



CrackingCHEM

GCSE | A-LEVEL

UNDERSTAND • APPLY • SUCCEED

OCR A H432

Introduction to Organic Chemistry II

Original exam questions | TEST IT → EXAM STYLE → HARDER MIXED → STRETCH

SPECIFICATION-LED. PROGRESSIVE. DIAGRAM-PRECISE.

OCR A SPECIFICATION	4.1.1(f-i) + 4.1.3(c-d) Fission, radicals, mechanisms and stereoisomerism		
TEST IT	EXAM STYLE	HARDER MIXED	STRETCH
8	10	4	1
23 QUESTIONS ORIGINAL		176 MARKS TOTAL	

FINAL SPECIFICATION-ALIGNED EDITION | ELECTRON MOVEMENT • E/Z • CIP

Independent practice material. Every question is original and mapped to OCR A Chemistry A H432 specification version 3.1 (May 2026).



START HERE

How to use this pack

Follow the electrons first; assign the stereochemical label only after the priorities are secure

- 1 Complete TEST IT without notes. Repair definitions before moving to the applications.
- 2 For mechanisms: mark dipoles, identify the electron-pair source, draw the full curly arrow, then audit atoms, valency and charge.
- 3 For E/Z: check eligibility on both alkene carbons, assign CIP priorities, compare the two winners, then label or draw the isomer.
- 4 Use the worked answers to find exactly which mark was lost. Redraw every faulty arrow or stereochemical structure yourself.

OCR A BOUNDARY

This pack covers 4.1.1(f–i) and 4.1.3(c–d): bond fission, radicals, full curly arrows, generic mechanism notation, stereoisomerism, E/Z, cis-trans as a special case and CIP priorities.

HELD BACK

Named reactions, reaction conditions and full family-specific mechanisms for alkanes, alkenes, haloalkanes and alcohols are taught in their later units. Half-curly arrows are not required here.

MECHANISM RULE

A full curly arrow starts at a bond, lone pair or negative charge and ends at the atom or position receiving the electron pair. A roughly placed arrow is not enough.

E/Z RULE

Each alkene carbon must carry two different groups. Rank by atomic number, move outward only when there is a tie, then use Z for same-side winners and E for opposite-side winners.

DIAGRAM
STANDARD

All printed structures use equal bond lengths and clear geometry. In your own drawings, keep groups visibly above or below the C=C and do not let bond lines cross atom labels.



SECTION A

TEST IT

Eight direct checks of the finished-notes mastery outcomes

QUESTION 1

TEST IT

(a) Define homolytic fission in terms of the two electrons in a covalent bond.

[2 marks]

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(b) Define heterolytic fission in terms of the two electrons in a covalent bond.

[2 marks]

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(c) Write the products of homolytic fission of Br–Br. Show every required radical dot.

[2 marks]

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(d) Write the products of heterolytic fission of H–I and state which atom receives the bonding pair.

[2 marks]

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QUESTION 2

TEST IT

(a) Define a radical.

[1 mark]

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(b) Add every required radical dot to both equations: $\text{Br}_2 \rightarrow 2\text{Br}$ and $\text{Br} + \text{C}_2\text{H}_6 \rightarrow \text{HBr} + \text{C}_2\text{H}_5$.

[3 marks]

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(c) In the second equation, identify the radical consumed and the radical formed.

[2 marks]

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(d) State how OCR represents a radical mechanism at this stage.

[1 mark]

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QUESTION 3

TEST IT

(a) State what a full curly arrow represents.

[1 mark]

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(b) State the three places from which OCR allows a full curly arrow to start.

[3 marks]

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(c) When a C-I bond breaks heterolytically, state exactly where the arrow starts and where it finishes.

[2 marks]

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(d) Explain why an arrow beginning in empty space cannot earn the mechanism mark.

[1 mark]

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QUESTION 4

TEST IT

Complete the generic mechanism. Nu^- is an electron-pair donor; R is an organic group; X receives the R-X bonding pair.

Complete the electron-pair movement and products



(a) Draw both full curly arrows from their exact electron sources.

[2 marks]

(b) Add the relevant dipoles to the R-X bond.

[2 marks]

(c) Draw the products and state the overall charge on each side.

[3 marks]

COMPLETE THE PRINTED MECHANISM ABOVE OR REDRAW IT HERE



QUESTION 5

TEST IT

(a) Define structural isomers.

[2 marks]

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(b) Define stereoisomers.

[2 marks]

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(c) Explain the single feature that distinguishes the two definitions.

[2 marks]

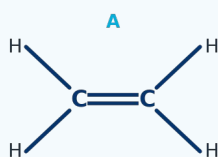
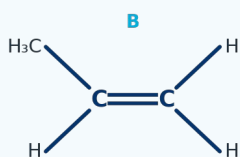
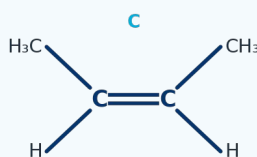
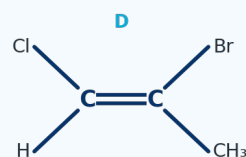
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QUESTION 6

TEST IT

The four alkenes A–D are shown. Determine whether each alkene can show E/Z isomerism.



(a) State YES or NO for A, B, C and D.

[4 marks]

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(b) For one YES and one NO answer, justify your decision by referring to the groups attached to each carbon of the C=C bond.

[3 marks]

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QUESTION 7

TEST IT

(a) State the first rule used to assign Cahn–Ingold–Prelog priority.

[2 marks]

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(b) In each pair, state the higher-priority group: H / CH₃; CH₃ / CH₂CH₃; CH₂OH / CH₂CH₃; Cl / CH₃.

[4 marks]

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(c) Explain what is meant by the first point of difference.

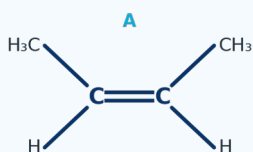
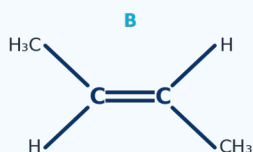
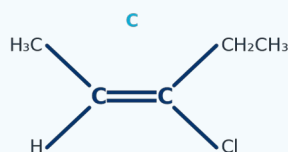
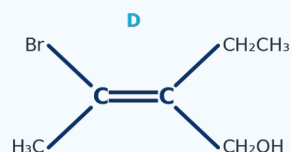
[1 mark]

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QUESTION 8

TEST IT

Assign E or Z to each structure A–D. State cis or trans as well only where that label is valid.



(a) Give the E/Z label for A, B, C and D.

[4 marks]

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(b) Identify every structure for which cis/trans terminology is valid, and give the cis/trans label.

[2 marks]

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(c) Explain why E does not automatically mean trans for every alkene.

[2 marks]

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SECTION B

EXAM STYLE

Ten original structured questions using OCR A command words and marking logic

QUESTION 9

EXAM STYLE

Hydrogen iodide undergoes heterolytic fission. The polarity and products are shown, but the electron movement is missing.



(a) Draw the full curly arrow in the correct position. [1 mark]

(b) Explain why the arrow starts at the H–I bond and ends on I. [2 marks]

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(c) Confirm that atom count and total charge are conserved. [2 marks]

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(d) State the type of bond fission. [1 mark]

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QUESTION 10

EXAM STYLE

A student writes the following two equations without radical dots: $\text{Cl}_2 \rightarrow 2\text{Cl}$ and $\text{Cl} + \text{C}_2\text{H}_6 \rightarrow \text{HCl} + \text{C}_2\text{H}_5$.

- (a) Rewrite both equations with every required radical dot. [3 marks]

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- (b) Identify the species that carries the unpaired electron before and after the second equation. [2 marks]

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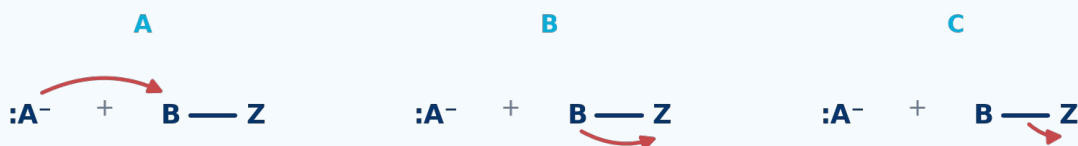
- (c) Explain why the equations, not full curly arrows, are used for this radical sequence in this OCR unit. [1 mark]

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QUESTION 11

EXAM STYLE

Three proposed full curly arrows are shown. Judge the exact origin of each arrow; do not judge only the likely product.



- (a) State which diagrams have a valid arrow origin. [2 marks]

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- (b) For each invalid diagram, identify the precise error and state the exact correction. [3 marks]

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- (c) State the electron-pair movement represented in diagram C. [2 marks]

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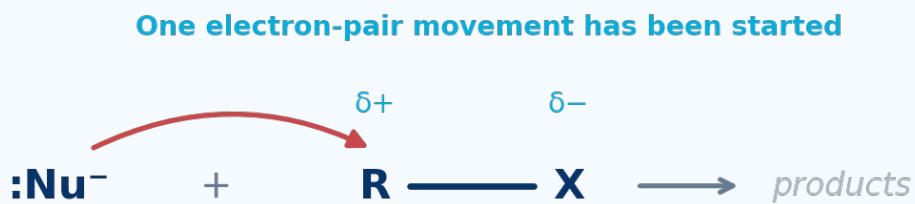
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QUESTION 12

EXAM STYLE

One arrow has been started in the generic mechanism below.



(a) Draw the second full curly arrow and complete the products.

[3 marks]

(b) Explain what each arrow does to a covalent bond.

[2 marks]

(c) State the total charge before and after the reaction.

[2 marks]



QUESTION 13

EXAM STYLE

For each pair, decide whether the compounds are structural isomers, stereoisomers or the same compound.

PAIR	STRUCTURE 1	STRUCTURE 2
A	$\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_3$	$\text{CH}_3\text{CH}(\text{CH}_3)\text{CH}_3$
B	(E)-but-2-ene	(Z)-but-2-ene
C	$\text{CH}_3\text{CH}_2\text{OH}$	$\text{CH}_3\text{CH}_2\text{OH}$ drawn in reverse

(a) Classify pairs A, B and C.

[3 marks]

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(b) For A and B, justify your decision using molecular formula, connectivity and spatial arrangement.

[4 marks]

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QUESTION 14

EXAM STYLE

3-methylpent-2-ene can form two E/Z stereoisomers.

(a) State why this compound satisfies the condition for E/Z isomerism.

[2 marks]

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(b) Draw both stereoisomers using clear displayed structures around the C=C bond. Label each E or Z.

[4 marks]

DRAW BOTH ISOMERS; KEEP ALL FOUR SUBSTITUENT BONDS EQUAL IN LENGTH

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(c) State the higher-priority group on each alkene carbon.

[2 marks]

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QUESTION 15

EXAM STYLE

For each pair of groups, determine which has higher CIP priority. Show the comparison used.

PAIR	GROUP 1	GROUP 2
A	NH ₂	CH ₃
B	CH ₂ Br	CH ₂ Cl
C	CH(CH ₃) ₂	CH ₂ CH ₃
D	CH ₂ OH	CH ₂ CH ₃

(a) State the higher-priority group in A–D.

[4 marks]

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(b) For B, C and D, explain how the first point of difference decides the priority.

[4 marks]

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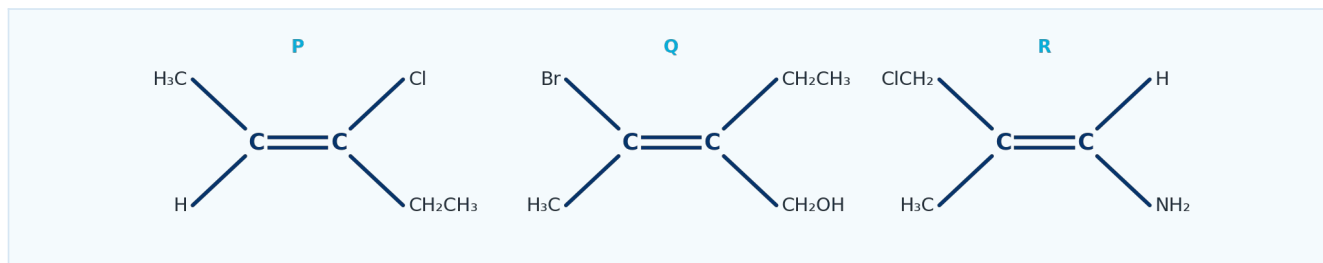
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QUESTION 16

EXAM STYLE

Determine the configuration of each alkene P–R.



(a) State the higher-priority group on each alkene carbon in P, Q and R.

[6 marks]

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(b) Assign E or Z to P, Q and R.

[2 marks]

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EXAM STYLE

[2 marks]

- [2 marks]

[4 marks]

[2 marks]

EXAM STYLE

[4 marks]

- [4 marks]

[4 marks]

DRAW BOTH ISOMERS; BR OUTRANKS CL AND CH₃ OUTRANKS H



SECTION C

HARDER MIXED

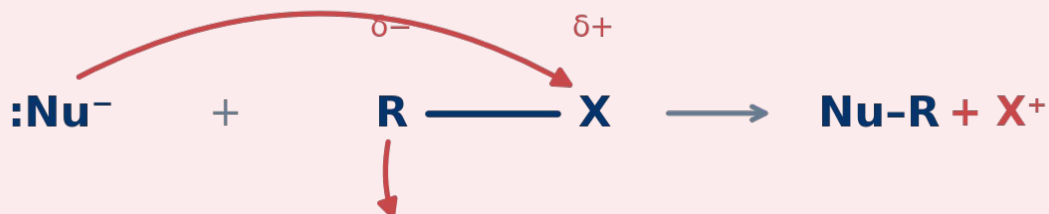
Four less-scaffolded applications combining electron movement and stereochemical reasoning

QUESTION 19

HARDER MIXED

A student proposes the generic mechanism shown. The drawing is neat, but four chemical conventions are wrong.

Student's proposed mechanism



(a) Identify four distinct errors in the diagram.

[4 marks]

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(b) Redraw the complete mechanism correctly, including dipoles, arrow origins, products and charges.

[4 marks]

CORRECTED MECHANISM

(c) State why a plausible product cannot compensate for an incorrectly placed curly arrow.

[1 mark]

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QUESTION 20

HARDER MIXED

Consider the three bond-breaking statements below.

CASE	STATEMENT
A	A–A gives two A• species
B	D–E gives D ⁺ and E [–]
C	F–G gives F [–] and G ⁺

(a) Classify each case as homolytic or heterolytic fission.

[3 marks]

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(b) For B and C, state where a full curly arrow must start and finish.

[4 marks]

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(c) Explain why a full curly arrow is not the OCR requirement for case A.

[1 mark]

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HARDER MIXED

structure S

The diagram shows a central carbon-carbon double bond (C=C). The left carbon is bonded to a chlorine atom (Cl) and an ethyl group (CH₃CH₂). The right carbon is bonded to a methyl group (CH₃) and a hydroxymethyl group (CH₂OH). The substituents are arranged in a trans configuration across the double bond.

CC(Cl)=C(C)CO



QUESTION 22

HARDER MIXED

For each alkene, determine whether E/Z isomerism is possible and hence the number of E/Z stereoisomers.

ALKENE	CONDENSED STRUCTURE
A	$\text{CH}_2=\text{C}(\text{CH}_3)_2$
B	$\text{CH}_3\text{CH}=\text{CHCH}_3$
C	$\text{CH}_3\text{CH}=\text{CCl}_2$
D	$\text{CHCl}=\text{CBrCH}_2\text{CH}_3$

(a) Complete the decision for A–D and state the number of E/Z stereoisomers for each.

[4 marks]

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(b) For each NO answer, identify the alkene carbon that carries two identical groups.

[2 marks]

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(c) Explain why the two stereoisomers of B have the same molecular formula and connectivity but are still different compounds.

[3 marks]

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SECTION D

STRETCH / SYNOPTIC

One final problem connecting precise mechanism notation with E/Z construction

QUESTION 23

STRETCH

A revision card contains two unfinished tasks. Complete both without using any named organic reaction.

- (a) For $:\text{Nu}^- + \text{R}\delta^+ - \text{X}\delta^-$, draw a complete two-arrow generic mechanism and both products. State the total charge before and after. [5 marks]

GENERIC MECHANISM: SHOW BOTH ELECTRON-PAIR MOVEMENTS

- (b) An alkene has CH_2OH and H on one carbon of $\text{C}=\text{C}$, and Cl and CH_2CH_3 on the other. Explain why E/Z isomerism is possible and identify the higher-priority group on each carbon. [3 marks]

- (c) Draw both stereoisomers and label each E or Z. Cis/trans labels are not required. [3 marks]

DRAW BOTH STEREOISOMERS WITH EQUAL SUBSTITUENT-BOND LENGTHS



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OCR A H432

Introduction to Organic Chemistry II

Worked answers and OCR-style marking guidance

SPECIFICATION-LED. PROGRESSIVE. DIAGRAM-PRECISE.

OCR A SPECIFICATION	4.1.1(f-i) + 4.1.3(c-d) Fission, radicals, mechanisms and stereoisomerism		
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OCR A MAP

How this pack matches the specification

Full coverage of 4.1.1(f-i) and 4.1.3(c-d), with later organic reaction content held back

OCR A AREA	WHAT IS ASSESSED	FREQUENT TRAP	QUESTIONS
4.1.1(f)	Homolytic and heterolytic fission in terms of the bonding pair.	Describing products without accounting for both electrons.	1, 9, 20, 23
4.1.1(g)	Radical definition, dot notation and balanced radical equations.	Omitting a dot from any species with one unpaired electron.	2, 10, 20
4.1.1(h-i)	Full curly arrows, exact origins and destinations, dipoles and generic mechanisms.	Starting in empty space or on the wrong atom.	3, 4, 9, 11, 12, 19, 23
4.1.3(c)	Stereoisomers, E/Z eligibility, CIP priorities and cis/trans as a special case.	Guessing by visual size or treating E as automatically trans.	5-8, 13-17, 21-23
4.1.3(d)	Determine and draw possible E/Z and cis/trans stereoisomers.	Changing connectivity while trying to change spatial arrangement.	8, 14, 16-18, 21, 23
BOUNDARY	No named haloalkane, alkane, alkene or alcohol reactions are required. Every mechanism question uses generic notation or bond-fission ideas already taught in the finished notes.		
MARKING LOGIC	Mechanism marks belong to precise electron movement. E/Z marks belong to eligibility, CIP comparison and the relative positions of the two higher-priority groups.		



SECTION A

TEST IT ANSWERS

Exact definitions, notation and direct stereochemical checks

QUESTION 1 | TEST IT ANSWER

8 MARKS

(a)

- One electron from the bonding pair goes to each bonded atom [2]

(b)

- Both electrons from the bonding pair go to one of the bonded atoms [2]

(c)

- $\text{Br}-\text{Br} \rightarrow \text{Br}\cdot + \cdot\text{Br}$; one visible radical dot on each Br species [2]

(d)

- $\text{H}-\text{I} \rightarrow \text{H}^+ + \text{I}^-$ [1]
- I receives the bonding pair [1]

EXAMINER GUIDANCE

Homolytic and heterolytic describe the allocation of the two bonding electrons. 'The bond splits equally' is too vague without electrons.

QUESTION 2 | TEST IT ANSWER

7 MARKS

(a)

- A radical is a species with an unpaired electron [1]

(b)

- $\text{Br}_2 \rightarrow 2\text{Br}\cdot$ [1]
- $\text{Br}\cdot + \text{C}_2\text{H}_6 \rightarrow \text{HBr} + \text{C}_2\text{H}_5\cdot$; both required dots are present in the second equation [2]

(c)

- $\text{Br}\cdot$ is consumed [1]
- $\text{C}_2\text{H}_5\cdot$ is formed [1]

(d)

- As a sequence of balanced equations [1]



QUESTION 3 | TEST IT ANSWER

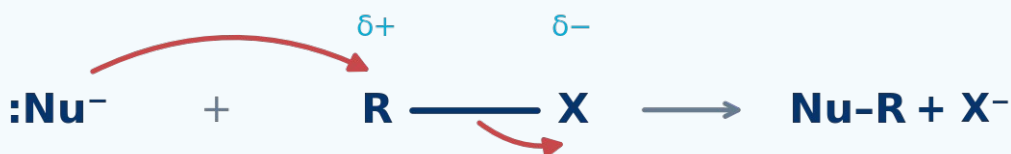
7 MARKS

- (a)
- Movement of an electron pair [1]
- (b)
- A covalent bond [1]
 - A lone pair [1]
 - A negative charge [1]
- (c)
- The arrow tail starts at the centre of the C-I bond [1]
 - The arrowhead finishes on I [1]
- (d)
- An arrow must identify a real electron-pair source; empty space contains no pair to move [1]

QUESTION 4 | TEST IT ANSWER

7 MARKS

Model mechanism



Both full curly arrows start at electron pairs; the bond-breaking arrow finishes on X.

- Arrow from the Nu⁻ lone pair / negative charge to R [1]
- Arrow from the centre of the R-X bond to X [1]
- R is δ⁺ [1]
- X is δ⁻ [1]
- Nu-R is drawn as one product [1]
- X⁻ is the other product [1]
- Total charge is -1 on both sides [1]



QUESTION 5 | TEST IT ANSWER

6 MARKS

- (a)
- Same molecular formula [1]
 - Different structural formula / different connectivity [1]
- (b)
- Same structural formula / same connectivity [1]
 - Different arrangement of atoms in space [1]
- (c)
- Structural isomers differ in connectivity [1]
 - Stereoisomers retain connectivity and differ only in spatial arrangement [1]

QUESTION 6 | TEST IT ANSWER

7 MARKS

- A: NO [1]
- B: NO [1]
- C: YES [1]
- D: YES [1]
- For a YES example, each carbon of the C=C carries two different groups [1]
- For a NO example, at least one carbon of the C=C carries two identical groups [1]
- The justification identifies the relevant alkene carbon and repeated / different groups [1]

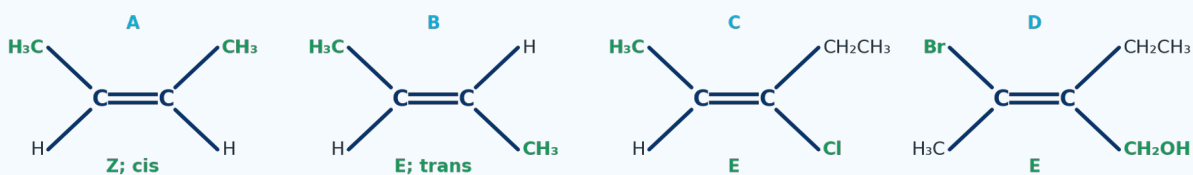
QUESTION 7 | TEST IT ANSWER

7 MARKS

- (a)
- The atom directly attached with the higher atomic number has higher priority [2]
- (b)
- CH₃ over H [1]
 - CH₂CH₃ over CH₃ [1]
 - CH₂OH over CH₂CH₃ [1]
 - Cl over CH₃ [1]
- (c)
- When directly attached atoms tie, compare the next atoms outward until the first unequal pair decides the priority [1]

QUESTION 8 | TEST IT ANSWER

8 MARKS



Green groups are the higher-priority group on each carbon of the C=C bond.

- A is Z; B is E; C is E; D is E [4]
- A is cis and B is trans [2]
- C and D do not contain one suitable repeated substituent on both alkene carbons [1]
- E compares the two CIP winners; trans compares positions of a repeated group [1]



SECTION B

EXAM STYLE ANSWERS

Worked routes and OCR-style marking guidance

QUESTION 9 | EXAM STYLE ANSWER

6 MARKS



- The full curly arrow runs from the H-I bond to I [1]
- The bonding pair is the electron source [1]
- I receives both electrons [1]
- One H atom and one I atom occur on each side [1]
- Total charge is zero on each side [1]
- Heterolytic fission [1]

QUESTION 10 | EXAM STYLE ANSWER

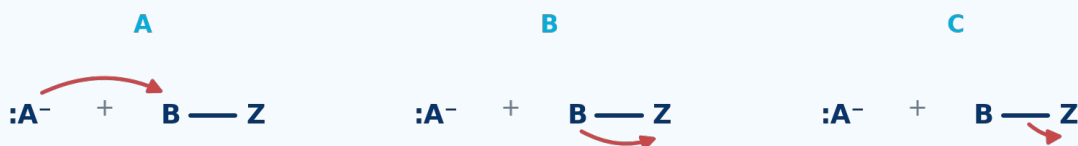
6 MARKS

- $\text{Cl}_2 \rightarrow 2\text{Cl}\cdot$ [1]
- $\text{Cl}\cdot + \text{C}_2\text{H}_6 \rightarrow \text{HCl} + \text{C}_2\text{H}_5\cdot$, with both radical dots correctly placed [2]
- $\text{Cl}\cdot$ carries the unpaired electron before the second equation [1]
- $\text{C}_2\text{H}_5\cdot$ carries it after the second equation [1]
- OCR represents this radical sequence as balanced equations rather than full curly arrows [1]



QUESTION 11 | EXAM STYLE ANSWER

7 MARKS

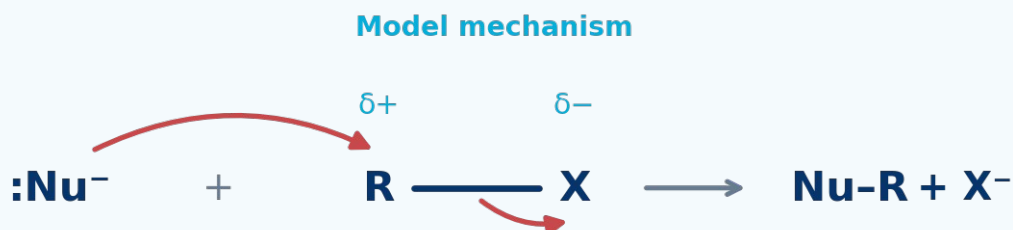


- A has a valid origin at the lone pair / negative charge [1]
- C has a valid origin at the B-Z bond [1]
- B is invalid because its arrow starts on atom B rather than on the bonding pair [1]
- Move the tail to the centre of the B-Z bond [1]
- Keep the arrowhead on Z, the atom receiving the pair [1]
- In C, the B-Z bonding pair moves to Z [1]
- The movement causes heterolytic bond fission [1]

EXAMINER GUIDANCE A correct destination does not rescue an invalid origin. The tail is part of the chemical information.

QUESTION 12 | EXAM STYLE ANSWER

7 MARKS



- Second arrow starts at the R-X bond and finishes on X [1]
- Products are Nu-R and X^- [2]
- The first arrow forms the Nu-R covalent bond [1]
- The second arrow breaks R-X heterolytically [1]
- Reactant-side total charge is -1 [1]
- Product-side total charge is -1 [1]



QUESTION 13 | EXAM STYLE ANSWER

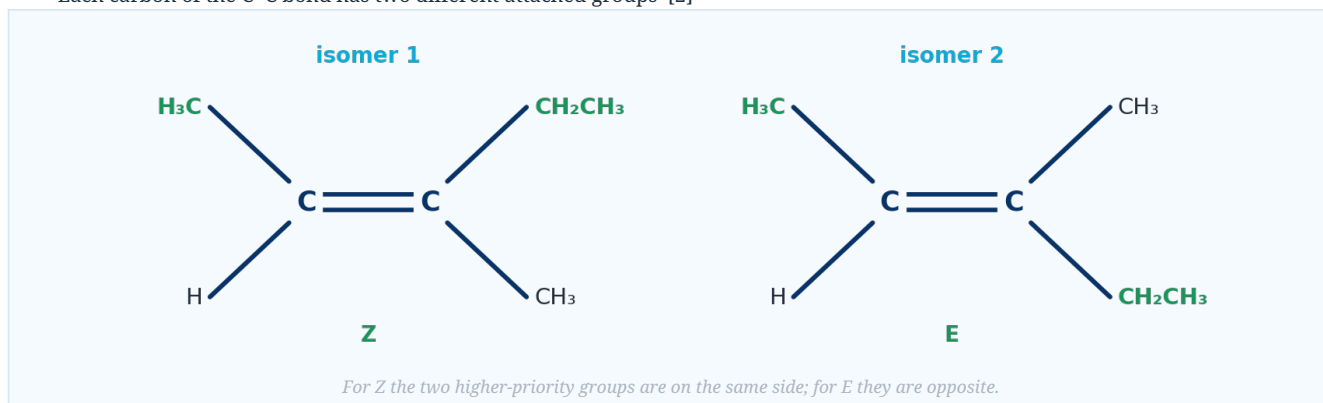
7 MARKS

- A: structural isomers [1]
- B: stereoisomers [1]
- C: the same compound [1]
- A has the same molecular formula [1]
- A has different carbon connectivity [1]
- B has the same connectivity [1]
- B has a different spatial arrangement about C=C [1]

QUESTION 14 | EXAM STYLE ANSWER

8 MARKS

- Each carbon of the C=C bond has two different attached groups [2]



- Correct Z structure with unchanged connectivity [2]
- Correct E structure with unchanged connectivity [2]
- On carbon 2, CH₃ has higher priority than H [1]
- On carbon 3, CH₂CH₃ has higher priority than CH₃ [1]



QUESTION 15 | EXAM STYLE ANSWER

8 MARKS

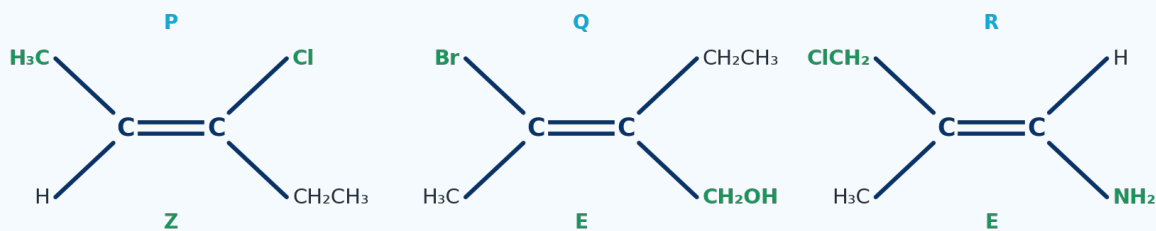
- A: NH_2 [1]
- B: CH_2Br [1]
- C: $\text{CH}(\text{CH}_3)_2$ [1]
- D: CH_2OH [1]
- B: the first atoms tie as C; Br has a higher atomic number than Cl at the next comparison [1]
- C: compare [C, C, H] with [C, H, H]; C beats H at the first difference [1]
- D: compare [O, H, H] with [C, H, H]; O beats C [1]
- The comparison moves outward only after the directly attached atoms tie [1]

EXAMINER GUIDANCE

Write the directly attached atoms first. If they tie, compare the next attached-atom sets in decreasing atomic number and stop at the first difference.

QUESTION 16 | EXAM STYLE ANSWER

8 MARKS



- P priorities: CH_3 and Cl [2]
- Q priorities: Br and CH_2OH [2]
- R priorities: CH_2Cl and NH_2 [2]
- Configurations: P is Z, Q is E and R is E [2]

EXAMINER GUIDANCE

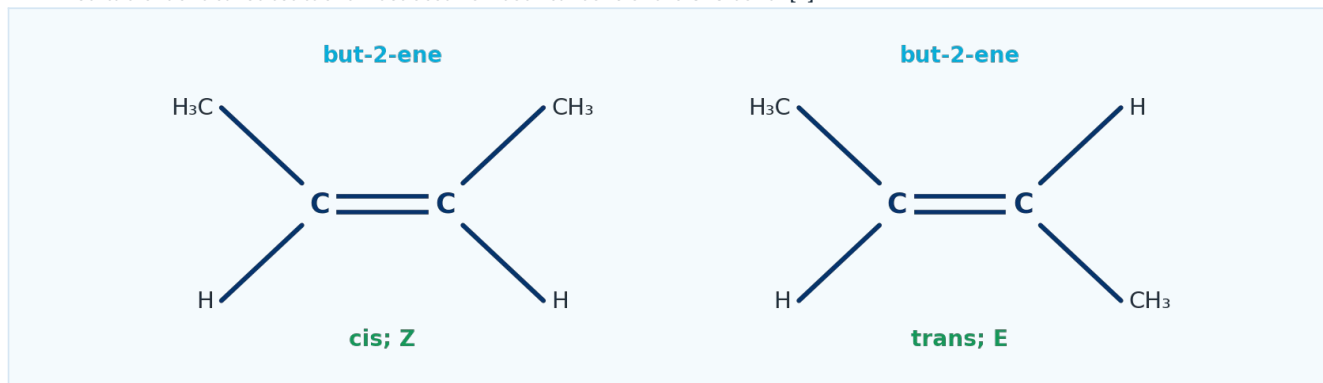
Assign both priorities before looking at the drawing as same-side or opposite-side. Visual size is never the priority rule.



QUESTION 17 | EXAM STYLE ANSWER

8 MARKS

- A suitable identical substituent must occur on both carbons of the C=C bond [2]

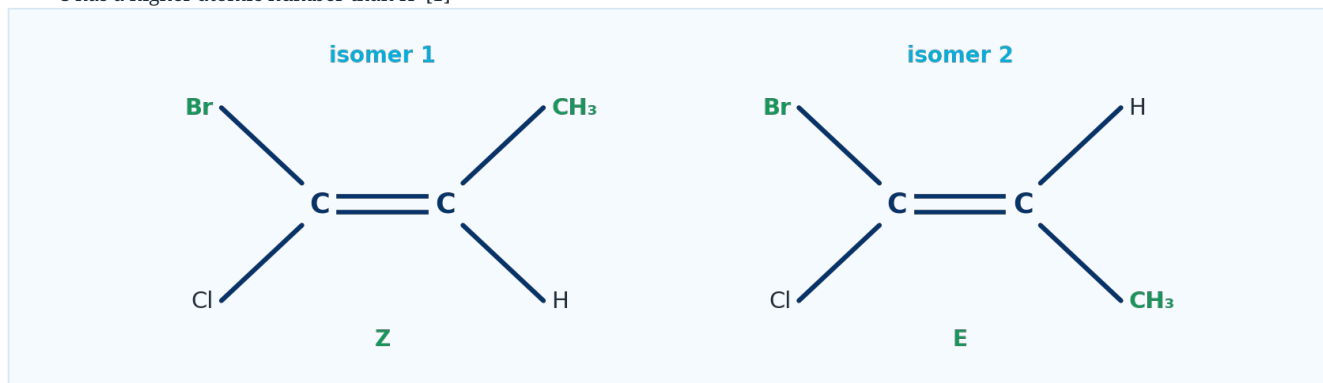


- Correct cis-but-2-ene structure labelled Z [2]
- Correct trans-but-2-ene structure labelled E [2]
- Four different substituents still allow two different groups on each alkene carbon, so E/Z can apply [1]
- No identical substituent is available on both alkene carbons, so cis/trans cannot apply [1]

QUESTION 18 | EXAM STYLE ANSWER

8 MARKS

- On carbon 1, Br has higher priority than Cl [1]
- Br has the higher atomic number: 35 compared with 17 [1]
- On carbon 2, CH₃ has higher priority than H [1]
- C has a higher atomic number than H [1]



- Correct Z structure and label [2]
- Correct E structure and label [2]



SECTION C

HARDER MIXED ANSWERS

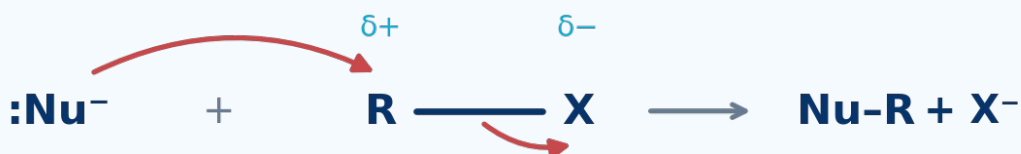
Less-scaffolded reasoning with explicit marking chains

QUESTION 19 | HARDER MIXED ANSWER

9 MARKS

- Any four distinct faults: the R/X dipoles are reversed; arrow 1 ends on X rather than R; arrow 2 does not start at the R-X bond; arrow 2 does not finish on X; the product charge on X is wrong [4]

Model mechanism

*One fully correct redraw.*

- Correct $\text{R}^{\delta+}-\text{X}^{\delta-}$ polarity [1]
- Arrow from Nu^- lone pair / negative charge to R [1]
- Arrow from the R-X bond to X [1]
- Products Nu-R and X^- with conserved charge [1]
- A curly-arrow mark reports exact electron-pair movement, not merely the identity of the final product [1]



QUESTION 20 | HARDER MIXED ANSWER

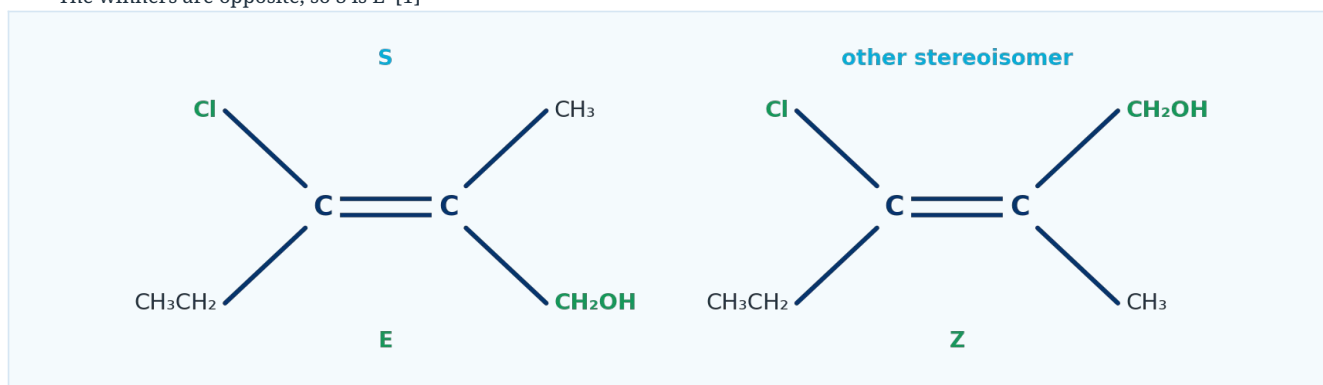
8 MARKS

- A is homolytic [1]
- B is heterolytic [1]
- C is heterolytic [1]
- B: arrow starts at the D–E bond [1]
- B: arrow finishes on E [1]
- C: arrow starts at the F–G bond [1]
- C: arrow finishes on F [1]
- Case A is represented using radical dots / a balanced radical equation; OCR does not require half-curly arrows [1]

QUESTION 21 | HARDER MIXED ANSWER

9 MARKS

- On the left carbon, Cl outranks CH_2CH_3 because Cl has the greater atomic number [2]
- On the right carbon, the first atoms tie as C; CH_2OH gives [O, H, H] while CH_3 gives [H, H, H], so CH_2OH wins [2]
- The winners are opposite, so S is E [1]



- Other isomer preserves all four groups and the same connectivity [1]
- The two higher-priority groups are placed on the same side [1]
- Correctly labelled Z [1]
- All substituent bonds are clear and attached to the correct alkene carbon [1]



QUESTION 22 | HARDER MIXED ANSWER

9 MARKS

- A: NO; 0 E/Z stereoisomers [1]
- B: YES; 2 E/Z stereoisomers [1]
- C: NO; 0 E/Z stereoisomers [1]
- D: YES; 2 E/Z stereoisomers [1]
- A fails because the CH_2 alkene carbon carries two H groups [1]
- C fails because one alkene carbon carries two Cl groups [1]
- The B stereoisomers have the same molecular formula [1]
- They have the same connectivity / structural formula [1]
- They differ in spatial arrangement about the restricted $\text{C}=\text{C}$ bond [1]

EXAMINER GUIDANCE

Decision audit: check both groups on the left alkene carbon, then both on the right. One repeated pair is enough to prevent E/Z isomerism.

EXAMINER GUIDANCE

Do not count E and Z as structural isomers. Their connectivity is unchanged; only the spatial arrangement differs.



SECTION D

STRETCH / SYNOPTIC ANSWER

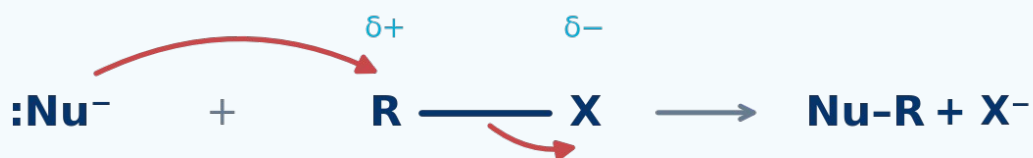
A final model linking two independent OCR A skills

QUESTION 23 | STRETCH ANSWER

11 MARKS

(a)

Model mechanism

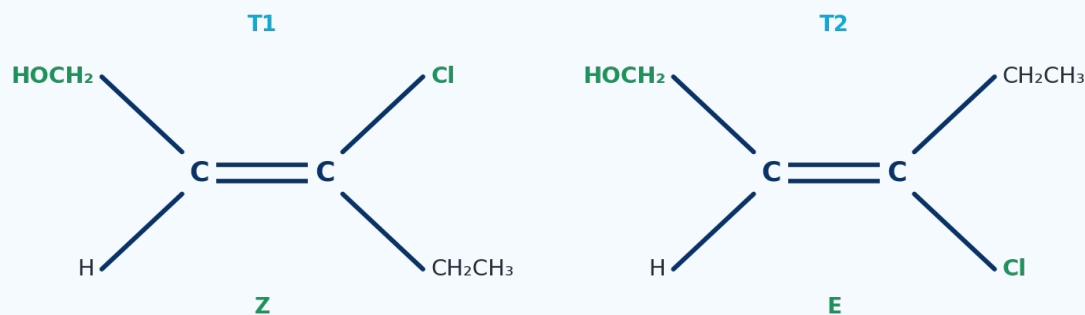


- Arrow from the :Nu^- lone pair / negative charge to R [1]
- Arrow from the R-X bond to X [1]
- Nu-R is formed [1]
- X^- is formed [1]
- Total charge is -1 before and after [1]

(b)

- Each carbon of the C=C carries two different groups [1]
- CH_2OH has higher priority than H on the first carbon [1]
- Cl has higher priority than CH_2CH_3 on the second carbon [1]

(c)



- Both structures preserve the stated connectivity and place the groups correctly [2]
- Same-side winners labelled Z and opposite-side winners labelled E [1]

EXAMINER GUIDANCE

Cis/trans is not available because there is no common substituent group on both alkene carbons.