

Basics of Organic Chemistry

Answers and mark scheme for OCR Chemistry A (H432) practice

Specification focus	Total marks
4.1.1(b)-(d): organic formulae, core organic terminology and use of general formulae.	60

Marking follows the intended learning points rather than official OCR mark-scheme wording. Equivalent chemically correct answers should be credited unless a specific representation is required.

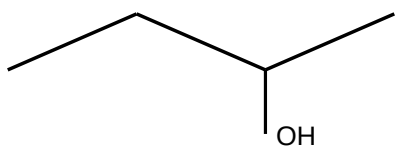
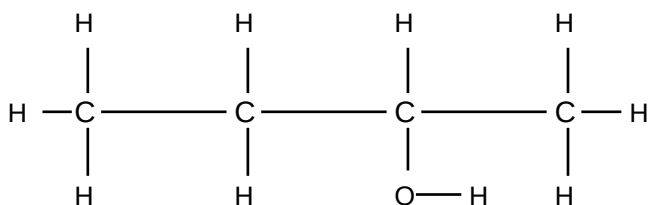
Question 1

Question	Answer	Marks	Guidance
1(a)	A: general formula B: structural formula C: displayed formula D: skeletal formula	4	1 mark for each correct identification.
1(b)	It is the formula of one particular member / one molecule, not an algebraic formula that represents every member of the series.	1	Accept any clear distinction between a specific molecular formula and an algebraic general formula.
1(c)	Skeletal formula	1	

Question 2

Question	Answer	Marks	Guidance
2(a)	Displayed formula corresponding to $\text{CH}_3\text{CH}_2\text{CH}(\text{OH})\text{CH}_3$, with every atom and every bond shown.	2	1 mark for correct carbon chain/connectivity; 1 mark for all H atoms and O-H bond shown.
2(b)	Correct line-angle formula for a four-carbon chain with OH attached to the second carbon from either end.	2	1 mark for correct carbon skeleton; 1 mark for OH at the correct carbon and no C-H labels.
2(c)	$\text{CH}_3\text{CH}_2\text{CH}(\text{CH}_3)\text{CH}_2\text{CH}_3$	2	1 mark for correct five-carbon main chain; 1 mark for the methyl branch / correct complete structural formula.
2(d)	6	1	Count every line end and vertex, including the branch end.

Reference sketches for 2(a) and 2(b):



Question 3

Question	Answer	Marks	Guidance
3(a)	CH ₃ COOH	1	The carboxyl group should be written as COOH in a structural formula.
3(b)	COO	1	
3(c)	A displayed formula shows all bonds / all atoms and the bonds between them.	1	Do not require a memorised definition.
3(d)	CH ₃ CH ₂ CH ₂ CH ₃ and CH ₃ (CH ₂) ₂ CH ₃	2	1 mark each. Accept equivalent unambiguous structural formulae for the same straight four-carbon chain.
3(e)	Functional groups / atoms other than omitted H atoms on carbon must remain shown.	1	Accept a clear statement that functional groups are retained.

Question 4

Question	Answer	Marks	Guidance
4(a)	A series of organic compounds with the same functional group, with each successive member differing by CH ₂ .	2	1 mark for same functional group; 1 mark for successive members differing by CH ₂ .
4(b)	Any two from: same OH group / same functional group; each successive formula differs by CH ₂ ; formulae follow the same pattern / general formula.	2	Maximum 2.
4(c)	C ₅ H ₁₁ OH	1	Accept C ₅ H ₁₂ O if written as a molecular formula.
4(d)	C ₃ H ₆ / three CH ₂ units	1	Second to fifth member is three steps.

Question 5

Question	Answer	Marks	Guidance
5(a)	A, B and D	1	All are non-aromatic carbon/hydrogen structures; aliphatic includes non-aromatic rings.
5(b)	B	1	
5(c)	C	1	
5(d)	C and D	1	Aromatic rings count as unsaturated in the specification terminology.
5(e)	A and B	1	
5(f)	C_4H_9	1	Substitute $n = 4$ into C_nH_{2n+1} .
5(g)	Functional group	1	
5(h)	An alkyl group or another fragment of an organic molecule that is not involved in the reaction.	1	Accept alkyl group / rest of the molecule / organic fragment.

Question 6

Question	Answer	Marks	Guidance
6(a)	C_7H_{16}	1	
6(b)	C_6H_{12}	1	
6(c)	$C_5H_{11}Cl$	1	
6(d)	$C_4H_{10}O$	1	
6(e)	C_8H_{14}	1	
6(f)	$C_3H_8O_2$	1	
6(g)	$C_{12}H_{25}Br$	1	
6(h)	$C_{15}H_{30}O$	1	

Question 7

Question	Answer	Marks	Guidance
7(a)	Yes. For $n = 8$, $H = 2n + 2 = 18$, so the formula is C_8H_{18} .	2	1 mark for substitution/calculation; 1 mark for correct conclusion.
7(b)	No. For $n = 6$, $H = 2n = 12$, so a member would be C_6H_{12} , not C_6H_{10} .	2	1 mark for expected hydrogen count; 1 mark for correct conclusion.
7(c)	$2n + 1 = 15$, so $n = 7$; formula $C_7H_{15}Cl$.	2	1 mark for $n = 7$; 1 mark for complete formula.
7(d)	5	1	n is the number of carbon atoms in the given formula.

Question 8

Question	Answer	Marks	Guidance
8(a)	7	1	Count six carbons along the zig-zag chain plus one branch carbon.
8(b)	$CH_3CH=C(CH_3)CH_2CH_2CH_3$	2	1 mark for correct connectivity around $C=C$; 1 mark for complete structural formula including branch.
8(c)	C_7H_{14}	1	
8(d)	Unsaturated	1	The structure contains a $C=C$ bond.
8(e)	Aliphatic	1	It is not aromatic and is not a ring.
8(f)	No	1	Hydrogen atoms bonded to carbon are omitted in skeletal formulae.

Question 9

Question	Answer	Marks	Guidance
9(a)	$C_{10}H_{22}$	1	
9(b)	$C_6H_{14}O$	1	
9(c)	CH_2	1	Each successive member differs by CH_2 .
9(d)	It gives only the numbers of each type of atom; it does not show how the atoms are arranged / connected.	1	
9(e)	Aromatic	1	A compound containing a benzene ring is aromatic.

Coverage summary

Specification area	Main questions	Marks
Formula types and representations (4.1.1(b))	1-3, 8, 9(d)	26
Core terminology / homologous series (4.1.1(c))	4-5, 8(d-f), 9(c,e)	19
Using general formulae (4.1.1(d))	4(c-d), 6-7, 9(a-c)	15
TOTAL		60