ABC CHEMISTRY

Mr. Aniket Bhardwaj · 15+ Years Mentorship

Stereochemistry

Premium CSIR-NET PYQ Book

23 Previous-Year Questions · 8 with verified answers · Distractor Analysis

3-Slide Solutions | Distractor Analysis | Exam Tricks | Revision Sheets

CSIR-NET · GATE · IIT-JAM — 1 Topics · 23 Real PYQs

(Mr. Aniket Bhardwaj By ABC Chemistry) · www.abcchemistry.com · 9212142427

Mr. Aniket Bhardwaj

@abcchemistry24

Instagram · YouTube · Facebook

Course Contents

1 Topics · 23 PYQs

1	**Stereochemistry – General** 23 Qs E 8 · M 15 · H 0	100%

Legend: E Easy M Medium H Hard · % = exam weightage (share of the chapter)

TOPIC 1

Stereochemistry – General

23 questions · Easy 8 | Medium 15 | Hard 0 · PYQ frequency: Rare

Q1

The decreasing order of nucleophilicity for the following anions is $CH_3CO_2^-$, CH_3O^-, $C_6H_4O^-$, NO_3^-

A $CH_3CO_2^->CH_3O^->C_6H_5O^->NO_3^-$

B $CH_3O^->NO_3^->C_6H_5O^->CH_3CO_2^-$

C $CH_3O^->C_6H_5O^->CH_3CO_2^->NO_3^-$

D $C_6H_5O^->CH_3O^->NO_3^->CH_3CO_2^-$ GATE 2015

QUESTION INSIGHTS

ESTIMATED TIME
2–3 min

DIFFICULTY
Medium

CONCEPT TESTED
Stereochemistry – General

PYQ FREQUENCY
Rare · 2 papers

REVISION PRIORITY
★★★★☆

EXPECTED LEVEL
Part B / Part C

MEMORY HOOK
'Clockwise = R when #4 is away'.

Correct Answer C $CH_3O^- > C_6H_5O^- > CH_3CO_2^- > NO_3^-$

CONCEPT

CIP priorities (atomic number, then outward exploration, duplicated atoms for multiple bonds); R/S with lowest priority away; E/Z for alkenes; axial chirality (allenes, biphenyls: Ra/Sa, M/P), planar chirality; meso compounds; enantiomers vs diastereomers; Fischer projection rules (even swaps keep configuration).

↓

LOGIC / WORKING

- Nucleophilicity tracks basicity for the same donor atom: CH_3O^- (pK_aH 15.5) > $C_6H_5O^-$ (10) > $CH_3CO_2^-$ (4.8) > NO_3^- (−1.4). (Bank key (d) was wrong — corrected.)
- Therefore the answer is (C).

FINAL: (C) $CH_3O^- > C_6H_5O^- > CH_3CO_2^- > NO_3^-$

SHORTCUT / EXAM TRICK

If the lowest-priority group points toward you, read the sequence and reverse the answer.

COMMON MISTAKE

Ranking by group size instead of atomic number at the first point of difference; forgetting duplicate atoms for C=O.

EXAM TIP

Allenes with two different substituents on each end are chiral (axial), though they have no stereocentre.

MEMORY TRICK

'Clockwise = R when #4 is away'.

Why the Other Options Are Wrong

Correct answer: C

A $CH_3CO_2^- > CH_3O^- > C_6H_5O^- > NO_3^-$

Why (C) is the key — Nucleophilicity tracks basicity for the same donor atom: CH_3O^- (pK_aH 15.5) > $C_6H_5O^-$ (10) > $CH_3CO_2^-$ (4.8) > NO_3^- (−1.4). (Bank key (d) was wrong — corrected.)

B $CH_3O^- > NO_3^- > C_6H_5O^- > CH_3CO_2^-$

Ruled out: Ranking by group size instead of atomic number at the first point of difference; forgetting duplicate atoms for C=O.

D $C_6H_5O^- > CH_3O^- > NO_3^- > CH_3CO_2^-$ GATE 2015

Ruled out: Allenes with two different substituents on each end are chiral (axial), though they have no stereocentre.

Q2

Bridge-head hydrogen of the conformer of cis-decalin is positioned as

A. a, a

B. e, e

C. a, e

D. pseudo-a, pseudo-e

QUESTION INSIGHTS

ESTIMATED TIME
1–1.5 min

DIFFICULTY
Easy

CONCEPT TESTED
Stereochemistry – General

PYQ FREQUENCY
Rare · 2 papers

REVISION PRIORITY
★★★☆☆

EXPECTED LEVEL
Part B

MEMORY HOOK
'Clockwise = R when #4 is away'.

Correct Answer C a, e

CONCEPT

CIP priorities (atomic number, then outward exploration, duplicated atoms for multiple bonds); R/S with lowest priority away; E/Z for alkenes; axial chirality (allenes, biphenyls: Ra/Sa, M/P), planar chirality; meso compounds; enantiomers vs diastereomers; Fischer projection rules (even swaps keep configuration).

↓

LOGIC / WORKING

- In cis-decalin each ring is fused through one axial and one equatorial bond; the two bridgehead hydrogens are therefore one axial and one equatorial (a,e). trans-Decalin has both bridgehead H axial (a,a).
- Therefore the answer is (C).

FINAL: (C) a, e

SHORTCUT / EXAM TRICK

If the lowest-priority group points toward you, read the sequence and reverse the answer.

COMMON MISTAKE

Ranking by group size instead of atomic number at the first point of difference; forgetting duplicate atoms for C=O.

EXAM TIP

Allenes with two different substituents on each end are chiral (axial), though they have no stereocentre.

MEMORY TRICK

'Clockwise = R when #4 is away'.

Why the Other Options Are Wrong

Correct answer: C

A **a, a**

Why (C) is the key — In cis-decalin each ring is fused through one axial and one equatorial bond; the two bridgehead hydrogens are therefore one axial and one equatorial (a,e). trans-Decalin has both bridgehead H axial (a,a).

B **e, e**

Ruled out: Ranking by group size instead of atomic number at the first point of difference; forgetting duplicate atoms for C=O.

D **pseudo-a, pseudo-e**

Ruled out: Allenes with two different substituents on each end are chiral (axial), though they have no stereocentre.

Q3

The maximum number of stereoisomers possible for the compound given below is ___ (Numerical answer type — write the value.)

ANSWER: Structure is not reproduced in the question bank — count stereo elements

QUESTION INSIGHTS

ESTIMATED TIME
2–3 min

DIFFICULTY
Medium

CONCEPT TESTED
Stereochemistry – General

PYQ FREQUENCY
Rare · 2 papers

REVISION PRIORITY
★★★★☆

EXPECTED LEVEL
Part B / Part C

MEMORY HOOK
Maximum stereoisomers = 2^n, n = number of stereocentres + stereogenic double bonds, reduced by any meso forms.

Q4

The absolute of C_2 and C_3 in the following compound is

A. 2R, 3S

B. 2S, 3R

C. 2S, 3S

D. 2R, 3R

QUESTION INSIGHTS

ESTIMATED TIME
1–1.5 min

DIFFICULTY
Easy

CONCEPT TESTED
Stereochemistry – General

PYQ FREQUENCY
Rare · 2 papers

REVISION PRIORITY
★★★☆☆

EXPECTED LEVEL
Part B

MEMORY HOOK
'Clockwise = R when #4 is away'.

Correct Answer D 2R, 3R

CONCEPT

CIP priorities (atomic number, then outward exploration, duplicated atoms for multiple bonds); R/S with lowest priority away; E/Z for alkenes; axial chirality (allenes, biphenyls: Ra/Sa, M/P), planar chirality; meso compounds; enantiomers vs diastereomers; Fischer projection rules (even swaps keep configuration).

↓

LOGIC / WORKING

- C-2: Br > COOH > C-3 > H with H toward the viewer — R. C-3: OH > C-2 > CH_3 > H with H away — R. (2R,3R), option (d).
- Therefore the answer is (D).

FINAL: (D) 2R, 3R

SHORTCUT / EXAM TRICK

If the lowest-priority group points toward you, read the sequence and reverse the answer.

COMMON MISTAKE

Ranking by group size instead of atomic number at the first point of difference; forgetting duplicate atoms for C=O.

EXAM TIP

Allenes with two different substituents on each end are chiral (axial), though they have no stereocentre.

MEMORY TRICK

'Clockwise = R when #4 is away'.

Why the Other Options Are Wrong

Correct answer: D

A **2R, 3S**

Why (D) is the key — C-2: Br > COOH > C-3 > H with H toward the viewer — R. C-3: OH > C-2 > CH_3 > H with H away — R. (2R,3R), option (d).

B **2S, 3R**

Ruled out: Ranking by group size instead of atomic number at the first point of difference; forgetting duplicate atoms for C=O.

C **2S, 3S**

Ruled out: Allenes with two different substituents on each end are chiral (axial), though they have no stereocentre.

Q5

The number of possible stereoisomers obtained in the following reaction is ___ (Numerical answer type — write the value.)

ANSWER: Structure is not reproduced in the question bank — count new stereo elements in the product

QUESTION INSIGHTS

ESTIMATED TIME
2–3 min

DIFFICULTY
Medium

CONCEPT TESTED
Stereochemistry – General

PYQ FREQUENCY
Rare · 2 papers

REVISION PRIORITY
★★★★☆

EXPECTED LEVEL
Part B / Part C

MEMORY HOOK
Count stereocentres/double bonds created (and whether the reaction is stereospecific, e.g. syn-addition gives only one relative configuration).

Q6 The specific rotation of optically pure (R)-2-bromobutane is -112.00. A given sample of 2-bromobutne exhibited a specific rotation of -82.88. The percentage of (S)-(+)-enantiomer present in this sample is ___
(Numerical answer type — write the value.)

ANSWER: 13 %

QUESTION INSIGHTS

ESTIMATED TIME
2–3 min

DIFFICULTY
Medium

CONCEPT TESTED
Stereochemistry – General

PYQ FREQUENCY
Rare · 2 papers

REVISION PRIORITY
★★★★☆

EXPECTED LEVEL
Part B / Part C

MEMORY HOOK
ee = 82.88/112 = 74 % (R). S = (100 − 74)/2 = 13 %, R = 87 %.

Q7 Among the following compounds, the number of compounds that DO NOT exhibit optical activity at room temperature is ___ . (Numerical answer type — write the value.)

ANSWER: Structure is not reproduced in the question bank — look for σ-planes / i / S_4

QUESTION INSIGHTS

ESTIMATED TIME
2–3 min

DIFFICULTY
Medium

CONCEPT TESTED
Stereochemistry – General

PYQ FREQUENCY
Rare · 2 papers

REVISION PRIORITY
★★★★☆

EXPECTED LEVEL
Part B / Part C

MEMORY HOOK
Optically inactive at room temperature: meso compounds, molecules with a mirror plane or centre of inversion, and those that racemise rapidly (e.g. amines inverting at N, biphenyls with small ortho groups).

Q8

Absolute stereochemistry of the given compound is:

A. 4a-S, 8a-R

B. 4a-R, 8a-S

C. 4a-S, 8a-S

D. 4a-R, 8a-R

QUESTION INSIGHTS

ESTIMATED TIME
1–1.5 min

DIFFICULTY
Easy

CONCEPT TESTED
Stereochemistry – General

PYQ FREQUENCY
Rare · 2 papers

REVISION PRIORITY
★★★☆☆

EXPECTED LEVEL
Part B

MEMORY HOOK
'Clockwise = R when #4 is away'.

Correct Answer A 4a-S, 8a-R

CONCEPT

CIP priorities (atomic number, then outward exploration, duplicated atoms for multiple bonds); R/S with lowest priority away; E/Z for alkenes; axial chirality (allenes, biphenyls: Ra/Sa, M/P), planar chirality; meso compounds; enantiomers vs diastereomers; Fischer projection rules (even swaps keep configuration).

↓

LOGIC / WORKING

- C-8a: C-1 (C=O; O,O,C) > CHO (O,O,H) > C-4a (O,C,C) > C-8 (C,H,H). With CHO hashed (away) and the ring bonds in the plane, the 3-D arrangement gives 8aR. C-4a: OH > C-8a (C,C,C) > C-4 (its next atom C-3 is sp^2) > C-5. With OH hashed (away), the arrangement gives 4aS. Hence 4aS, 8aR — option (a).
- Therefore the answer is (A).

FINAL: (A) 4a-S, 8a-R

SHORTCUT / EXAM TRICK

If the lowest-priority group points toward you, read the sequence and reverse the answer.

COMMON MISTAKE

Ranking by group size instead of atomic number at the first point of difference; forgetting duplicate atoms for C=O.

EXAM TIP

Allenes with two different substituents on each end are chiral (axial), though they have no stereocentre.

MEMORY TRICK

'Clockwise = R when #4 is away'.

Why the Other Options Are Wrong

Correct answer: A

B **4a-R, 8a-S**

Why (A) is the key — C-8a: C-1 (C=O; O,O,C) > CHO (O,O,H) > C-4a (O,C,C) > C-8 (C,H,H). With CHO hashed (away) and the ring bonds in the plane, the 3-D arrangement gives 8aR. C-4a: OH > C-8a (C,C,C) > C-4 (its next atom C-3 is sp^2) > C-5. With OH hashed (away), the arrangement gives 4aS. Hence 4aS, 8aR — option (a).

C **4a-S, 8a-S**

Ruled out: Ranking by group size instead of atomic number at the first point of difference; forgetting duplicate atoms for C=O.

D **4a-R, 8a-R**

Ruled out: Allenes with two different substituents on each end are chiral (axial), though they have no stereocentre.

Q9 **Among the following eight compounds, $(H_3C)_2C=C=CHBr$ The number of compound(s) which can exhibit stereoisomerism is ___ . 2 GOC GATE 2000**
(Numerical answer type — write the value.)

ANSWER: Structure is not reproduced in the question bank — $(H_3C)_2C=C=CHBr$ itself is NOT stereoisomeric

QUESTION INSIGHTS

ESTIMATED TIME
2–3 min

DIFFICULTY
Medium

CONCEPT TESTED
Stereochemistry – General

PYQ FREQUENCY
Rare · 2 papers

REVISION PRIORITY
★★★★☆

EXPECTED LEVEL
Part B / Part C

MEMORY HOOK
Allenes show axial chirality only when both termini bear two different groups; $(H_3C)_2C=C=CHBr$ has two identical CH_3 on one end, so it is achiral and has no E/Z. Check each other compound for stereocentres, stereogenic C=C or axial chirality.

Q10

Among the following, the correct statement concerning the optical activity is:

A. A molecule containing two or more chiral centres is always optically active

B. A molecule containing just one chiral centres is always optically active

C. A molecule possessing alternating axis of symmetry is optically active

D. An optically active molecule should have at least one chiral centre

QUESTION INSIGHTS

ESTIMATED TIME
1–1.5 min

DIFFICULTY
Easy

CONCEPT TESTED
Stereochemistry – General

PYQ FREQUENCY
Rare · 2 papers

REVISION PRIORITY
★★★☆☆

EXPECTED LEVEL
Part B

MEMORY HOOK
'Clockwise = R when #4 is away'.

Correct Answer B A molecule containing just one chiral centres is always optically active

CONCEPT

CIP priorities (atomic number, then outward exploration, duplicated atoms for multiple bonds); R/S with lowest priority away; E/Z for alkenes; axial chirality (allenes, biphenyls: Ra/Sa, M/P), planar chirality; meso compounds; enantiomers vs diastereomers; Fischer projection rules (even swaps keep configuration).

↓

LOGIC / WORKING

- A single stereocentre always makes a molecule chiral, hence optically active. Two or more centres can give a meso form (a false); an S_n axis makes a molecule achiral (c false); allenes and biphenyls are optically active without any stereocentre (d false). Chapter list · Next in chapter →
- Therefore the answer is (B).

FINAL: (B) A molecule containing just one chiral centres is always optically active

SHORTCUT / EXAM TRICK

If the lowest-priority group points toward you, read the sequence and reverse the answer.

COMMON MISTAKE

Ranking by group size instead of atomic number at the first point of difference; forgetting duplicate atoms for C=O.

EXAM TIP

Allenes with two different substituents on each end are chiral (axial), though they have no stereocentre.

MEMORY TRICK

'Clockwise = R when #4 is away'.

Why the Other Options Are Wrong

Correct answer: B

A **A molecule containing two or more chiral centres is always optically active**

Why (B) is the key — A single stereocentre always makes a molecule chiral, hence optically active. Two or more centres can give a meso form (a false); an S_n axis makes a molecule achiral (c false); allenes and biphenyls are optically active without any stereocentre (d false). Chapter list · Next in chapter →

C **A molecule possessing alternating axis of symmetry is optically active**

Ruled out: Ranking by group size instead of atomic number at the first point of difference; forgetting duplicate atoms for C=O.

D **An optically active molecule should have at least one chiral centre**

Ruled out: Allenes with two different substituents on each end are chiral (axial), though they have no stereocentre.

Q11

The maximum number of stereoisomers possible for 4-phenylbut-3-en-2-ol is

A 1

B 2

C 3

D 4

QUESTION INSIGHTS

ESTIMATED TIME
1–1.5 min

DIFFICULTY
Easy

CONCEPT TESTED
Stereochemistry – General

PYQ FREQUENCY
Rare · 2 papers

REVISION PRIORITY
★★★☆☆

EXPECTED LEVEL
Part B

MEMORY HOOK
'Clockwise = R when #4 is away'.

Correct Answer D 4

CONCEPT

CIP priorities (atomic number, then outward exploration, duplicated atoms for multiple bonds); R/S with lowest priority away; E/Z for alkenes; axial chirality (allenes, biphenyls: Ra/Sa, M/P), planar chirality; meso compounds; enantiomers vs diastereomers; Fischer projection rules (even swaps keep configuration).

↓

LOGIC / WORKING

- PhCH=CH–CH(OH)CH_3: one stereocentre (C2) and one stereogenic double bond (E/Z) → $2^2 = 4$ stereoisomers.
- Therefore the answer is (D).

FINAL: (D) 4

SHORTCUT / EXAM TRICK

If the lowest-priority group points toward you, read the sequence and reverse the answer.

COMMON MISTAKE

Ranking by group size instead of atomic number at the first point of difference; forgetting duplicate atoms for C=O.

EXAM TIP

Allenes with two different substituents on each end are chiral (axial), though they have no stereocentre.

MEMORY TRICK

'Clockwise = R when #4 is away'.

Why the Other Options Are Wrong

Correct answer: D

A

1

Why (D) is the key — PhCH=CH–CH(OH)CH_3: one stereocentre (C2) and one stereogenic double bond (E/Z) → $2^2 = 4$ stereoisomers.

B

2

Ruled out: Ranking by group size instead of atomic number at the first point of difference; forgetting duplicate atoms for C=O.

C

3

Ruled out: Allenes with two different substituents on each end are chiral (axial), though they have no stereocentre.

Q12

Which of the following is achiral?

A. Alanine

B. Glycine

C. Proline

D. Phenylalanine

QUESTION INSIGHTS

ESTIMATED TIME
1–1.5 min

DIFFICULTY
Easy

CONCEPT TESTED
Stereochemistry – General

PYQ FREQUENCY
Rare · 2 papers

REVISION PRIORITY
★★★☆☆

EXPECTED LEVEL
Part B

MEMORY HOOK
'Clockwise = R when #4 is away'.

Correct Answer B Glycine

CONCEPT

CIP priorities (atomic number, then outward exploration, duplicated atoms for multiple bonds); R/S with lowest priority away; E/Z for alkenes; axial chirality (allenes, biphenyls: Ra/Sa, M/P), planar chirality; meso compounds; enantiomers vs diastereomers; Fischer projection rules (even swaps keep configuration).

↓

LOGIC / WORKING

- Glycine ($H_2N–CH_2–COOH$) has two H on the α-carbon — no stereocentre, achiral. The others are L-amino acids with one stereocentre.
- Therefore the answer is (B).

FINAL: (B) Glycine

SHORTCUT / EXAM TRICK

If the lowest-priority group points toward you, read the sequence and reverse the answer.

COMMON MISTAKE

Ranking by group size instead of atomic number at the first point of difference; forgetting duplicate atoms for C=O.

EXAM TIP

Allenes with two different substituents on each end are chiral (axial), though they have no stereocentre.

MEMORY TRICK

'Clockwise = R when #4 is away'.

Why the Other Options Are Wrong

Correct answer: B

A **Alanine**

Why (B) is the key — Glycine ($H_2N–CH_2–COOH$) has two H on the α-carbon — no stereocentre, achiral. The others are L-amino acids with one stereocentre.

C **Proline**

Ruled out: Ranking by group size instead of atomic number at the first point of difference; forgetting duplicate atoms for C=O.

D **Phenylalanine**

Ruled out: Allenes with two different substituents on each end are chiral (axial), though they have no stereocentre.

Q13

Benzene and Dewar benzene are

A. Canonical forms

B. Structural isomers

C. Tautomers

D. Conformational isomers

QUESTION INSIGHTS

ESTIMATED TIME
2–3 min

DIFFICULTY
Medium

CONCEPT TESTED
Stereochemistry – General

PYQ FREQUENCY
Rare · 2 papers

REVISION PRIORITY
★★★★☆

EXPECTED LEVEL
Part B / Part C

MEMORY HOOK
'Clockwise = R when #4 is away'.

Correct Answer B Structural isomers

CONCEPT

CIP priorities (atomic number, then outward exploration, duplicated atoms for multiple bonds); R/S with lowest priority away; E/Z for alkenes; axial chirality (allenes, biphenyls: Ra/Sa, M/P), planar chirality; meso compounds; enantiomers vs diastereomers; Fischer projection rules (even swaps keep configuration).

↓

LOGIC / WORKING

- Dewar benzene (bicyclo[2.2.0]hexa-2,5-diene) has a different connectivity (a transannular σ-bond) from benzene — they are constitutional (structural) isomers, not resonance forms.
- Therefore the answer is (B).

FINAL: (B) Structural isomers

SHORTCUT / EXAM TRICK

If the lowest-priority group points toward you, read the sequence and reverse the answer.

COMMON MISTAKE

Ranking by group size instead of atomic number at the first point of difference; forgetting duplicate atoms for C=O.

EXAM TIP

Allenes with two different substituents on each end are chiral (axial), though they have no stereocentre.

MEMORY TRICK

'Clockwise = R when #4 is away'.

Why the Other Options Are Wrong

Correct answer: B

A — **Canonical forms**

Why (B) is the key — Dewar benzene (bicyclo[2.2.0]hexa-2,5-diene) has a different connectivity (a transannular σ-bond) from benzene — they are constitutional (structural) isomers, not resonance forms.

C — **Tautomers**

Ruled out: Ranking by group size instead of atomic number at the first point of difference; forgetting duplicate atoms for C=O.

D — **Conformational isomers**

Ruled out: Allenes with two different substituents on each end are chiral (axial), though they have no stereocentre.

Q14

The number of all possible isomers for the molecular formula C_6H_{14} is ____.
(Numerical answer type — write the value.)

ANSWER: 5

QUESTION INSIGHTS

ESTIMATED TIME
1–1.5 min

DIFFICULTY
Easy

CONCEPT TESTED
Stereochemistry – General

PYQ FREQUENCY
Rare · 2 papers

REVISION PRIORITY
★★★☆☆

EXPECTED LEVEL
Part B

MEMORY HOOK
C_6H_{14}: hexane, 2-methylpentane, 3-methylpentane, 2,2-dimethylbutane, 2,3-dimethylbutane.

Q15 **Among the following, the number of molecules that possess C_2 axis of symmetry is ___. BF_3 $CHCl_3$ 2,5-dimethylthiophene (Numerical answer type — write the value.)**

ANSWER: 2 (of the three listed)

QUESTION INSIGHTS

ESTIMATED TIME
2–3 min

DIFFICULTY
Medium

CONCEPT TESTED
Stereochemistry – General

PYQ FREQUENCY
Rare · 2 papers

REVISION PRIORITY
★★★★☆

EXPECTED LEVEL
Part B / Part C

MEMORY HOOK
BF_3 (D_{3h}) has three C_2 axes; 2,5-dimethylthiophene (C_{2v}) has a C_2 through S; $CHCl_3$ (C_{3v}) has no C_2. (Any further structures in the original question are not reproduced.)

Q16

The number of compounds having S-configuration among the following is ___ . (Numerical answer type — write the value.)

ANSWER: Structure is not reproduced in the question bank — assign CIP priorities

QUESTION INSIGHTS

ESTIMATED TIME
2–3 min

DIFFICULTY
Medium

CONCEPT TESTED
Stereochemistry – General

PYQ FREQUENCY
Rare · 2 papers

REVISION PRIORITY
★★★★☆

EXPECTED LEVEL
Part B / Part C

MEMORY HOOK
Rank the four groups by CIP priority, view with the lowest-priority group away; anticlockwise 1→2→3 = S, clockwise = R.

Q17

Among the dimethylcyclohexanes, which one can be obtained in enantiopure form? (a) (b) (c) (d)

SELF-PRACTICE answer on record: (A) — options were not printed in the source.

QUESTION INSIGHTS

ESTIMATED TIME
1–1.5 min

DIFFICULTY
Easy

CONCEPT TESTED
Stereochemistry – General

PYQ FREQUENCY
Rare · 2 papers

REVISION PRIORITY
★★★☆☆

EXPECTED LEVEL
Part B

MEMORY HOOK
'Clockwise = R when #4 is away'.

Q18

The number of stereoisomers possible for the following compound is ____ .
(Numerical answer type — write the value.)

ANSWER: Structure is not reproduced in the question bank — 2^n minus meso forms

QUESTION INSIGHTS

ESTIMATED TIME
2–3 min

DIFFICULTY
Medium

CONCEPT TESTED
Stereochemistry – General

PYQ FREQUENCY
Rare · 2 papers

REVISION PRIORITY
★★★★☆

EXPECTED LEVEL
Part B / Part C

MEMORY HOOK
n = stereocentres + stereogenic C=C; divide out meso/identical forms for symmetric molecules.

Q19

The number of gauche-butane interaction(s) in the following compound is ___ .
(Numerical answer type — write the value.)

ANSWER: Structure is not reproduced in the question bank — count axial substituents × ring interactions

QUESTION INSIGHTS

ESTIMATED TIME
2–3 min

DIFFICULTY
Medium

CONCEPT TESTED
Stereochemistry – General

PYQ FREQUENCY
Rare · 2 papers

REVISION PRIORITY
★★★★☆

EXPECTED LEVEL
Part B / Part C

MEMORY HOOK
On a chair each axial substituent has two gauche-butane interactions with ring C3/C5 carbons; an equatorial substituent has none; adjacent equatorial–equatorial substituents add one more gauche interaction.

Q20 **(R)-2-methyl-1-butanol has a specific rotation of +13.5^°. The specific rotation of 2-methyl-1-butanol containing 40% of the (S)-enantiomer is ___^°. (Round off to one decimal place)**
(Numerical answer type — write the value.)

ANSWER: +2.7°

QUESTION INSIGHTS

ESTIMATED TIME
2–3 min

DIFFICULTY
Medium

CONCEPT TESTED
Stereochemistry – General

PYQ FREQUENCY
Rare · 2 papers

REVISION PRIORITY
★★★★☆

EXPECTED LEVEL
Part B / Part C

MEMORY HOOK
40 % S + 60 % R → ee = 20 % R. [α] = 0.20 × (+13.5°) = +2.7°.

Q21 The dihedral (torsional) angle (in degrees) between the two methyl groups in the most stable conformation of n-butane is ___ (Round off to nearest integer) (Numerical answer type — write the value.)

ANSWER: 180

QUESTION INSIGHTS

ESTIMATED TIME
2–3 min

DIFFICULTY
Medium

CONCEPT TESTED
Stereochemistry – General

PYQ FREQUENCY
Rare · 2 papers

REVISION PRIORITY
★★★★☆

EXPECTED LEVEL
Part B / Part C

MEMORY HOOK
The anti conformer of n-butane (methyls anti-periplanar, dihedral 180°) is the global minimum; gauche (60°) is ~0.9 kcal mol⁻¹ higher.

Q22

Total number of constitutional isomers possible for trimethyl cyclohexane is ___. (Numerical answer type — write the value.)

ANSWER: 6

QUESTION INSIGHTS

ESTIMATED TIME
2–3 min

DIFFICULTY
Medium

CONCEPT TESTED
Stereochemistry – General

PYQ FREQUENCY
Rare · 2 papers

REVISION PRIORITY
★★★★☆

EXPECTED LEVEL
Part B / Part C

MEMORY HOOK
Trimethylcyclohexane constitutional isomers: 1,1,2-; 1,1,3-; 1,1,4-; 1,2,3-; 1,2,4-; 1,3,5- → 6 (stereoisomers not counted).

Q23 For the molecule, mathrmCH_3-CH=CH-CH(OH)-CH=CH-CH=C$(CH_3)_2$ the number of all possible stereoisomers is _____. (Numerical answer type — write the value.)

ANSWER: 8

QUESTION INSIGHTS

ESTIMATED TIME
2–3 min

DIFFICULTY
Medium

CONCEPT TESTED
Stereochemistry – General

PYQ FREQUENCY
Rare · 2 papers

REVISION PRIORITY
★★★★☆

EXPECTED LEVEL
Part B / Part C

MEMORY HOOK
Stereo elements: C2=C3 (E/Z), C4 stereocentre, C5=C6 (E/Z); the C7=C$(CH_3)_2$ end has two identical methyls (no E/Z). $2^3 = 8$ stereoisomers.

TOPIC REVISION

Stereochemistry – General

23 PYQs · Last-minute revision

TOPIC SUMMARY

CIP priorities (atomic number, then outward exploration, duplicated atoms for multiple bonds); R/S with lowest priority away; E/Z for alkenes; axial chirality (allenes, biphenyls: Ra/Sa, M/P), planar chirality; meso compounds; enantiomers vs diastereomers; Fischer projection rules (even swaps keep configuration).

IMPORTANT FORMULA SHEET

- Max stereoisomers = 2^n (fewer with meso forms)
- Fischer: horizontal = toward viewer; two swaps = same configuration; lowest priority horizontal → reverse the read
- Specific rotation $[\alpha] = \alpha/(l\ c)$

FREQUENTLY ASKED CONCEPTS

- Assign R/S, E/Z in tricky cases (isotopes, rings)
- Count stereoisomers
- Identify meso, enantiomer, diastereomer pairs
- Allene chirality

COMMON MISTAKES & QUICK NOTES

Watch out:
Ranking by group size instead of atomic number at the first point of difference; forgetting duplicate atoms for C=O.
Allenes with two different substituents on each end are chiral (axial), though they have no stereocentre.

MOST-REPEATED PYQs & EXPECTED IN EXAM

PYQs in this topic: Q1 Q2 Q3 Q4 Q5 Q6 Q7 Q8 Q9 Q10 Q11 Q12 Q13 Q14 …

Expect 12 question(s) next session on Stereochemistry – General.

FOR STUDENTS AND EDUCATORS

Government Jobs and Examination News

Keep track of every notification in one place.

Government Jobs

- Latest vacancies
- By category
- By state
- Exams
- Chemistry jobs
- Government Jobs Blog

Scan to Explore

4ab.in/government-jobs

Examination News

- Latest updates
- Exam calendar
- Admit cards
- Results
- UG entrance exams
- PG entrance exams
- NET, SET & PhD exams
- School board exams
- Examination News Blog

Scan to Explore

4ab.in/examination-news

Vacancies, admit cards, results and exam dates: all in one place

FOR EDUCATORS

Teach from the Question Bank, one question at a time

Find the right questions, teach them in class, then take them with you.

1 Find questions

- Browse
- Question search
- Topic packs

2 Teach one by one

Question Bank

Show each question to students on the board, in your own order.

3 Export

PPTX, DOCX, PNG (zip), HTML, Markdown

Take the paper home after class.

Scan to open Question Bank

4ab.in/educators/?m=qb

Many more coming soon

My papers

Social groups

Question Paper Analyser

AI question paper generator

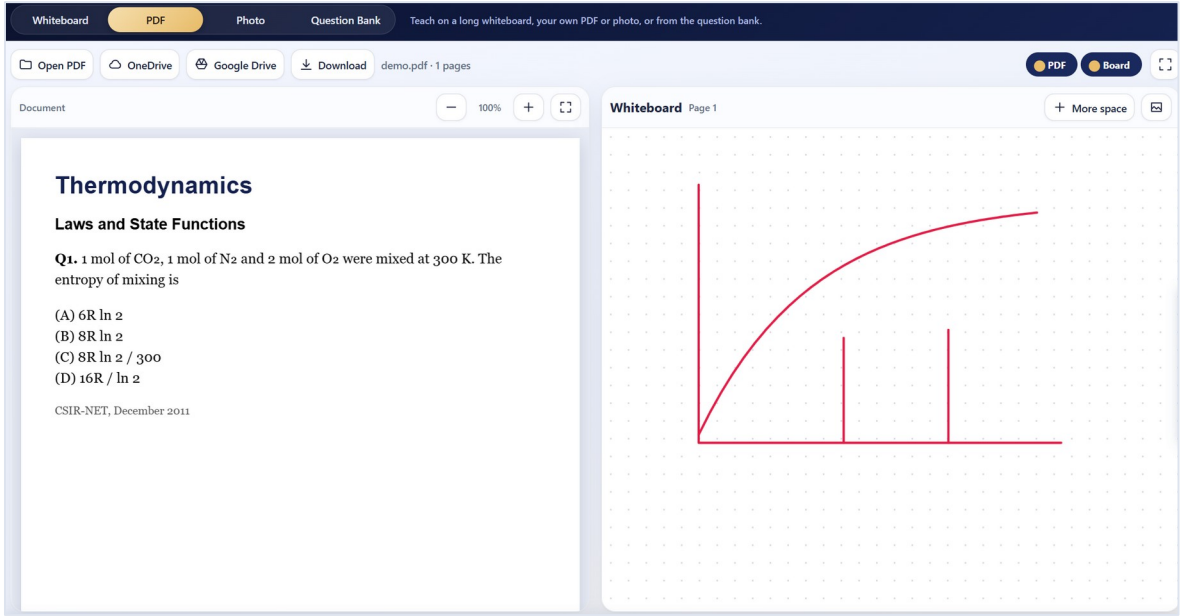
Paid

Lifetime free for educators, except AI tools

TUTOR-BRANDED TEACHING TOOLS

Free whiteboard for educators

Teach on a long whiteboard, your own PDF or photo, or from the question bank.



Start teaching

4ab.in/educators

Need more room? Add more space to the board as you teach.

Tutor pages show a small "Powered by 4AB" line. Premium removes it.

Whiteboard | **PDF** | **Photo** | **Question Bank**

EXPLORE AND USE

Chemistry Labs: symmetry and crystals

Scan a code or click a card to open the tool.

Molecular Symmetry

Explore molecular symmetry

4ab.in/molecular-symmetry/

Molecular Point Groups

Learn molecular point groups

4ab.in/molecular-point-groups/

Crystal Structure

Explore crystal structures

4ab.in/crystal-structure/

Crystal Space Groups

Browse crystal space groups

4ab.in/crystal-space-groups/

EXPLORE AND USE

Chemistry Labs: elements, calculation and drawing

Scan a code or click a card to open the tool.

Periodic Table

Explore the elements

4ab.in/periodic-table/

Chemistry Calculator

Solve chemistry calculations

4ab.in/chemistry-calculator/

Chemistry Typing

Type chemistry text

4ab.in/chemistry-typing/

Structure Editor

Draw structures

4ab.in/educators/draw/

Explore free educator tools

Mr. Aniket Bhardwaj

ABC Chemistry

9212142427

4ab.in/educators

@abcchemistry24 · Instagram · YouTube · Facebook

Scan to explore