Complete Organic Chemistry by Shubh Karan Choudhary Sir (SKC) 2026

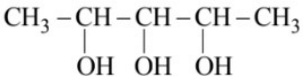
Practice Sheet

Chemistry

Isomerism

Q1 Which of the following compounds can exhibit enantiomerism?
(A) 3-Hydroxypropanoic acid
(B) 3-Hydroxybutanoic acid
(C) 4-Hydroxybutanoic acid
(D) None of these

Q2 The number of meso form of the given compound is:



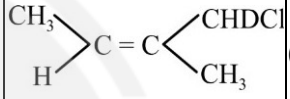
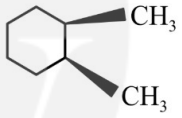
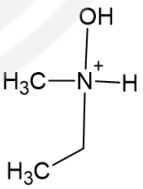
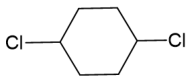
(A) 2 (B) 3
(C) 4 (D) 8

Q3 Which of the following dienes is chiral?
(A) $CH_3 - CH = C = CH_2$
(B) $CH_3 - CH = CH - CH = CH_2$
(C) $CH_3 - CH = C = CH - CH_3$
(D) $CH_2 = CH - CH_2 - CH = CH_2$

Q4 Which of the following is **true** regarding the enantiomers?
(A) They always exist as discrete pairs.
(B) They are stable and isolable compounds.
(C) An equimolar mixture of enantiomers is called racemic mixture.
(D) All of these

Q5 Which one of the following is optically inactive?
(A) trans-1,2-Dibromocyclopropane
(B) trans-1-Bromo-2-chlorocyclopropane
(C) cis-1-Bromo-2-chlorocyclopropane
(D) cis-1,2-Dibromocyclopropane

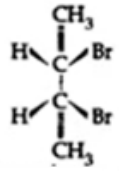
Q6 Match **List-I** with **List-II** to find out the **correct** option.

List-I (Molecule)			**List-II (isomerism)**
(A)		(P)	Geometrical and Optical
(B)		(Q)	Neither Geometrical nor optical
(C)		(R)	Only Optical
(D)		(S)	Only Geometrical

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

Q7 Given below are two statements: one is labelled as Assertion A and the other is labelled as

Reason R:



Assertion A: The structure has two asymmetric carbon atoms but does not show optical activity.

Reason R: The meso compounds are optically inactive.

In the light of the above statements, choose the **correct** answer from the options given below:

(A) A is true but R is false.

(B) A is false but R is true.

(C) Both A and R are true and R is the correct explanation of A.

(D) Both A and R are true but R is NOT the correct explanation of A.

Q8 Given below are two statements: one is labelled as Assertion A and the other is labelled as Reason R:

Assertion A: Addition of Br_2 to 1-butene gives two optical isomers.

Reason R: The product contains one asymmetric carbon atom.

In the light of the above statements, choose the correct answer from the options given below:

(A) A is true but R is false.

(B) A is false but R is true.

(C) Both A and R are true and R is the correct explanation of A.

(D) Both A and R are true but R is NOT the correct explanation of A.

Q9 Given below are two statements:

Statement I: Stereoisomers which are not mirror images of each other are called diastereomers..

Statement II: Diastereomers may or may not be optically active.

In the light of the above statements, choose the *most appropriate* answer from the options given below:

(A) Statement I is correct but Statement II is incorrect.

(B) Statement I is incorrect but Statement II is correct.

(C) Both Statement I and Statement II are correct.

(D) Both Statement I and Statement II are incorrect.

Q10 Given below are two statements: one is labelled as Assertion A and the other is labelled as Reason R:

Assertion A: Only two optically active stereoisomers are possible for 2, 3-butanediol.

Reason R: Total number of stereoisomers of the compound 2, 4-dichloroheptane are 2.

In the light of the above statements, choose the **correct** answer from the options given below:

(A) A is true but R is false.

(B) A is false but R is true.

(C) Both A and R are true and R is the correct explanation of A.

(D) Both A and R are true but R is NOT the correct explanation of A.

Q11 Given below are two statements: one is labelled as Assertion A and the other is labelled as Reason R:

Assertion A: Diastereomers are not mirror image of each other.

Reason R: Diastereomers may or may not be optically active.

In the light of the above statements, choose the **correct** answer from the options given below:

(A) A is true but R is false.

(B) A is false but R is true.

(C) Both A and R are true and R is the correct explanation of A.

(D) Both A and R are true but R is NOT the correct explanation of A.

Q12 Given below are two statements: one is labelled as Assertion A and the other is labelled as Reason R:

Assertion A: Meso tartaric acid is optically inactive.

Reason R: Meso tartaric acid has plane of symmetry.

In the light of the above statements, choose the **correct** answer from the options given below:

(A) A is true but R is false.

(B) A is false but R is true.

(C) Both A and R are true and R is the correct explanation of A.

(D) Both A and R are true but R is NOT the correct explanation of A.

Q13 Given below are two statements: one is labelled as Assertion A and the other is labelled as Reason R:

Assertion A: Molecules that are not superimposable on their mirror images are chiral.

Reason R: All chiral molecules have chiral centre.

In the light of the above statements, choose the **correct** answer from the options given below:

(A) A is true but R is false.

(B) A is false but R is true.

(C) Both A and R are true and R is the correct explanation of A.

(D) Both A and R are true but R is NOT the correct explanation of A.

Q14 Given below are two statements: one is labelled as Assertion A and the other is labelled as Reason R:

Assertion A: Organic compounds which do not contain chiral carbon atoms might be optically active.

Reason R: An organic compound is optically active only when its mirror image is non–superimposable irrespective of the fact whether it contains a chiral carbon atom or not.

In the light of the above statements, choose the **correct** answer from the options given below:

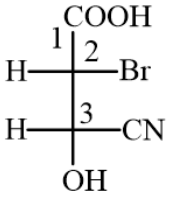
(A) A is true but R is false.

(B) A is false but R is true.

(C) Both A and R are true and R is the correct explanation of A.

(D) Both A and R are true but R is NOT the correct explanation of A.

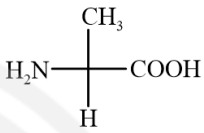
Q15 The absolute configurations of the two chiral centers in the following molecules are:

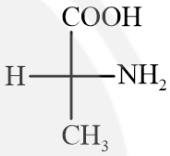


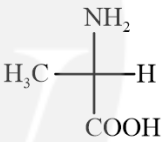
(A) 2(R), 3(S) (B) 2(R), 3(R)

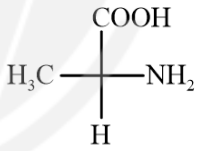
(C) 2(S), 3(S) (D) 2(S), 3(R)

Q16 Amongst the following amino acids, the (R)-enantiomer is represented by:

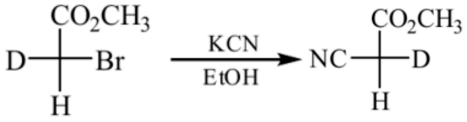
(A) 

(B) 

(C) 

(D) 

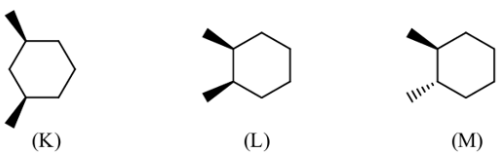
Q17 The configurations of the reactant and the product in the following reaction, respectively, are:



(A) R, R (B) R, S

(C) S, R (D) S, S

Q18 The molecule(s) that exist as meso structure(s)

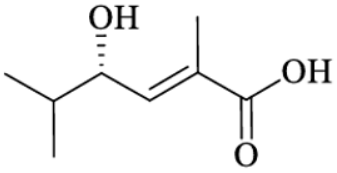


(K) (L) (M) is/are:

(A) Only M (B) Both K and L

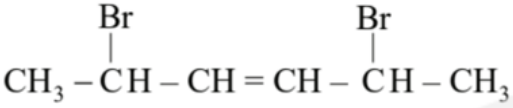
(C) Only L (D) Only K

Q19 For the compound the stereochemical notations are:



(A) 2Z, 4R (B) 2Z, 4S
(C) 2E, 4R (D) 2E, 4S

Q20 Total number of stereoisomers of following compound is:

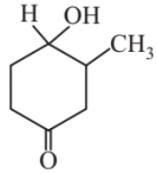


(A) 2 (B) 4
(C) 6 (D) 8

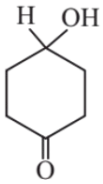
Q21 The total number of stereoisomers possible for 2, 3-dichloro butane is:
(A) 2 (B) 3
(C) 4 (D) 5

Q22 Which is a meso compound?
(A) (2R, 3R)-2, 3-dibromobutane
(B) (2R, 3S)-2, 3-dibromobutane
(C) (2R, 4R)-2, 4-dibromopentane
(D) (2S, 4S)-2, 4-dibromopentane

Q23 Which of the following compounds possesses a chiral centre?
(A)



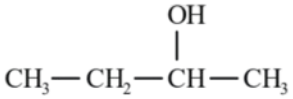
(B)



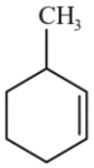
(C)

(D)

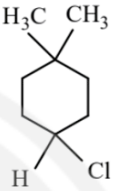
Q24 Which of the following compound is optically inacally inactive?
(A)



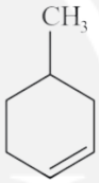
(B)



(C)

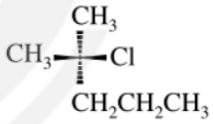


(D)

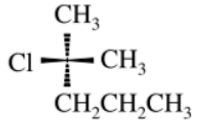


Q25 Consider the following set of molecules

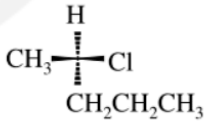
(I)



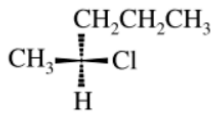
(II)



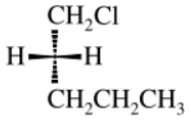
(III)



(IV)



(V)



The pairs of enantiomers are
(A) I, II, III and IV
(B) I and II
(C) III and IV
(D) IV and V

Q26 Given below are two statements: one is labelled as Assertion A and the other is labelled as Reason R:

Assertion A: A molecule containing chiral carbon must be non-superimposable on its mirror image.
Reason R: A chiral carbon is bonded to four different atoms or groups.
In the light of the above statements, choose the correct answer from the options given below:
(A) A is true but R is false.
(B) A is false but R is true.
(C) Both A and R are true and R is the correct explanation of A.
(D) Both A and R are true but R is NOT the correct explanation of A.

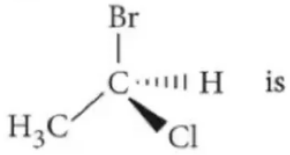
Q27 How many stereoisomers does this molecule have?

$CH_3CH = CHCH_2CHBrCH_3$

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

Q28 Which of the following is **not** chiral?
(A) $2-\text{Hydroxypropanoic acid}$
(B) $2-\text{Butanol}$
(C) $2,3-\text{Dibromopentane}$
(D) $3-\text{Bromopentane}$

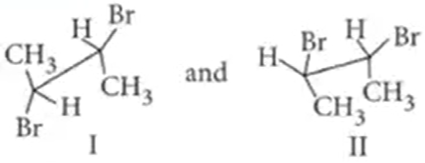
Q29 The chirality of the compound is



is

(A) R (B) S
(C) E (D) Z

Q30 Given:



I and II are
(A) identical
(B) a pair of conformers
(C) a pair of geometrical isomers
(D) a pair of optical isomers.

Answer Key

Q1	(B)
Q2	(A)
Q3	(C)
Q4	(D)
Q5	(D)
Q6	(C)
Q7	(C)
Q8	(C)
Q9	(C)
Q10	(A)
Q11	(A)
Q12	(C)
Q13	(A)
Q14	(C)
Q15	(A)
Q16	(B)
Q17	(B)
Q18	(B)
Q19	(D)
Q20	(C)
Q21	(A)
Q22	(B)
Q23	(A)
Q24	(C)
Q25	(C)
Q26	(D)
Q27	(C)
Q28	(D)
Q29	(A)
Q30	(B)

Hints & Solutions

Note: scan the QR code to watch video solution

Q1 Text Solution:

(B)

The C-3 of 3-hydroxybutanoic acid is chiral and hence optically active.

Q2 Text Solution:

(A)

The molecules has plane of symmetry and contains odd number of chiral centre. To calculate the number of meso compounds, the formula is Number of meso forms = m = $2^{\frac{(n-1)}{2}}$

Q3 Text Solution:

(C)

Disubstituted (at two different sp^2) allenes are chiral due to lack of symmetry elements.

Q4 Text Solution:

(D)

All the above statements reflect the properties of enantiomers.

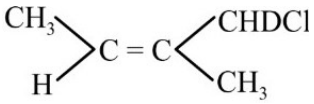
Q5 Text Solution:

(D)

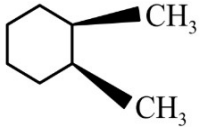
cis-1,2-dibromocyclopropane has plane of symmetry and its mirror-image is superimposable on it.

Q6 Text Solution:

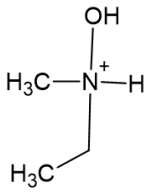
(C)



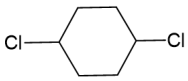
It has one C=C bond system and a assymetrci carbon atom.



It has plane of symmetry hence no optical isomerism. And the two methyl groups have a fixed position hence, no optical isomerism.



It has only one assymteric carbon but no C=C bond system hence show only optical isomerism.



It has plane of symmetry if the two chloro groups are cis to each other and center of symmetry if the two chloro group are trans to each other, hence no optical isomerism. But the two chloro groups can be placed on the same side or on the opposite side of planar cyclohexane ring. Hence, it shows geometrical isomerism.

Q7 Text Solution:

(C)

The given structure has two asymmetric carbon atoms but does not show optical activity because the given structure is a meso compound an is optically inactive.

Video Solution:

Q8 Text Solution:

(C)

The product is 1,2-dibromobutane and has one assymetric carbon atom.

Video Solution:

Q9 Text Solution:

(C)

In sterochemistry, diastereomers (sometimes called diastereoisomers) are a type of stereoisomers. Diastereomers are defined as non-mirror image, non-identical stereoisomers. Hence, they occur when two or more stereoisomers of a compound have different configurations at one or more (but not all) of the equivalent (related) stereocenters and are not mirror images of each other

Q10 Text Solution:

(A)

- 2,4-Dichloroheptane (CH_3-CHCl-CH_2-CHCl-CH_2-CH_2-CH_3) has two chiral centers (C2 and C4).
- The total number of stereoisomers should be:

$$2^n = 2^2 = 4$$

  - If there were a meso form, it would reduce the total count, but 2,4-dichloroheptane does not have a plane of symmetry.
  - Hence, all four stereoisomers exist.

Video Solution:

Q11 Text Solution:

(A)

- Diastereomers are stereoisomers that are not mirror images of each other.
- Unlike enantiomers (which are non-superimposable mirror images), diastereomers differ at one or more chiral centers but are not complete mirror images.
- Some diastereomers are optically active (having a non-superimposable mirror image).
- Some diastereomers are optically inactive (like meso compounds, which have an internal plane of symmetry)

Video Solution:

Q12 Text Solution:

(C)

Meso tartaric acid is optically inactive because meso tartaric acid has plane of symmetry.

Video Solution:

Q13 Text Solution:

(A)

A molecule is said to be chiral if it cannot be superimposed on its mirror image by any combination of rotations and translations. A chiral molecule exists as two stereoisomers that are mirror images of each other called enantiomers. Enantiomers are distinguished based on their absolute configuration. They have the same chemical properties but different physical properties. A homogeneous mixture of two enantiomers is called a racemic mixture. In chiral organic molecules, a stereocenter is an asymmetric carbon, multiple stereocenters may give rise to additional stereoisomers. Chirality is

based on molecular symmetry; A chiral molecule cannot have an improper axis of rotation which includes planes of symmetry and inversion center.

Complete step by step answer:

We will analyze both the statements. Statement 1 : Molecules that are not superimposable on their mirror images are chiral.

This statement is true as molecules that are not superimposable on their mirror images are asymmetric and hence chiral. Such molecules are known as enantiomers. These molecules when placed on top of one another will not give the same molecule hence they are chiral. Therefore, we can conclude that statement 1 is true.

Statement 2 is: All chiral molecules have chiral centers. All chiral molecules don't have to have a stereogenic center. A molecule can be chiral even if it does not have a stereocenter. A molecule's chirality depends entirely on whether it is asymmetrical. Example-Biphenyls do not have a chiral carbon but they cannot rotate freely due to steric crowding. Hence, they are asymmetrical. Therefore, we can conclude that statement 2 is false.

Hence option (B) is the correct answer.

Note:

A molecule with stereocenters need not be chiral always.

In chiral organic compounds, a stereocenter is often an asymmetric carbon.

A molecule that has no plane, center, or axis of symmetry is asymmetric.

Asymmetric molecules are always chiral.

Video Solution:

Q14 Text Solution:

"Organic compounds which do not contain chiral carbon atoms might be optically active."

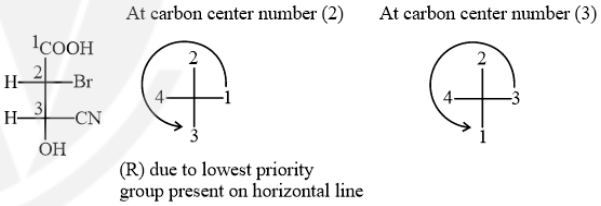
- This is true because optical activity is not strictly dependent on the presence of a chiral carbon.
- Some molecules exhibit axial, planar, or helical chirality, even in the absence of a chiral center.

"An organic compound is optically active only when its mirror image is non-superimposable, irrespective of the fact whether it contains a chiral carbon atom or not."

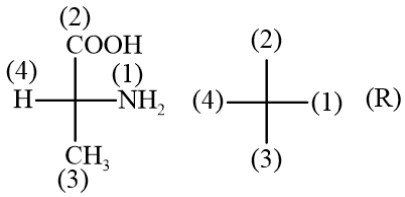
- This is correct because optical activity is determined by the absence of symmetry elements (e.g., a plane of symmetry or center of symmetry) and the non-superimposability of mirror images.
- Even if a molecule lacks a chiral carbon, it can be chiral and optically active due to other forms of chirality

Q15 Text Solution:

Priority according to higher atomic number



Q16 Text Solution:

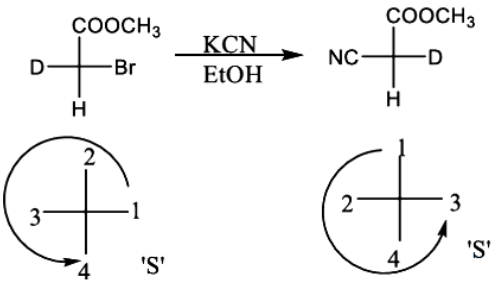


Lowest priority group (4) on horizontal line.

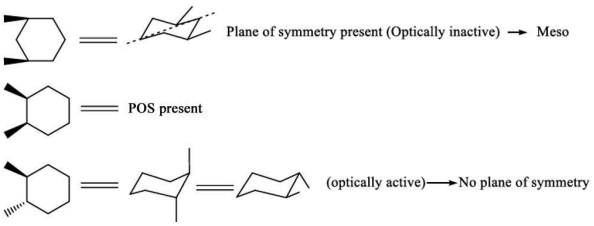
Rotation of group is taken reverse.

Q17 Text Solution:

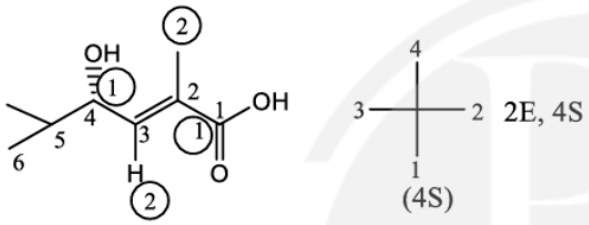
Above product formed through S_N2 mechanism in which (CN^-) group attack from back side. (invesion mechanism) given priority according to CIP rule.



Q18 Text Solution:



Q19 Text Solution:



Q20 Text Solution:

Because 3 chiral centres are present so

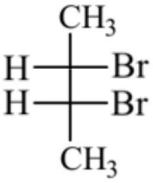
$2^{(n-1)} + 2^{\frac{(n-1)}{2}}$

$= 2^2 + 2^1 = 6.$

Q21 Text Solution:

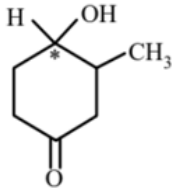
Total No. of optical isomers = $2^{(n-1)} + 2^{(n/2)} - 1 = 3$; here n = 2

Q22 Text Solution:



Plane of symmetry is present.

Q23 Text Solution:



Q24 Text Solution:

Achiral compounds are optically inactive.

Q25 Text Solution:

Ill and IV both are chiral and mirror images of one another.

Q26 Text Solution:

Both Assertion (A) and Reason (R) are correct, but Reason (R) does not fully explain Assertion (A) because the presence of a chiral carbon does not always guarantee non-superimposability (e.g., meso compounds).

Video Solution:

Q27 Text Solution:

(C)

The total number of stereoisomers is given by the formula:

$$2^n$$

where n = number of independent stereogenic elements (chiral centers + geometrical isomerism sites).

$$2^1 \times 2^1 = 2 \times 2 = 4$$

Video Solution:

Q28 Text Solution:

(D)

3-bromopentane is no chiral as it is not assymmetric.

Video Solution:

Q29 **Text Solution:**

(A)

The absolute configuration of the given molecule is R.

Video Solution:

Q30 **Text Solution:**

(B)

The given pair of compounds are conformers.

Video Solution: