15. STEREO ISOMERISM

SOLUTIONS

TEACHING TASK

JEE MAINS LEVEL QUESTIONS

1. Which of the following compounds is chiral?
   A) $CH_3–CH_2–CH_3$ (propane)
   B) $CH_3–CH(OH)–CH_3$ (2-propanol)
   C) $CH_3–CH(Cl)–CH_2–CH_3$ (2-chlorobutane)
   D) $CH_3–C(CH_3)_3$ (tert-butylmethane)

Answer:C

Solution:A) Propane – no chiral center.
B) 2-propanol – C2 has two identical methyl groups, not chiral.
C) 2-chlorobutane – C2 has four different substituents (H, CH_3, Cl, C_2H_5), chiral.
D) tert-butylmethane (neopentane) – no chiral center.

2. A molecule with one asymmetric carbon has how many stereoisomers?
   A) 1 B) 2 C) 3 D) 4

Answer:B

Solution:A molecule with one asymmetric (chiral) carbon atom typically has 2 stereoisomers. These two stereoisomers are a pair of enantiomers (non-superimposable mirror images).
The maximum number of possible stereoisomers for a molecule with n asymmetric carbon atoms is given by the Le Bel-van't Hoff rule, which states the maximum number is 2^n.
For a molecule with one asymmetric carbon, n=1, so the maximum number of stereoisomers is $2^1=2$.

3. Enantiomers are:
   A) Mirror images and superimposable
   B) Mirror images and non-superimposable
   C) Not mirror images but non-superimposable
   D) Identical compounds

Answer:B

Solution:An enantiomer is a molecule that is a mirror image of another molecule, but cannot be superimposed on top of it, like your left and right hands.

4. A racemic mixture is: **(FA & SA- 2 Marks)**
   A) 100% d-isomer
   B) 100% l-isomer
   C) 50:50 mixture of d and l enantiomers

D) A meso compound

Answer:C

Solution:50:50 mixture of d and l enantiomers.

5. Which statement is true about meso compounds?
   A) They are mixtures of enantiomers
   B) They have internal symmetry and are optically inactive
   C) They always have only one chiral center
   D) They are always optically active

Answer:B

Solution:Meso compounds have stereocentres but an internal plane of symmetry cancels optical activity.

6. Which of the following does NOT show optical isomerism?
   A) 2-butanol
   B) 2-methylpropane
   C) 2-chlorobutane
   D) 3-methylhexane (with a chiral centre)

Answer:B

Solution:2-methylpropane — no chiral centre, so it cannot show optical isomerism.

7. The pair of enantiomers have identical:
   A) Optical rotation sign
   B) Boiling point in achiral solvent
   C) Interaction with plane-polarized light
   D) Taste in biological systems

Answer:B

Solution:Enantiomers have identical physical properties in achiral environments (bp, mp, density, etc.)

8. How many optical stereoisomers does 2-butanol (CH_3–CH(OH)–CH_2–CH_3) have?
   A) 1 B) 2 C) 3 D) 4

Answer:B

Solution:One chiral center $\rightarrow 2^n = 2^1 = 2$ stereoisomers.

9. Which method can be used to separate enantiomers in a racemic mixture?
   A) Distillation only
   B) Use of an optically active resolving agent (forming diastereomeric salts)
   C) Simple filtration
   D) Sublimation

Answer:B

Solution:Classic resolution method (diastereomers have different physical properties and can be separated.

10. The molecule CH_3–CHBr–CHBr–COOH has how many enantiomers?

(FA & SA- 3 Marks/4 Marks)

   A) 0 B) 1 C) 2 D) 4

Answer:D

Solution:4 — there are two stereogenic centres $\rightarrow$ up to $2^2 = 4$

stereoisomers.
Because the two stereocentres are attached to different groups (CH_3 vs COOH), no meso form arises here, so all four stereoisomers exist — they form two enantiomeric pairs (total 4 optically active stereoisomers).

11. Which of these is a correct reason for optical inactivity of a meso compound?
A) External compensation between molecules
B) Internal plane of symmetry cancels rotations
C) Lack of chiral centres
D) Only one enantiomer present

Answer:B

Solution:Internal plane of symmetry cancels rotations.

12. In a Newman projection of ethane, the staggered form is:
A) Higher in energy than eclipsed
B) Lower in energy than eclipsed
C) Same energy as eclipsed
D) Not possible

Answer:B

Solution:In a Newman projection of ethane, the staggered conformation has the lowest energy because the hydrogen atoms on adjacent carbons are as far apart as possible, minimizing steric hindrance and torsional strain, making it more stable compared to the eclipsed conformation where the hydrogen atoms are directly behind each other.

13. Which compound is optically active?
A) 1-chloropropane
B) 2-methylpropane (isobutane)
C) 2-methylbutane (CH_3–$CH(CH_3)$–CH_2–CH_3) if there is a chiral centre
D) CH_4

Answer:NONE

Solution:None of these are optically active. 1-Chloropropane has no stereogenic center (the carbon bearing Cl is CH_2). 2-Methylpropane and 2-methylbutane each have a carbon bonded to two identical CH3 groups, so no chiral center. CH_4 is entirely symmetric with no possibility of chirality.

14. A 50:50 mixture of enantiomers shows zero rotation because of:
A) Internal compensation
B) External compensation
C) Loss of chirality at each centre
D) Change in molecular formula

Answer:B

Solution:A racemic 50:50 mixture shows zero net rotation because the rotations of the two enantiomers cancel each other externally (equal and opposite contributions).

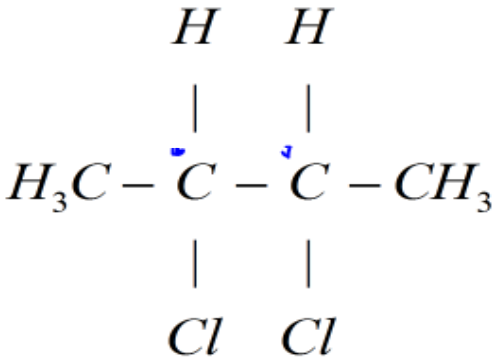
15. How many stereoisomers are possible for 2,3-dichlorobutane?

(FA & SA- 5 Marks/8Marks)

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

Answer:B

Solution:



n = 2

No. of optically active isomers(a)=2^{n-1}

No. of meso compounds(m)=$2^{n/2-1}$

Total no. of stereoisomer (a + m)=$2^{n-1}+2^{n/2-1}=2+2^0=3$

16. Which of the following pairs are enantiomers?
A) Two identical drawings of the same molecule
B) Mirror images that are not superimposable
C) Two different constitutional isomers
D) Cis and trans isomers of an alkene

Answer:B

Solution:Enantiomers are non-superimposable mirror images.

17. The property that distinguishes enantiomers experimentally is:
A) Melting point in achiral solvent
B) Rotation of plane-polarized light
C) Molar mass
D) Boiling point

Answer:B

Solution:Enantiomers have identical physical properties in an achiral environment except for interaction with plane-polarized light (optical rotation).

18. A compound has two stereogenic centers and no internal symmetry. Maxi mum number of stereoisomers =
A) 2 B) 3 C) 4 D) 8

Answer:C

Solution:General rule: for n chiral centers with no internal symmetry (and no meso forms), maximum 2^n stereoisomers.

Here n=2 $\rightarrow 2^2 = 4$

19. Which statement about diastereomers is correct?
A) They are mirror images of each other
B) They have identical physical properties in achiral environment
C) They are not mirror images and have different physical properties
D) They always occur as racemic mixtures

Answer:C

Solution:Diastereomers :Stereoisomers that are not mirror images of each other. They have different physical and chemical properties.

20. Pent-3-en-2-ol (CH_3–C(OH)H–CH=CH–CH_3) can show:
A) Only geometric isomerism
B) Only optical isomerism
C) Both geometric (E/Z) and optical isomerism (if a chiral centre present)
D) Neither

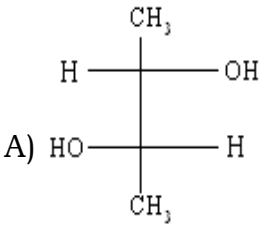
Answer:C

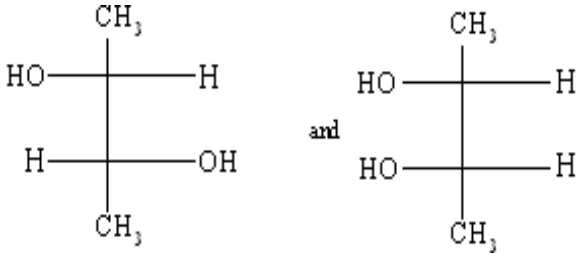
Solution:It contains a C=C $\rightarrow$ E/Z isomerism possible
The carbon bearing –OH (C2) is attached to four different groups $\rightarrow$chiral centre $\rightarrow$ optical isomerism.

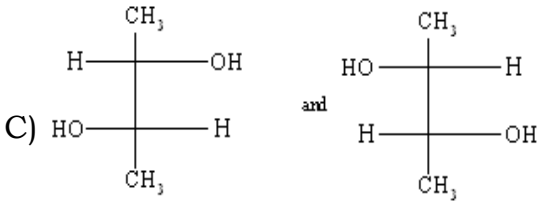
JEE ADVANCED LEVEL QUESTIONS

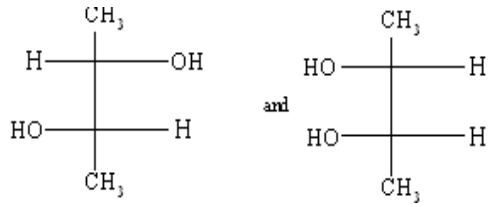
Multicorrect Answer Type

21. Which of the following pairs of compounds are diastereomers?

A) 

B) 

C) 

D) 

Answer:A,B,D

Solution:Diastereomers :Stereoisomers that are not mirror images of each other.
A,B,D options are not mirror image but C is mirror image

Comprehension Type

OPTICAL ISOMERS :

Two or more than two compound have same molecular formula, same structural formula but different direction of rotation of PPL (plane polarised light).

Condition for optical activity :

"Molecule should be chiral".

Chiral object :

A chiral object is one that cannot be divided into two equal and identical parts (i.e., it is asymmetrical).

Such objects do not have a plane of symmetry and cannot be superimposed on their mirror image.

Meaning of "Chiral" :

Chiral = unsymmetrical (lacking symmetry).

The word "chiral" comes from the Greek word "cheir" = hand, because human hands are classic examples:

Right hand and left hand are mirror images, but they cannot be superimposed

22. Optical isomers are defined as:
A) Compounds with different molecular formula but same structural formula
B) Compounds with same molecular and structural formula but different direction of rotation of plane-polarized light
C) Compounds with identical molecular and physical properties
D) Compounds that differ only in boiling point

Answer:B

Solution:Optical isomers (enantiomers) have:
same molecular formula
same connectivity
differ in optical rotation (one rotates light left, the other right)

23. Condition for optical activity is:
A) Molecule must have double bond B) Molecule must be planar
C) Molecule must be chiral D) Molecule must be symmetrical

Answer:C

Solution:Chirality (absence of symmetry + non-superimposable mirror images) is the key requirement.

24. A chiral object is one that:
A) Can be divided into two equal identical parts
B) Has a plane of symmetry
C) Cannot be superimposed on its mirror image
D) Has only one type of atom

Answer:C

Solution:Chirality = not superimposable on its mirror image.

25. Which of the following is a classic example of chirality?
A) Square B) Circle C) Human hands D) Equilateral triangle

Answer:C

Solution:Classic everyday example: human hands (left and right hands are mirror images but not identical).

26. The word 'chiral' is derived from Greek ‘cheir’, which means:
A) Eye B) Hand C) Light D) Symmetry

Answer:B

Solution:"Chiral" comes from Greek cheir = hand.

27. Which statement is correct about chiral molecules?
A) They always have a plane of symmetry
B) They are always superimposable on their mirror image
C) They are asymmetrical and optically active
D) They cannot rotate plane-polarized light

Answer:C

Solution:Chiral molecules lack symmetry elements like plane/center of symmetry and can rotate plane-polarized light.

Matrix Matching Type:

28.

Column - I	**Column - II**
a) Geometrical isomerism	p) Compound showing non-superimposable mirror images
b) Optical isomerism	q) Compound containing plane of symmetry
c) Meso compound	r) Compound containing centre of symmetry
d) Achiral compound	s) Compound showing cis–trans isomerism

Answer:a – s,b – p, c – q,d – r

Solution:

a) Geometrical isomerism	s) Compound showing cis–trans isomerism
b) Optical isomerism	p) Compound showing non-superimposable mirror images
c) Meso compound	q) Compound containing plane of symmetry
d) Achiral compound	r) Compound containing centre of symmetry

Assertion and Reason Type:

A) Both A and R are true and R is correct explanation of A
B) Both A and R are true and R is not correct explanation of A
C) A is true but R is false
D) A is false but R is true

29. **Assertion(A)** **:** Lactic acid is optically active compound
Reason (R) **:** It contains a chiral centre with plane of symmetry

Answer:C

Solution:Assertion (A): TRUE
Lactic acid contains one chiral carbon (CH_3–CH(OH)–COOH).

Reason (R): FALSE
A compound with a plane of symmetry cannot be optically active.
Chiral centre + no plane of symmetry = optical activity.

30. **Assertion(A)** : Racemic mixture is optically inactive
Reason (R) : Racemic mixture is a mixture of meso compounds

Answer:C

Solution:Assertion (A): TRUE
Racemic mixture contains equal amounts of (+) and (–) enantiomers, so optical rotation cancels out.
Reason (R): FALSE
Meso compounds are achiral and individually optically inactive, but racemic mixtures are mixtures of enantiomers, not meso compounds.

LEARNER'S TASK

CONCEPTUAL UNDERSTANDING QUESTIONS(CUQ'S)

1. Optically active tartaric acid is named as D(+) tartaric acid because it is
A) optically dextro rotatory and derived from D- glucose
B) it changes its activity in aqueous solution
C) optically active only when H - atoms are substituted by deuterium atoms
D) optically dextro rotatory and derived from D(+) glyceraldehyde.

Answer:D

Solution:D and L notation in sugars/glyceraldehyde series is based on configuration relative to D-glyceraldehyde (last chiral center OH on the right in Fischer projection).
D(+) tartaric acid has (+) rotation (dextrorotatory) and the configuration corresponds to D-glyceraldehyde.

2. An enantiomerically pure acid is treated with racemic mixture of an alcohol having chiral carbon, the ester formed will be
A) mixture of diastereomers B) mixture of enantiomers
C) meso compound D) racemic mixture

Answer:A

Solution:When an enantiomerically pure acid reacts with a racemic alcohol (two enantiomers), each alcohol enantiomer gives a different ester.
These esters are diastereomers (not mirror images), hence a mixture of diastereomers forms.

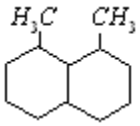
3. Which of the following is optically active?
A) Glycerine B) Acetaldehyde C) GlyceraldehydeD) Acetone

Answer:C

Solution:Glyceraldehyde ($CH_2OH–CHOH–CHO$) has a chiral carbon (the middle one) and is optically active.
Glycerine (glycerol) has no chiral center inactive.

Acetaldehyde and acetone have no chiral carbon → inactive

4. Number of chiral centres in the given compound



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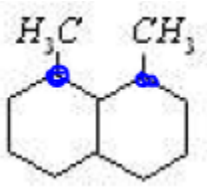
A) 1 B) 2 C) 3 D) 4

Answer:B

Solution:



A carbon atom is a chiral center if it is bonded to four different groups. In the given compound, 1,2-dimethylcyclohexane (specifically a decalin derivative with methyl groups), there are two carbon atoms that fit this description:

The carbon atom on the left ring with the (CH_3) group attached is bonded to a hydrogen atom, the methyl group, and two different paths through the rings.

The carbon atom on the right ring with the (CH_3) group attached is similarly bonded to a hydrogen atom, the methyl group, and two different paths through the rings.

The bridgehead carbons (where the two rings join) are not chiral because the paths through the two rings connecting them are identical. Thus, there are two chiral centers in the molecule.

5. Optically active isomers but not mirror-images are called?

A) Enantiomers B) Mesomers C) Tautomers D) Diastereomers

Answer:D

Solution:Diastereomers are stereoisomers that are optically active (in general) but are not mirror images.

6. The minimum number of C atoms for a hydrocarbon to exhibit optical isomerism

A) 4 B) 5 C) 6 D) 7

Answer:D

Solution:7 — a chiral carbon in a pure hydrocarbon needs four different carbon substituents; the smallest hydrocarbon that can provide that requires 7 carbon atom

$$H - \begin{array}{c} CH_3 \\ | \\ C \\ | \\ C_3H_7 \end{array} - C_2H_5$$

7. Which of the following is correctly matched?
   A) tartaric acid-geometrical isomerism
   B) fumaric acid-optical isomerism
   C) lactic acid-optical isomerism
   D) malic acid-geometrical isomerism

Answer:C

Solution:A) tartaric acid – geometrical isomerism → No, tartaric acid shows optical isomerism (and meso forms), not geometrical.
B) fumaric acid – optical isomerism → No, fumaric acid is geometrical (trans) isomer of maleic acid, not optical (achiral).
C) lactic acid – optical isomerism → Yes, lactic acid (2-hydroxypropanoic acid) has a chiral carbon → optical isomers.
D) malic acid – geometrical isomerism → No, malic acid (2-hydroxybutanedioic acid) shows optical isomerism, not geometrical.

8. Among the following compounds which exhibits optical isomerism
   A) propanol B) 2 - propanol C) 1- Butanol D) 2 - Butanol

Answer:D

Solution:A) propanol (1-propanol) → no chiral center.
B) 2-propanol → C2 has CH_3, OH, CH_3 → two same groups → achiral.
C) 1-Butanol → no chiral center.
D) 2-Butanol → C2 has CH_3, OH, H, C_2H_5 → chiral →optical isomerism.

9. Which of the following can have meso isomer
   A) $CH_2OHCHOHCHO$ B) $CH_2OHCHOHCHOHCHO$
   C) $HOOCCHOHCHOHCOOH$ D) $HOH_2CCHOHCHOHCOOH$

Answer:C

Solution:HOOC–CHOH–CHOH–COOH →tartaric acid → two chiral centers, ends same (COOH) → meso form possible

10. d- tartaric acid and *l* - tartaric acid can be separated by
   A) Salt formation B) Fractional distillation
   C) Fractional crystallisation D) Chromatography

Answer:A

Solution:Enantiomers have identical physical properties (melting point, solubility, boiling point) in an achiral environment.
They cannot be separated by fractional distillation or crystallization alone, because those methods rely on differences in physical properties.
React D- and L-tartaric acid with a chiral base (e.g., brucine or quinine) to form diastereomeric salts.
Diastereomers have different solubilities → can be separated by crystallization.

JEE MAINS LEVEL QUESTIONS

1. Which of the following alkenes shows both geometrical and optical isomerism?
   A) 2-pentene B) 2,3-dimethyl-2-butene
   C) 3-hexene D) 2,3-dimethyl-3-hexene

Answer:None

Solution:2-pentene (A): Shows E/Z (geometrical) isomerism; no chiral center, so not optical.
2,3-dimethyl-2-butene (B): No E/Z (each C of C=C has identical substituents); not optical.
3-hexene (C): Shows E/Z; achiral overall.
2,3-dimethyl-3-hexene (D): Shows E/Z, but any candidate tetrahedral center (e.g., C2) has two identical methyl groups, so no chirality.

2. How many stereoisomers are possible for 2,3,4-trihydroxybutanal (CHO–CH(OH)– CH(OH)–CH_2OH)? **(FA & SA- 3 Marks/4 Marks)**
   A) 2 B) 4 C) 6 D) 8

Answer:B

Solution:2,3,4-trihydroxybutanal = aldotetrose (erythrose/threose type).
Number of chiral centers: C2 and C3 $\rightarrow$ both chiral. Ends: CHO and CH_2OH different $\rightarrow$ no internal symmetry $\rightarrow$no meso.
So 2^2 =4 stereoisomers.

3. Which of the following statements about enantiomers is incorrect?
   A) They have equal and opposite optical rotations.
   B) They have identical melting and boiling points in achiral solvents.
   C) They can be separated by simple distillation.
   D) They are non-superimposable mirror images.

Answer:C

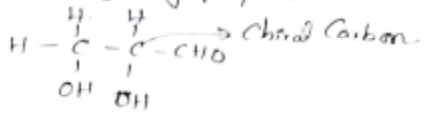
Solution:Enantiomers have identical physical properties in achiral media, so simple distillation won't separate them (unless a chiral environment is used).

4. Which of the following cannot show optical activity?
   A) 2,3-dihydroxypropanal B) 2-chloropropanoic acid
   C) 1,2-dichloroethane D) 2-bromobutane

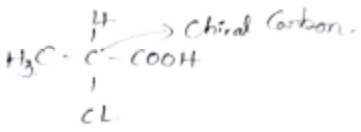
Answer:C

Solution:

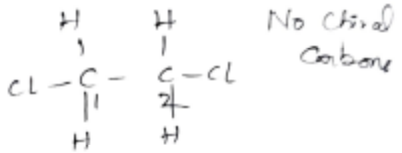
A) 2,3 dihydroxy propanal



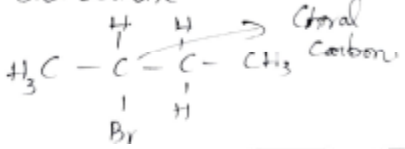
B) 2 Chloropropanoic acid.



C) 1,2- dichloroethane.



D) 2- Bromobutane



5. Which condition is essential for a molecule to show geometrical isomerism?

(FA & SA- 2 Marks)

A) At least one chiral carbon B) Restricted rotation about a bond
C) Presence of a plane of symmetry D) Absence of polar groups

Answer:B

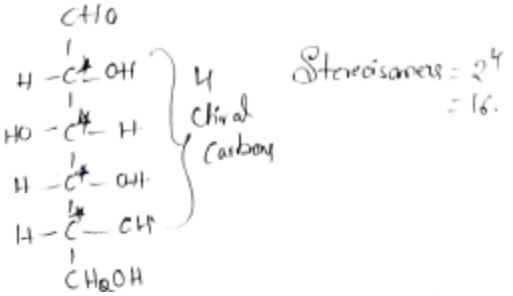
Solution:Restricted rotation about a bond.(e.g., a double bond or ring that prevents free rotation.)

6. The number of stereoisomers possible for glucose (an aldohexose) is:

A) $2^4 = 16$ B) $2^6 = 64$ C) $2^3 = 8$ D) $2^5 = 32$

Answer:C

Solution:



7. Which of the following statements about meso compounds is correct?

A) They are optically active due to internal compensation.

B) They are optically inactive due to external compensation.
C) They are optically inactive due to internal symmetry.
D) They have no chiral centres.

Answer:C

Solution:Meso compounds are molecules that contain two or more chiral centers but also possess an internal plane of symmetry.
Because of this symmetry, the optical rotations of the two halves cancel each other out.
Result: They are achiral overall, even though they contain chiral centers.

8. Which of the following molecules will show conformational isomerism?
A) Ethane B) Propane C) Cyclohexane D) All of these

Answer:D

Solution:Conformational isomerism: ethane (rotational), propane, cyclohexane (chair-boat) $\rightarrow$ all show conformational isomers.

9. A compound has 3 stereogenic centres and no plane of symmetry. The maximum number of stereoisomers possible is:
A) 4 B) 6 C) 8 D) 16

Answer:C

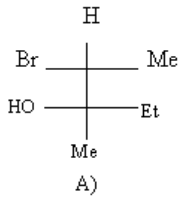
Solution: $2^3 = 8$

10. A compound contains 2 dissimilar asymmetric carbon atoms. The number of optically active isomers is
A) 2 B) 3 C) 4 D) 5

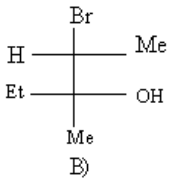
Answer:C

Solution:Compounds having dissimilar ends,
No. of optically active isomers(a)=$2^n=2^2=4$

11. Which of the following structures are super imposable?



A)



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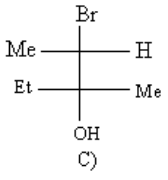
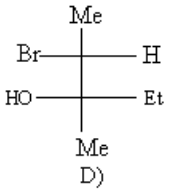


C)

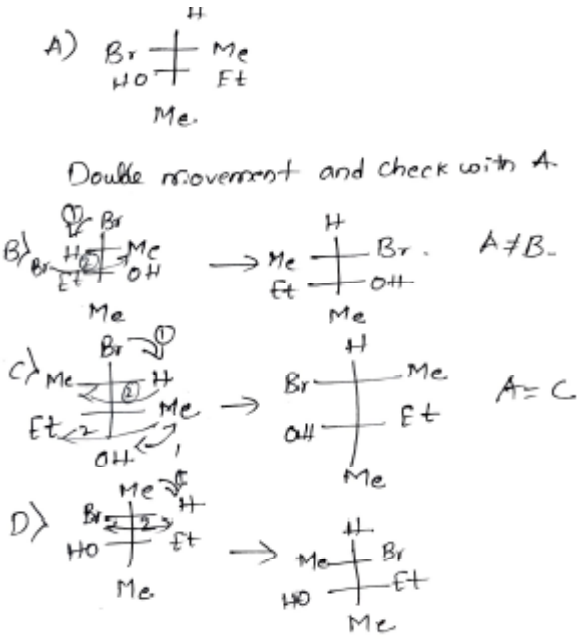


D)

A) A and B B) B and C C) A and D D) A and C

Answer:D

Solution:



12. Which of the following can exist in enantiomeric forms?

A) $CH_3-CH(CH_3)-COOH$ B) $CH_3-CH=CH-CH_2-CH_3$

C) $CH_3-CH(NH_2)-CH_3$ D) $CH_3-CH_2-CH(OH)-CH_3$

Answer:D

Solution:Only the structure in D — $(CH_3)_2CH-CH(OH)-CH_3$ (2-butanol) — has a carbon bearing four different groups, so it can exist as enantiomers.
(Enantiomers require at least one stereogenic carbon with four different substituents; the others lack such a centre.)

13. Which of the following exists in two enantiomeric forms

A) Oxalic acid B) Benzoic acid C) Acetic acid D) Lactic acid

Answer:D

Solution: Enantiomeric forms = chiral.

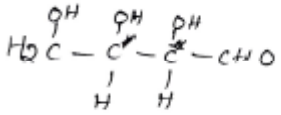
A) Oxalic acid $\rightarrow$ HOOC–COOH $\rightarrow$ no chiral center
B) Benzoic acid $\rightarrow$ C_6H_5–COOH $\rightarrow$ no chiral center
C) Acetic acid $\rightarrow$ CH_3–COOH $\rightarrow$ no chiral center
D) Lactic acid $\rightarrow$ CH_3–CH(OH)–COOH $\rightarrow$ chiral center

14. Optical isomers possible for $CH_2OHCHOHCHOHCHO$ are

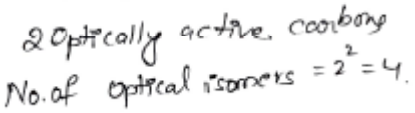
(FA & SA- 5Marks/8Marks)

A) 2 B) 3 C) 4 D) 8

Answer:C



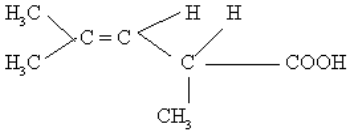
Solution:



15. Tartaric acid cannot form
A) a pair of enantiomers
B) mesoisomer
C) racemic mixture
D) E & Z compounds

Answer:D

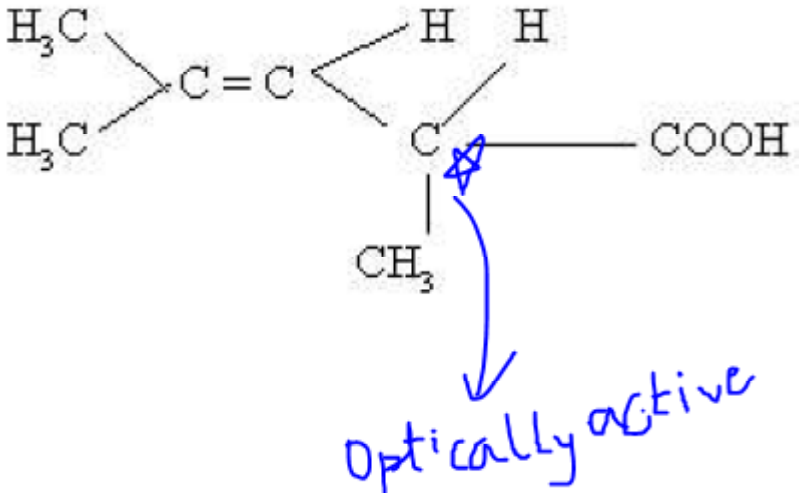
Solution:Tartaric acid forms enantiomers (D- and L- forms), meso-isomers, and racemic mixtures (equal parts D & L), but it cannot form E & Z (Geometric) isomers because it lacks the necessary double bond with different groups on each carbon

16. The structure  shows

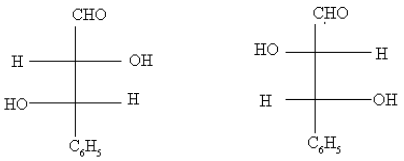
A) geometrical isomerism
B) optical isomerism
C) both geometrical and optical isomerism
D) tautomerism

Answer:B

Solution:



17 Of compounds which among the following statements are correct

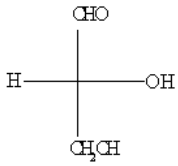


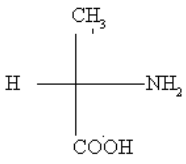
i)Both are enantiomers ii) both are in threo form
iii) Both are diastereomers iv) Both are in erythro form
A) i, ii B) i. ii, iii C) ii, iii D) i, iii

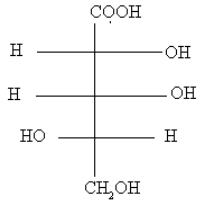
Answer:A

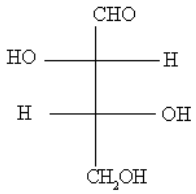
Solution:The two Fischer structures are mirror images (left↔right swap at both stereocentres), so they are enantiomers (i true). In both projections the two –OH groups appear on opposite sides of the vertical chain (Fischer), which is the threo relationship — so ii is true. They are not diastereomers (iii false) and not erythro (iv false).

18. Which among the following compound has (L) configuration

A) 

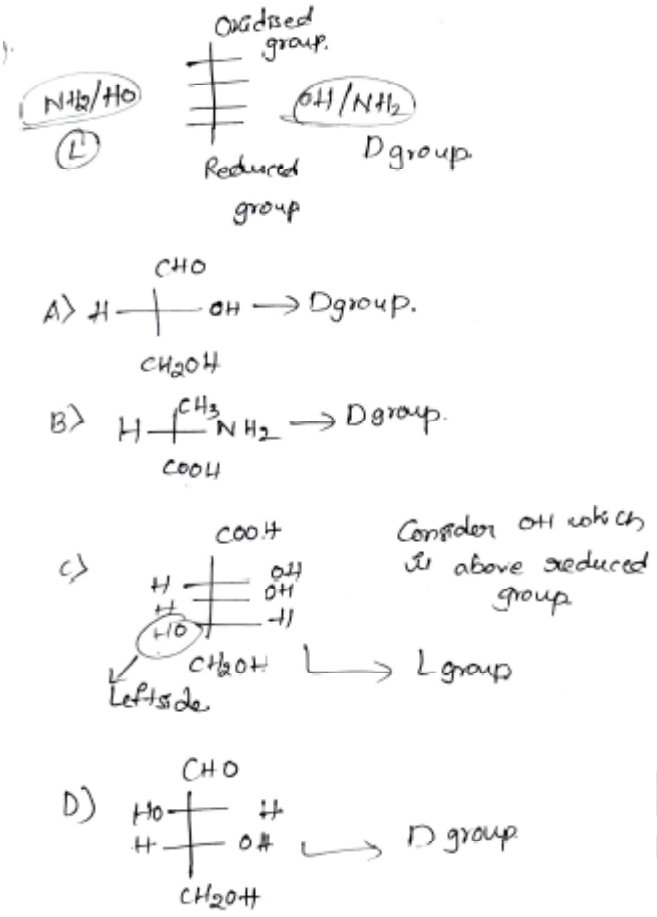
B) 

C) 

D) 

Answer:C

Solution:

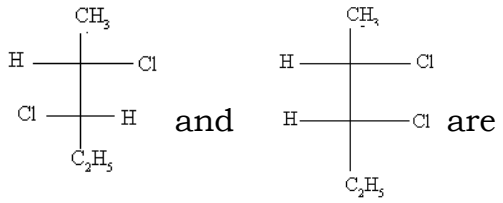


19. Consider the following statements.
I. Meso form is optically inactive due to absence of dissymmetry in the molecule
II. Compound will be optically active if it is dissymmetric molecule
III. Geometrical isomers are stereo isomers
IV. Physical properties of stereo isomers are different
Select the correct answer from the codes given below
A)Only IV is correct B) I,II,III and IV are correct
C)I,II and IV are correct D) II,III and IV are correct

Answer:B

Solution:I: True — meso compounds have internal symmetry (absence of dissymmetry) causing internal compensation and optical inactivity.
II: True — dissymmetric molecules (no internal symmetry elements like a mirror plane or center) are optically active.
III: True — geometrical (E/Z, cis/trans) isomers are a type of stereoisomer.
IV: True — stereoisomers have different physical properties; enantiomers differ in optical rotation (a physical property), and diastereomers differ in many properties (mp, bp, solubility)

20. The two opticalisomers given below namely



A) enantiomers B) geometrical isomers
C) diastereomers D) structural isomers

Answer:C

Solution:The two molecules are stereoisomers that have the same connectivity but different spatial arrangements. They are neither superimposable on each other, nor are they non-superimposable mirror images of each other. Therefore, they are diastereomers.

JEE ADVANCED LEVEL QUESTIONS

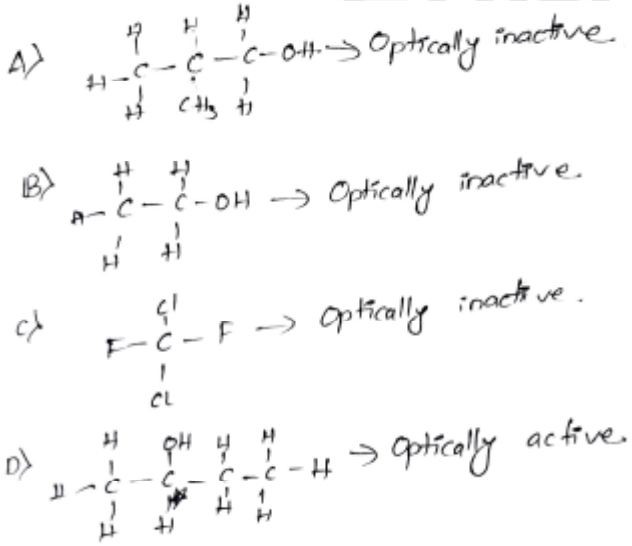
Multicorrect Answer Type

21. Which of the following compounds is /are optically inactive

A) $(CH_3)_2CHCH_2OH$ B) CH_3CH_2OH C) CCl_2F_2 D) $CH_3CHOHC_2H_5$

Answer:A,B,C

Solution:



Assertion and Reason Type:

A) Both A and R are true and R is the correct explanation of A
B) Both A and R are true and R is not the correct explanation of A
C) A is true but R is false
D) A is false but R is true

22. **Assertion (A)** **:** Meso-tartaric acid is optically inactive
Reason (R) **:**It is due to the external compensation of rotation of plane

polarized light

Answer:C

Solution: Meso-tartaric acid is optically inactive due to internal compensation (presence of an internal plane of symmetry), not external compensation. External compensation refers to racemic mixtures, not meso compounds.

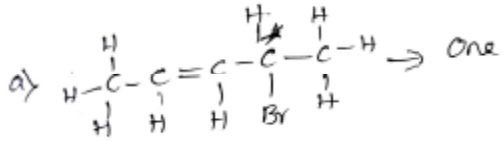
Matrix Matching Type

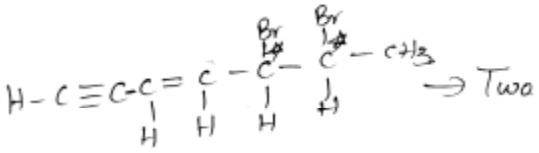
23.

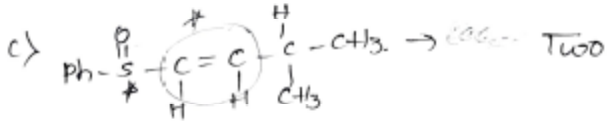
Column - I **Molecule**	**Column - II** **Stereocentres**
a) $CH_3-CH=CH-\underset{\displaystyle Br}{\underset{\vert}{CH}}-CH_3$	p) 1
b) $H-C\equiv C-CH=CH-\underset{\displaystyle Br}{\underset{\vert}{CH}}-\underset{\displaystyle Br}{\underset{\vert}{CH}}-CH_3$	q) 2
c) $Ph-\overset{\displaystyle O}{\overset{\Vert}{S}}-CH=CH-\underset{\displaystyle CH_3}{\underset{\vert}{CH}}-CH_3$	r) 3
d) $Ph-\underset{\displaystyle Cl}{\underset{\vert}{CH}}-Et$	s)4

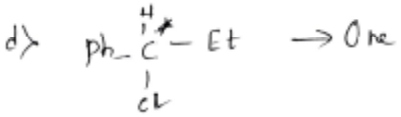
Answer:a-p,b-q,c-q,d-p

Solution:

a) 

b) 

c) 

d) 

24.

Set - I	**Set - II**
1. Mesoform	a. complete non super imposable mirror images
2. E-configuration	b. partial non superimposable mirror images
3. Enantiomers	c. geometrical isomers

4. Diastereomers	d. optically inactive

Answer:1-d, 2-c, 3-a, 4-b

Solution:

1. Mesoform	d. optically inactive
2. E-configuration	c. geometrical isomers
3. Enantiomers	a. complete non super imposable mirror images
4. Diastereomers	b. partial non superimposable mirror images

KEY

				TEACHING TASK					
			JEE MAINS LEVEL QUESTIONS						
1	2	3	4	5	6	7	8	9	10
C	B	B	C	B	B	B	B	B	D
11	12	13	14	15	16	17	18	19	20
B	B	NONE	B	B	B	B	C	C	C
			JEE ADVANCED LEVEL QUESTIONS						
21	22	23	24	25	26	27	28		29
A,B,D	B	C	C	C	B	C	a – s,b – p, c – q,d – r		C
30									
C									
				LEARNER'S TASK					
			CONCEPTUAL UNDERSTANDING QUESTIONS(CUQ'S)						
1	2	3	4	5	6	7	8	9	10
D	A	C	B	D	D	C	D	C	A
			JEE MAINS LEVEL QUESTIONS						
1	2	3	4	5	6	7	8	9	10
NONE	B	C	C	B	C	C	D	C	C
11	12	13	14	15	16	17	18	19	20
D	D	D	C	D	B	A	C	B	C
			JEE ADVANCED LEVEL QUESTIONS						
21	22	23		24					
A,B,C	C	a-p,b-q,c-q,d-p		1-d, 2-c, 3-a, 4-b					