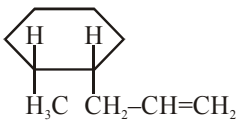
(A) 

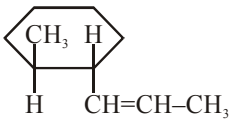
(B) 

(C) 

(D) 

SR0018

19. 



(A) Geometrical isomer

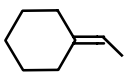
(B) Ring chain isomer

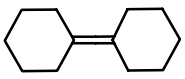
(C) Position isomer

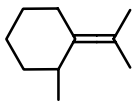
(D) Chain isomer

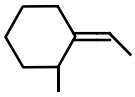
SR0019

20. Which of the following can show geometrical isomesrism :

(A) 

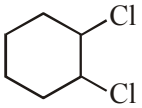
(B) 

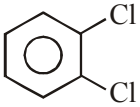
(C) 

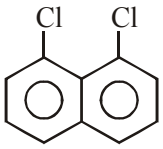
(D) 

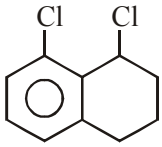
SR0020

21. Which of the following will show Geometrical isomerism.

(A) 

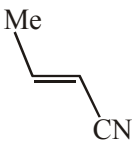
(B) 

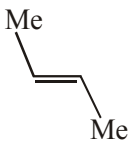
(C) 

(D) 

SR0021

22. Which of the following will have lowest dipole moment?

(A) 

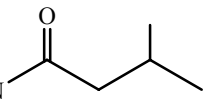
(B) 

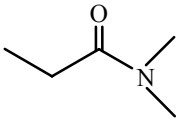
(C) 

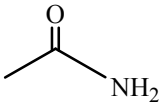
(D) 

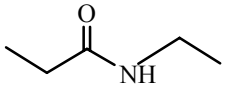
SR0022

23. Which of the following compounds can show geometrical isomerism in its resonating structure.

(A) 

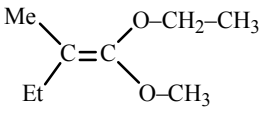
(B) 

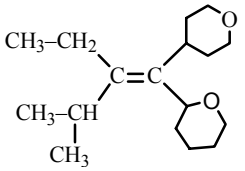
(C) 

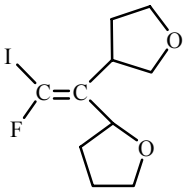
(D) 

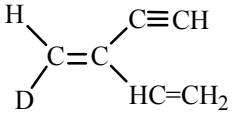
SR0023

24. Which of the following represent Z-isomer ?

(A) 

(B) 

(C) 

(D) 

SR0024

25. Which of the following statement is not correct :-

(A) Cyclobutane is a planar compound

(B) Trans cyclohexadecene is relatively more stable than its cis form

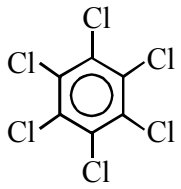
(C) Cis form of 1,3,5-trimethylclohexane is relatively more stable than its trans form

(D) Cis 1,2-dichloroethene is relatively more stable than its trans form.

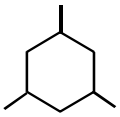
SR0025

26. Select which one of the following can not show geometrical isomerism

(A) 

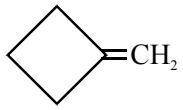
(B) 

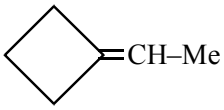
(C) Me–CH = C = C = CH – Me

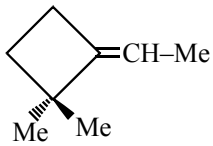
(D) 

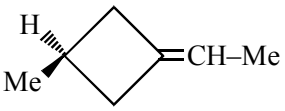
SR0026

27. Which one of the following is capable of showing geometrical isomerism.

(A) 

(B) 

(C) 

(D) 

SR0027

More than one correct Type :

28. Which of the following statements is/are not correct :

(A) Metamerism belongs to the category of structural isomerism

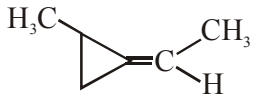
(B) Tautomeric structures are the resonating structures of a molecule

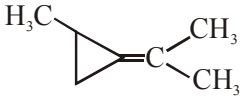
(C) Keto form is always more stable than the enol form

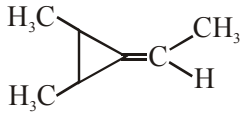
(D) Geometrical isomerism is shown only by alkenes

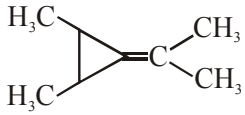
SR0028

29. Which of the following will show geometrical isomerism :

(A) 

(B) 

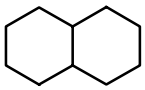
(C) 

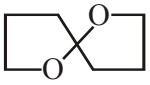
(D) 

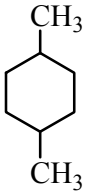
SR0029

30. Which of the following compound will shows geometrical isomerism ?

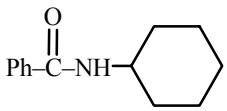
(A) Ph –CH =N –Me

(B) 

(C) 

(D) 

SR0030

31 

(A) This molecule shows geometrical isomerism.

(B) One of the resonating structure of this molecule shows geometrical isomerism

(C) One of the tautomer of this molecule shows geometrical isomerism

(D) In acidic medium this molecule shows geometrical isomerism.

SR0031

Assertion / Reasoning Type :

32. **Statement-1 :** All double bond containing compounds show geometrical isomerism.

and

Statement-2 : Alkenes have restricted rotation about the carbon-carbon double bond.

(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.

SR0032

33. **Statement-1 :** According to CIP sequence rule the priority of the groups is

$-CH = CH_2 < -C \equiv CH < -C \equiv N < -CH = O$

and

Statement-2 : Priority of the given groups are based on molecular mass of groups.

(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

SR0033

Comprehension Type :

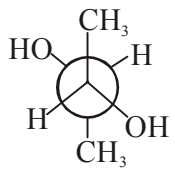
Paragraph for Q. 34 to 35

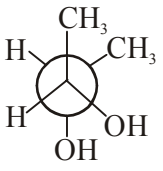
Different spatial arrangements of the atoms that result from rotation about a single bond are conformers. n-Butane has four conformers eclipsed, partial eclipsed, gauche and anti. The stability order of these conformers are as follows :

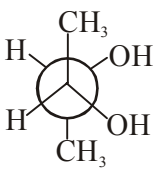
Anti > gauche > Partial eclipsed > Fully eclipsed

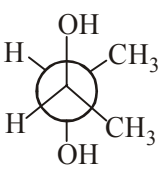
Although anti is more stable than gauche but in some cases gauche is more stable than anti.

34. Which one of the following is the most stable conformer ?

(A) 

(B) 

(C) 

(D) 

SR0034

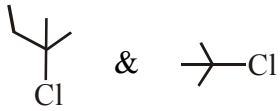
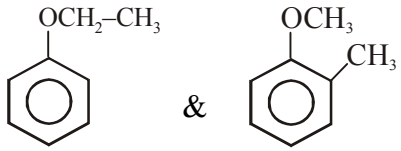
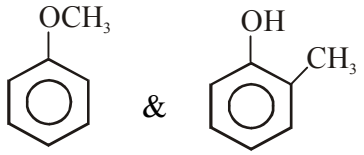
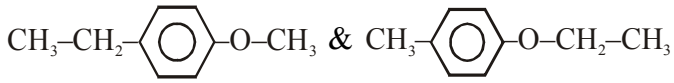
35. Number of possible conformations of n-butane is :

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

SR0034

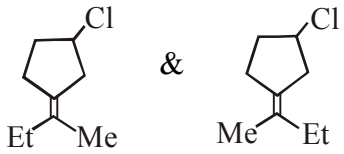
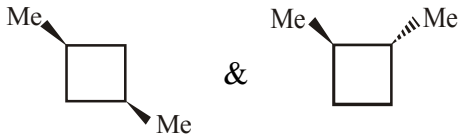
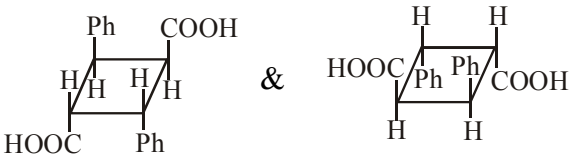
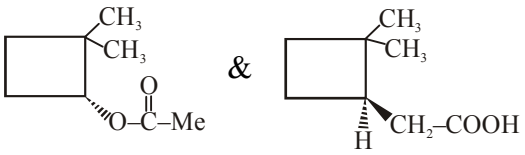
Matrix Match Type :

36. Match the column I with column II.

Column-I (reaction)	**Column-II (stereoisomers)**
(A) 	(P) Homologs
(B) 	(Q) Functional isomers
(C) 	(R) Metamer
(D) 	(S) Position isomers

SR0035

37. Match the column I with column II.

Column-I	**Column-II**
(A) 	(P) Identical
(B) 	(Q) Functional isomers
(C) 	(R) Geometrical Isomers
(D) 	(S) Positional Isomers

SR0036

Subjective Type :

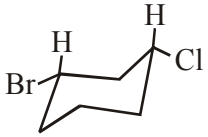
38. Considering rotation about the C_3–C_4 bond of 2-methylhexane :

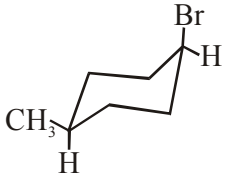
(a) Draw the Newman projection of the most stable conformer

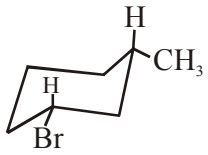
(b) Draw the Newman projection of the least stable conformer

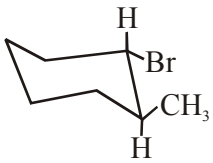
SR0037

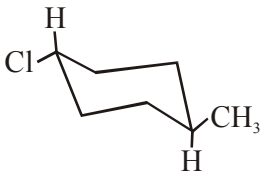
39. Determine whether each of the following compounds is a cis isomer or a trans isomer.

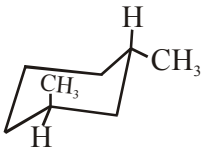
(a) 

(b) 

(c) 

(d) 

(e) 

(f) 

SR0038

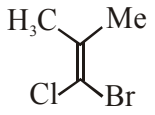
40. Draw the most stable conformer of N-methylpiperidine.

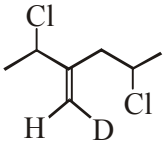
SR0039

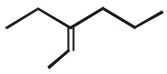
41. How many pair(s) of geometrical isomers are possible with C_6H_{12} (only in open chain structures)

SR0040

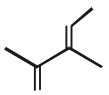
42. Identify molecules which usually can show geometrical isomerism (at room temperature):

(I) 

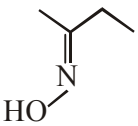
(II) 

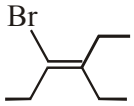
(III) 

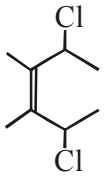
(IV) 

(V) 

SR0041

(VI) 

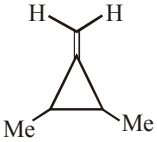
(VII) 

(VIII) 

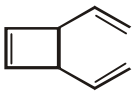
(IX) 

SR0042

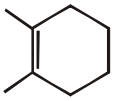
(X) 

(XI) 

(XII) 

(XIII) 

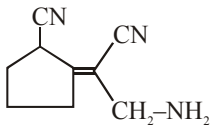
(XIV) 

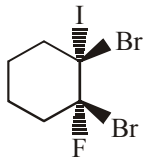
(XV) 

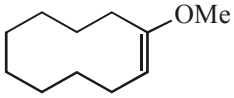
SR0043

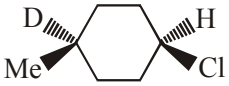
43. Calculate the number of Benzenoid isomers possible for C_6H_3ClBrI.

SR0044

44. (a) 

(b) 

(c) 

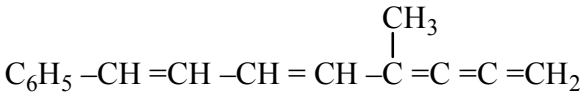
(d) 

Assign E or Z to the following compounds and write 1 for E and 2 for Z.

Write answer of part (a), (b), (c) & (d) in the same order and present the four digit number as answer in OMR sheet. For example: If all these answer are 9 then fill 9999 in OMR sheet.

SR0045

45. (a) Number of geometrical isomers of the following compound.



(b) Total number 2° and 3° Alcohols possible for $C_5H_{11}OH$. without connting stereo isomers.

Write answer of part (a) & (b) in the same order and present the four digit number as answer in OMR sheet. For example: If your Answer for (a) is 9 & (b) is 9 then fill 0909 in OMR sheet.

SR0046

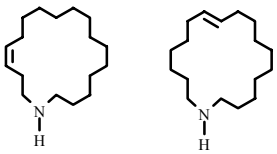
46. Analyse the following pairs of compounds.

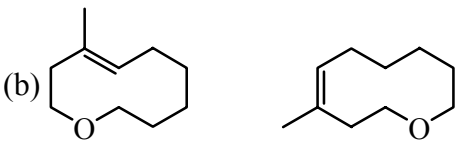
Write 1 if they are Geometrical isomers.

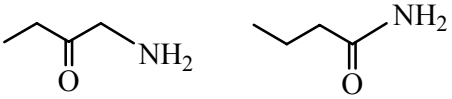
Write 2 if they are Chain isomers.

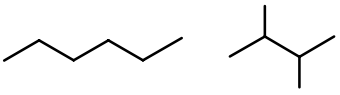
Write 3 if they are position isomers.

Write 4 if they are Functional group isomers.

(a) 

(b) 

(c) 

(D) 

Write answer of part (a), (b), (c) & (d) in the same order and present the four digit number as answer in OMR sheet. For example: If all these answers are 9 then fill 9999 in OMR sheet.

SR0047

EXERCISE # II (J-MAINS)

1. Geometrical isomerism is not shown by- **[AIEEE-2002]**

(A) 1,1–dichloro–1–pentene (B) 1,2–dichloro–1–pentene

(C) 1,3–dichloro–2–pentene (D) 1,4–dichloro–2–pentene

SR0048

2. Increasing order of stability among the three main conformations (i.e. Eclipse, Anti, Gauche) of 2-fluoroethanol is **[AIEEE-2006]**

(A) Gauche, Eclipse, Anti (B) Eclipse, Anti, Gauche

(C) Anti, Gauche, Eclipse (D) Eclipse, Gauche, Anti

SR0049

3. The alkene that exhibits geometrical isomerism is :- **[AIEEE-2009]**

(A) 2–butene (B) 2–methyl–2–butene

(C) Propene (D) 2–methyl propene

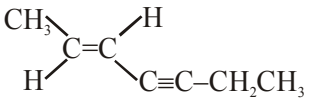
SR0051

4. Identify the compound that exhibits tautomerism :- **[AIEEE-2011]**

(A) 2-Pentanone (B) Phenol (C) 2-Butene (D) Lactic acid

SR0052

5. The IUPAC name of the following compounds is : **[JEE-MAIN-2012]**



(A) (Z) – 5 hepten – 3 – yne (B) (Z) – 2 hepten – 4 – yne

(C) (E) – 5 hepten – 3 – yne (D) (E) – 2 hepten – 4 – yne

SR0053

6. Dipole moment is shown by :- **[JEE-MAIN 2012]**

(A) trans-2, 3-dichloro- 2-butene (B) 1, 2-dichlorobenzene

(C) 1, 4-dichlorobenzene (D) trans-1, 2-dinitroethene

SR0054

7. Maleic acid and fumaric acids are :- **[JEE-MAIN 2012]**

(A) Tautomers (B) Chain isomers

(C) Geometrical isomers (D) Functional isomers

SR0055

8. Monocarboxylic acids are functional isomers of : **[JEE-MAIN 2013]**

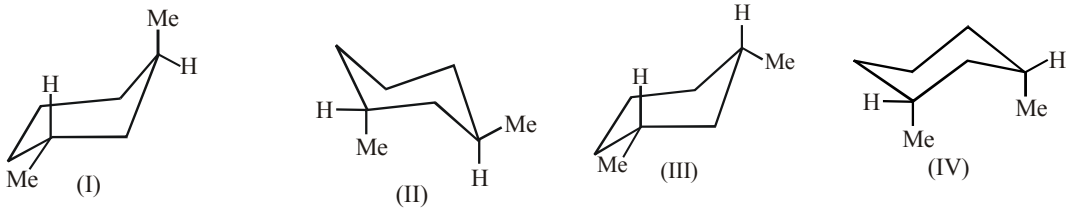
(A) Esters (B) Amines

(C) Ethers (D) Alcohols

SR0056

9. Arrange in the correct order of stability (decreasing order) for the following molecules:

[JEE-MAIN 2013]



(A) (I) > (II) > (III) > (IV)

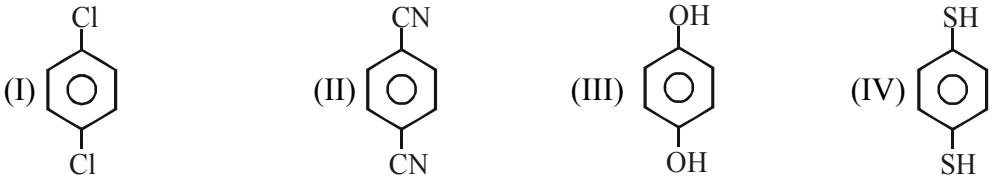
(B) (IV) > (III) > (II) ≈ (I)

(C) (III) > (I) ≈ (II) > (IV)

(D) (I) > (ll) ≈ (III) > (IV)

SR0057

10. For which of the following molecule significant $\mu \neq 0$ **[JEE-MAIN 2014]**



(A) Only (III)

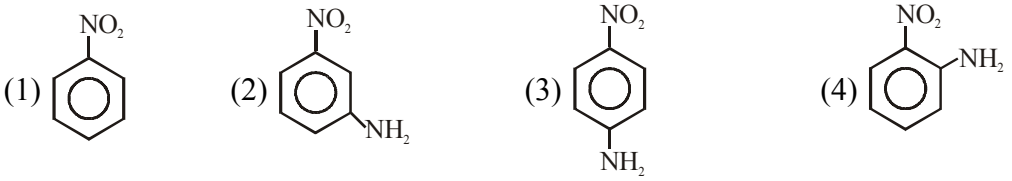
(B) (III) and (IV)

(C) Only (I)

(D) (I) and (II)

SR0058

11. Which compound exhibits maximum dipole moment among the following :-**[JEE-MAIN 2015]**



SR0059

12. The number of structural isomers for C_6H_{14} is: **[JEE-MAIN 2015]**

(1) 6

(2) 4

(3) 3

(4) 5

SR0060

EXERCISE # III (J-ADVANCED OBJECTIVE)

1. When cyclohexane is poured on water, it floats, because : **[IIT-1997]**

(A) cyclohexane is in 'boat' form

(B) cyclohexane is in 'chair' form

(C) cyclohexane is in 'crown' form

(D) cyclohexane is less dense than water

SR0063

2. Which of the following compounds will show geometrical isomerism : **[IIT-1998]**

(A) 2-butene (B) propene

(C) 1-phenylpropene (D) 2-methyl-2-butene

SR0064

3. Which of the following compound will exhibits geometrical isomerism : **[IIT-2000]**

(A) 1–phenyl–2–butene (B) 3–phenyl–1–butene

(C) 2–phenyl–1–butene (D) 1, 1–diphenyl–1–propene

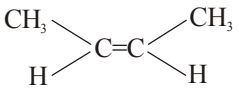
SR0065

4. The number of isomers for the compound with molecular formula $C_2BrClFI$ is : **[IIT-2000]**

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

SR0066

5. Which of the following has the lowest dipole moment : **[IIT-2000]**

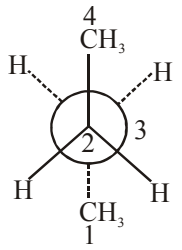
(A) 

(B) $CH_3–C\equiv C–CH_3$

(C) $CH_3CH_2C\equiv CH$ (D) $CH_2=CH–C\equiv CH$

SR0067

6. In the given conformation, If C_2 is rotated about $C_2–C_3$ bond anticlockwise by an angle of 120° then the conformation obtained is : **[IIT-2004]**



(A) Fully eclipsed conformation (B) Partially eclipsed conformation

(C) Gauche conformation (D) Staggered conformation

SR0068

7. (i) $\mu_{obs} = \sum_i \mu_i x_i$

where μ_i is the dipole moment of a stable conformer of the molecule, $Z–CH_2–CH_2–Z$ and x_i is the mole fraction of the stable conformer. **[IIT- 2005]**

Given : μ_{obs} = 1.0 D and x (Anti) = 0.82

Draw all the stable conformers of $Z–CH_2–CH_2–Z$ and calculate the value of $\mu_{(Gauche)}$.

(ii) Draw the stable conformer of Y–CHD–CHD–Y(meso form), when Y = CH_3 (rotation about $C_2–C_3$) and Y = OH (rotation about $C_1–C_2$) in Newmann projection.

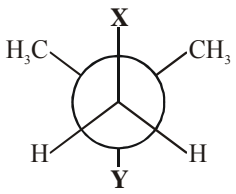
SR0069

8. The number of structural isomers of C_6H_{14} is : **[IIT-2007]**

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

SR0070

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

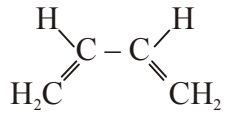


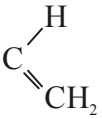
X and **Y** can respectively be –

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

SR0071

10. Amongst the given option, the compound(s) in which all the atoms are in one plane in all the possible conformations (if any), is (are) - **[IIT-2011]**

(A) 

(B) 

(C) $H_2C = C = O$

(D) $H_2C = C = CH_2$

SR0072

ANSWER KEY

EXERCISE # I (MAINS ORIENTED)

Single Correct Type :

1. Ans. (D) **2. Ans. (A)** **3. Ans. (C)** **4. Ans. (C)** **5. Ans. (C)**

6. Ans. (C) **7. Ans. (D)** **8. Ans. (D)** **9. Ans. (A)** **10. Ans. (B)**

11. Ans. (C) **12. Ans. (A)** **13. Ans. (C)** **14. Ans. (B)** **15. Ans. (A)**

16. Ans. (D) **17. Ans. (B)** **18. Ans. (D)** **19. Ans. (C)** **20. Ans. (D)**

21. Ans. (A) **22. Ans. (B)** **23. Ans. (D)** **24. Ans. (B)** **25. Ans. (A)**

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

More than one correct Type :

28. Ans. (B,C,D) **29. Ans. (A,C,D)** **30. Ans. (A,B,D)** **31. Ans. (B,C,D)**

Assertion / Reasoning Type :

32. Ans. (D) **33. Ans. (C)**

Comprehension Type :

34. Ans. (C) **35. Ans. (D)**

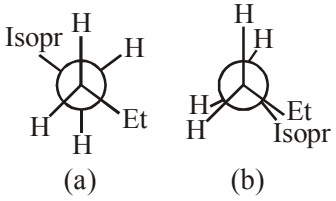
Matrix Match Type :

36. Ans. (A)→P ; (B)→R ; (C)→Q ; (D)→R

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

Subjective Type :

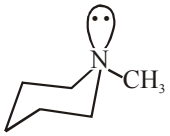
38. Ans.



(a) (b)

39. Ans. (a) cis (b) cis (c) cis (d) trans (e) trans (f) trans

40. Ans.



41. Ans. (4) **42. Ans. II, III, IV, V, VI, VIII, IX, XI, XIII, XIV,**

43. Ans. (10) **44. Ans. (2112)** **45. (a) Ans. (4) ; (b) Ans. (0404)**

46. Ans. (a) Position isomers so (3) **(b) Geometrical isomers so (1)**

(c) Functional isomers so (4) **(d) Chain isomers so (2)**

EXERCISE # II (J-MAINS)

1. **Ans. (A)** **2.** **Ans. (B)** **3.** **Ans. (A)** **4.** **Ans. (A)** **5.** **Ans. (D)**

6. **Ans. (B)** **7.** **Ans. (C)** **8.** **Ans. (A)** **9.** **Ans. (C)** **10.** **Ans. (B)**

11. **Ans. (3)** **12.** **Ans. (4)**

EXERCISE # III (J-ADVANCED OBJECTIVE)

1. **Ans. (D)** **2.** **Ans. (A,C)** **3.** **Ans. (A)** **4.** **Ans. (D)** **5.** **Ans. (B)**

6. **Ans. (C)** **7.** **Ans. (i)** $\frac{1}{0.18}$D**, (ii) Anti form when Y =** CH_3 **& Gauche when Y= –OH**

8. **Ans. (C)** **9.** **Ans. (B,D)** **10.** **Ans. (B,C)**