Pearson Edexcel

Mark Scheme (Results)

Summer 2025

Pearson Edexcel International GCSE In Chemistry (4WSD4) Unit 4C

Edexcel and BTEC Qualifications

Edexcel and BTEC qualifications are awarded by Pearson, the UK's largest awarding body. We provide a wide range of qualifications including academic, vocational, occupational and specific programmes for employers. For further information visit our qualifications websites at www.edexcel.com or www.btec.co.uk. Alternatively, you can get in touch with us using the details on our contact us page at www.edexcel.com/contactus.

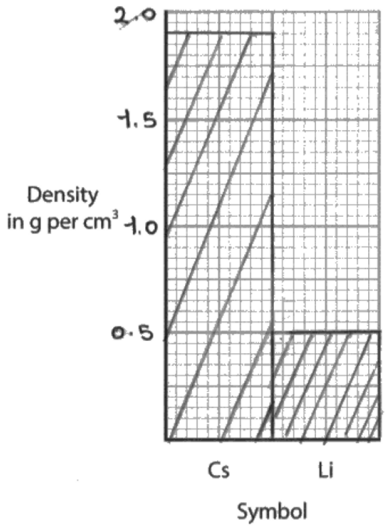
Pearson: helping people progress, everywhere

Pearson aspires to be the world's leading learning company. Our aim is to help everyone progress in their lives through education. We believe in every kind of learning, for all kinds of people, wherever they are in the world. We've been involved in education for over 150 years, and by working across 70 countries, in 100 languages, we have built an international reputation for our commitment to high standards and raising achievement through innovation in education. Find out more about how we can help you and your students at: www.pearson.com/uk

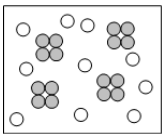
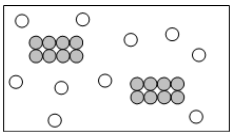
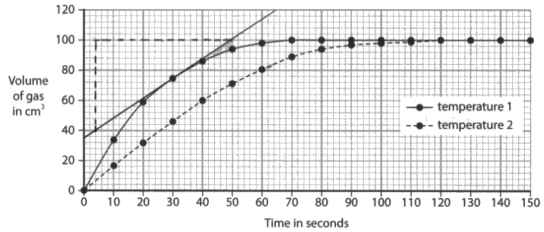
Summer 2025
Question Paper Log Number P81759A
Publications Code 4WSD4_1C_2506_MS

General Marking Guidance

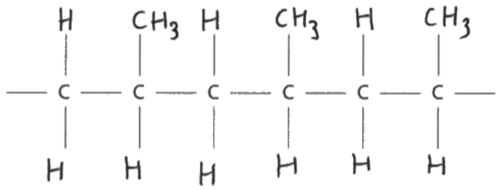
- All candidates must receive the same treatment. Examiners must mark the first candidate in exactly the same way as they mark the last.
- Mark schemes should be applied positively. Candidates must be rewarded for what they have shown they can do rather than penalised for omissions.
- Examiners should mark according to the mark scheme not according to their perception of where the grade boundaries may lie.
- There is no ceiling on achievement. All marks on the mark scheme should be used appropriately.
- All the marks on the mark scheme are designed to be awarded. Examiners should always award full marks if deserved, i.e. if the answer matches the mark scheme. Examiners should also be prepared to award zero marks if the candidate's response is not worthy of credit according to the mark scheme.
- Where some judgement is required, mark schemes will provide the principles by which marks will be awarded and exemplification may be limited.
- When examiners are in doubt regarding the application of the mark scheme to a candidate's response, the team leader must be consulted.
- Crossed out work should be marked UNLESS the candidate has replaced it with an alternative response.

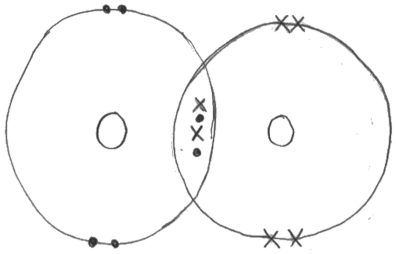
Question number	Answer	Notes	Marks
1 (a) (i)	caesium		1
(ii)	sodium		1
(b)	**M1** add (rubidium) to water **M2** effervescence / fizzing	 **ALLOW** burns with a (coloured) flame **ALLOW** solution turns blue/purple with universal indicator **IGNORE** floats on water **IGNORE** hydrogen or alkali produced	2
(c) (i)	 **M1** appropriate scale on y axis **M2** bars correctly drawn for Cs and Li	 **ALLOW** +/- 1 square	2
(ii)	a value between 0.8 and 1.6 inclusive		1
			Total 7

Question number	Answer	Notes	Marks
2 (a)	**A** (diamond) *B is not the correct structure as a fullerene only has 3 bonds per atom* *C is not the correct structure as graphite only has 3 bonds per atom and is in layers* *D is not the correct structure as methane is a simple molecule*		1
(b)	**M1** (pairs of) electrons are shared **M2** electrostatic attraction between electrons and nuclei		2
(c)	Any **one** of the following: • does not conduct electricity • hard	**ACCEPT** colourless / transparent **IGNORE** density	1
(d)	**M1** ice is a simple (molecular) structure **M2** weak intermolecular forces (between water molecules) **M3** carbon is a giant (covalent) structure **M4** many/strong (covalent) bonds (between atoms) **M5** the energy to overcome forces in ice is less than in carbon	**ACCEPT** ice consists of small molecules	5
(e)	**M1** heat the ice **M2** the melting point will be 0 °C **OR** the boiling point will be 100 °C	**ACCEPT** melt / boil the ice	2
			Total 11

Question number	Answer	Notes	Marks
3 (a) (i)	**B**  *A is not correct as it would decrease the rate of reaction.* *C is not correct as it would decrease the rate of reaction.* *D is not correct as it would decrease the rate of reaction.*		1
(ii)	**D**  *A is not correct as it would increase the rate of reaction.* *B is not correct as it would increase the rate of reaction.* *C is not correct as it would increase the rate of reaction.*		1
(b) (i)	**M1** reaction takes a greater amount of time to complete **M2** temperature has decreased / is lower so must be 25 °C	**ACCEPT** (gradient of the) graph is less steep **ACCEPT** lower rate of reaction	2
(ii)	 **M1** tangent drawn on graph for temperature 1	tangent line spans at least 10-50 seconds	1

(iii)	**M1** readings taken from tangent and calculation **M2** value in the range of 1.2 to 1.4 (cm^3 per second)	step y ÷ step x e.g. (100 – 40) ÷ (50 – 4)	2
(iv)	**M1** rate doubles three times / $\times 2^3$ **M2** answer from (iii) $\times$ 8 e.g. (1.3 x 8 =) 10.4 (cm^3 per second)	**ACCEPT** (increase/difference of) 30 °C **ALLOW** ECF from (iii) **ALLOW** use of 1.3 as instead to answer from (iii) value in the range of 9.6 to 11.2 (cm^3 per second) scores 2 marks	2
(v)	**M1** reaction is too fast at 65 °C to take (volume / time) measurements accurately **M2** reaction is too slow at -5 °C so reaction will take too long (to complete) **M3** (most) <u>particles</u> have high (kinetic) energy at higher temperature/65 °C **AND** have low (kinetic) energy at lower temperature/ -5 °C **M4** collisions (between particles) are more frequent at higher temperature/65 °C **AND** are less frequent at lower temperature/-5 °C	**ACCEPT** too fast to observe / monitor / collect gas **ACCEPT** volume of gas collected is too small **ACCEPT** no reaction **observed** **ALLOW** higher / lower energy **ACCEPT** (most) particles have energy (equal to or) greater than activation energy at 65 °C / higher temperature **AND** energy less than activation energy at -5 °C / lower temperature **ACCEPT** collisions per unit time	4
			Total 13

Question number	Answer	Notes	Marks
4 (a)	**M1** for C_3H_8, $M_r = 44$ **AND** for C_3H_6, $M_r = 42$ **M2** 6 600 000 ÷ 44 × 42 **M3** 6.3×10^6 (g)	**ACCEPT** conversion to standard form at any point **ACCEPT** 6 300 000 correct answer without working scores 3	3
(b) (i)	addition		1
(ii)	 **M1** CH_3 (or displayed formula) on alternate carbon atoms **M2** rest of molecule correct	**ACCEPT** CH_3 groups on carbon positions 1, 4, and 5 **OR** carbon positions 2, 3 and 5 **OR** carbon positions 1, 3 and 6	2
(iii)	**M1** (causes an) increase in global temperature / global warming **M2** contributes to climate change	**ACCEPT** acts as a greenhouse gas **ACCEPT** glaciers melting, forest fires, flooding	2
(iv)	Any one of the following: • non-biodegradable / does not biodegrade • remains in environment for a very long time • shortage of land		1
			Total 9

Question number	Answer	Notes	Marks
5 (a)	relights a glowing splint		1
(b)	 **M1** four electrons shown between the two atoms **M2** rest of diagram correct	**ALLOW** any combination of dots and crosses	2
(c) (i)	**M1** 230 × (21 ÷ 100) **M2** 100 – 48.3 **M3** 52	**ACCEPT** 48.3 **ACCEPT** 51.7 correct answer without working scores 3	3
(ii)	$4Fe + 3O_2 \rightarrow 2Fe_2O_3$ **M1** left-hand side of the equation **M2** right-hand side of the equation	**ACCEPT** multiples	2
(iii)	<table><tr><th>Ion</th><th>Number of these ions in Fe_3O_4</th></tr><tr><td>Fe^{+}</td><td>0</td></tr><tr><td>Fe^{2+}</td><td>1</td></tr><tr><td>Fe^{3+}</td><td>2</td></tr><tr><td>Fe^{4+}</td><td>0</td></tr><tr><td>Fe^{5+}</td><td>0</td></tr></table>	All four rows correct scores 2 **ALLOW** 1 mark for any three rows correct	2
			Total 10

Question number	Answer	Notes	Marks
6 (a) (i)	cool the mixture		1
(ii)	$NH_3(g) + HCl(g) \rightleftharpoons NH_4Cl(s)$ **M1** formulae and reversible arrow **M2** state symbols	**ACCEPT** equation written other way around	2
(b) (i)	**M1** (damp) red litmus paper turns blue **M2** white precipitate		2
(ii)	CaI_2		1
(iii)	**ammonium chloride** **M1** no (visible) colour change / stays same colour **M2** bromine cannot displace chlorine from its compound **compound Z** **M3** solution turns brown / darker **M4** bromine displaces iodine from its compound	 **ACCEPT** stays (pale) yellow/ orange **ACCEPT** bromine is less reactive than chlorine **ECF** from (ii) only if a halide e.g. no colour change **ACCEPT** bromine is more reactive than iodine **ECF** for the halide identified in (ii) e.g. bromine cannot displace itself	4
			Total 10

Pearson Education Limited. Registered company number 872828
with its registered office at 80 Strand, London, WC2R 0RL, United Kingdom