GradeMax

Pearson

Mark Scheme (Results)

Summer 2026

Pearson Edexcel International GCSE in Chemistry

4CH1/1C

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Summer 2026
Question Paper Log Number P79401A
Publication Code 4CH1_1C_2606_MS
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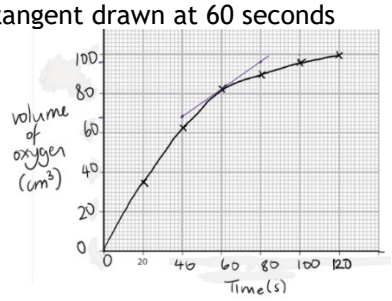
General Marking Guidance

- 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)	**D (NH_4^+)** A is not the formula for the ammonium ion as it should only have a 1+ charge B is not the formula for the ammonium ion as it should only have four hydrogen atoms C is not the formula for the ammonium ion as it should only have a 1+ charge		1
(b)	**B (CO_3^{2-})** A is not the formula for the carbonate ion as it has three oxygen atoms C is not the formula for the carbonate ion as it has three oxygen atoms and a 2- charge D is not the formula for the carbonate ion as it has three oxygen atoms and a 2- charge		1
(c)	**M1** 2 or more/4 (different) elements **M2** (chemically) joined/bonded together	ALLOW (four) different types of atoms REJECT different molecules IGNORE covalent/ionic	2
(d) (i)	**M1** bubble/pass/add carbon dioxide/gas into limewater **M2** (limewater) turns cloudy/milky	IGNORE 'limewater test' for M1 **ALLOW** white precipitate **M2** dependent on mention of limewater **REJECT** addition of extra reagent for both marks	2
(ii)	17/seventeen		1
(iii)	(14 ÷ 17) x 100 = 82(.35)%	Allow ecf from (ii)	1

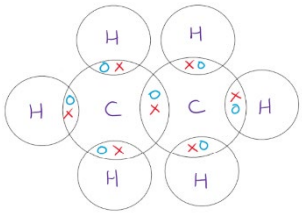
	(d)	(iv)	**M1** (ammonia is an alkali as it) forms/source of hydroxide/OH^- ions **M2** (ammonia is a base as it) accepts protons/H^+ ions	ALLOW (an alkali) is a soluble base ALLOW references to **neutralising** an acid for M2 IGNORE pH references	2
					Total 10

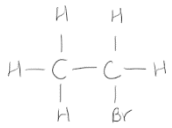
Question number	Answer	Notes	Marks
2 (a) (i)	Any 2 from: **M1** effervescence/bubbles/fizzing **M2** moves **M3** floats **M4** disappears/ gets smaller **M5** turns into a sphere/ball **M6** white trail	moves on surface scores **M2** and **M3** **ALLOW** dissolves **IGNORE** heat produced ALLOW sodium melts IGNORE flame	2
(ii)	sodium + water → sodium hydroxide + hydrogen **M1** correct reactants **M2** correct products	ACCEPT correct equation using formulae scores 2 marks	2
(iii)	**M1** 0.25 ÷ 23 (= 0.0108696) **M2** 0.011 (mol)	 ecf 0.023 (mol) scores 1	2
(iv)	**M1** fewer moles of potassium reacted/fewer moles of potassium in 0.25 g/correct calculation (0.25 ÷ 39 (= 0.0064)) **M2** less hydrogen would be produced	IGNORE greater A_r /atomic mass but can score M2 M2 dep on M1	2
(b) (i)	$4Na(s) + (1)O_2(g) \rightarrow 2Na_2O(s)$ **M1** correct state symbols **M2** correct balancing	ACCEPT correct multiples or fractions	2
(ii)	**M1** minimum **M2** exothermic **M3** ionic **M4** basic		4
			Total 14

Question number	Answer	Notes	Marks
3 (a)	gas syringe	ALLOW collection over water using measuring cylinder/graduated gas jar	1
(b)	Any TWO of the following: **M1** temperature **M2** concentration of hydrogen peroxide **M3** mass/volume of hydrogen peroxide **M4** mass/volume of catalyst **M5** concentration OR surface area of catalyst	ACCEPT amount of hydrogen peroxide for one mark only as an alternative for both M2 and M3 ACCEPT amount of catalyst for one mark only as an alternative for both M4 and M5	2
(c)	relights a glowing splint		1
(d)	**M1** (a catalyst) speeds up the reaction/increases the rate (of reaction) **M2** is chemically unchanged OR mass does not change	IGNORE changes rate ACCEPT is not used up IGNORE reference to alternative pathway/ lowering E_a	2
(e) (i)	All points plotted correctly to the nearest + or – half a small square		1
(ii)	smooth curve of best fit		1
(f) (i)	tangent drawn at 60 seconds  		1
(ii)	**M1** suitable values taken from the graph for two coordinates using their tangent **M2** gradient calculated (expected value approx. 0.5-0.7 cm^3/s) **M3** correct units of cm^3/s	If no tangent drawn then only M3 can be awarded. ALLOW cm^3/second ALLOW cm^3s^{-1}	3 **Total 12**

Question number			Answer	Notes	Marks
4	(a)		**M1** (a molecule/compound/substance) made of hydrogen and carbon **M2** only	REJECT 'carbon/hydrogen molecules/ions' for M1 M2 dep on mention of hydrogen and carbon in M1.	2
	(b)		**M1** amount of C = 88.2 ÷ 12 = 7.35 (mol) **M2** amount of H = 11.8 ÷ 1 = 11.8 (mol) **M3** show the simplest ratio is 1:1.6 which gives 5:8	Calculation **must** be shown to score marks. C_5H_8 alone scores 0	3
	(c)		**M1** general formula for propene is C_nH_{2n} **M2** more than one double bond (so doesn't fit the alkene general formula).	ALLOW general formula for isoprene	2
	(d)		**M1** M_r of isoprene = 68 **M2** amount of isoprene = 50 ÷ 68 = 0.735 mol **M3** amount of CO_2 = 0.735 x 5 = 3.7 mol	ecf for M2 ecf for M3 ALLOW any number of SF except 1	3
	(e)	(i)	addition (reaction)	IGNORE synthesis	1
		(ii)	**M1** mass of X = 0.050 x 139 = 6.95 g **M2** % yield = (0.212 ÷ 6.95) x 100 **M3** 3.05 % (2 dp only) OR **M1** – moles of X = 0.212/139 (= 0.001525) **M2** – % yield = M1/0.0500 x 100 **M3** - 3.05 % (2 dp only)	Correct answer 3.05% scores 3 ecf for M2 ecf for M3 but only to 2dp 6.24% scores 2 marks ecf for M2 ecf for M3 but only to 2dp	3
					Total 14

Question number	Answer	Notes	Marks
5 (a)	**M1** (fractional distillation) separates the mixture based on boiling points / fractions condense at different temperatures	Must make reference to a temperature linked to boiling/condensing	6
	M2 temperature gradient / hotter at bottom / shorter chain alkanes rise higher in the column ORA	Credit can be given for M1 and M2 even if fractionation is described after cracking.	
	M3 more long chain hydrocarbons are produced than can be used directly / not enough short chain (alkanes) / greater demand for short chain (alkanes) ORA	ACCEPT a named example e.g. not enough gasoline Must refer to supply / demand issues.	
	Any 3 marks from the following:		
	M4 cracking requires 600-700 °C		
	M5 cracking requires silica / alumina / zeolite catalyst		
	M6 (cracking) produces (more) short chain/shorter alkanes	ALLOW products which are more flammable IGNORE 'more useful'	
	M7 (cracking) produces alkenes	ALLOW products which are used to make polymers/ plastics	
(b) (i)	(a substance that) when burned releases heat (energy)/thermal energy	ALLOW burns /combusts /catches fire	1
(ii)	**M1** (a common impurity in fuels is) sulfur	IGNORE C/CO/CO_2 REJECT nitrogen for M1	4
	M2 (sulfur) burns/combusts/reacts in (air/oxygen) to form sulfur dioxide/SO_2	Accept correct equation for M2 IGNORE sulfur oxide/sulfur trioxide for M2.	
	M3 sulfur dioxide/SO_2 dissolves in/reacts with rain/water	IGNORE mixes Accept correct equation for M3	
	M4 (to form) acid rain		
			Total 11

Question number	Answer	Notes	Marks
6 (a)	**M1** carbon monoxide/CO **M2** reduces the capacity of blood to transport oxygen OWTTE/poisonous/toxic OR **M1** soot/carbon/C **M2** causes breathing difficulties/asthma/respiratory problems	ACCEPT correct references to haemoglobin ALLOW produces carboxyhaemoglobin	2
(b)	 **M1** 2 electrons between carbon atoms **M2** rest of the molecule correct	IGNORE inner shell on carbon atoms ACCEPT with or without shell drawn. M2 dep on M1	2
(c)	**M1** irregular/random arrangement of particles **M2** (particles) move (very) quickly/high(er) kinetic energy/random movement	ALLOW particles are far apart/widely spaced REJECT mention of ions for M1 REJECT references to ethane being a liquid – scores 0	2
(d)	**M1** ethane has weaker intermolecular forces ORA **M2** less energy needed to overcome them	ACCEPT forces between molecules ALLOW intermolecular bonds REJECT breaking of bonds for M1	2
(e) (i)	ultraviolet radiation	ALLOW UV light ALLOW 'UV'	1

(ii)	**M1** H-Br/Br-H **M2** 	REJECT HBr as bond must be shown REJECT 'br' once REJECT structural or molecular formula ALLOW bromine atom anywhere on molecule ACCEPT multiple substitutions on molecule	2
(f)	**M1 (**ethane has) only one possible structure/no other way of being displayed/ cannot be rearranged **M2** isomers have the same molecular formula but a different structural/displayed formula	ALLOW (ethane) cannot be branched REJECT references to double bonds for M1. REJECT references to having only two carbon molecules for M1. REJECT incorrect references to general formula in isomer definition.	2
			Total 13

Question number	Answer	Notes	Marks
7 (a) (i)	x = (5.25 ÷ 1.75) = 3		1
(ii)	(the reaction is) reversible	ACCEPT reaction that goes both ways/both forwards and backwards reaction occur IGNORE references to equilibrium IGNORE references to reactants turning into products and products into reactants.	1
(iii)	M1 – add water to anhydrous copper(II) sulfate M2 – turns (from white to) blue M3 – **heat** the hydrated copper(II) sulfate (to dryness) M4 – turns (from blue to) white/turns back to white Any one from: M5 – suitable vessel to contain the experiment (e.g. evaporating basin, boiling tube) M6 – colourless liquid/water vapour/ steam /condensation will be observed/produced	ALLOW steps in reverse starting from hydrated $CuSO_4$ REJECT 'evaporate' in a context that would form hydrated crystals for M3	5
(b) (i)	**A (black)** B blue is not correct as copper(II) oxide is black C green is not correct as copper(II) oxide is black D white is not correct as copper(II) oxide is black		1
(ii)	$CuO + H_2SO_4 \rightarrow CuSO_4 + H_2O$ **M1** – correct formula for reactants **M2** – correct balanced chemical equation		2

(iii)	**M1** (copper(II) oxide) can be easily removed by filtration (at the end)/is insoluble **M2** all the acid is used up/neutralised	ALLOW (copper(II)oxide can be observed when in excess/when stopped reacting ALLOW acid doesn't contaminate product	2
(iv)	copper will not react (with a dilute acid)/copper is unreactive/copper is at the bottom of the reactivity series/copper is below hydrogen in the reactivity series		1
			Total 13

Question number	Answer	Notes	Marks
8 (a) (i)	2,7		1
(ii)	**B (Period 2)** A is not correct as fluorine is in Period 2 not Period 1 C is not correct as fluorine is in Period 2 not Period 3 D is not correct as fluorine is in Period 2 not Period 7		1
(b) (i)	**M1** the two (fluorine) atoms in a molecule share a pair of electrons **M2** resulting in a full outer shell **OR** **M1** (electrostatic) attraction between a shared pair of electrons **M2** and nuclei	ALLOW covalent bonding for M1 REJECT references to ionic bonding- scores 0 REJECT **pairs** of electrons for M1	2
(ii)	**M1** M_r of F_2 = 38 **M2** amount of F_2 = 100 ÷ 38 = 2.63 (mol) **M3** no. of molecules = **M2** x (6.0×10^{23}) = 1.6×10^{24}	ecf for M2 and M3 Answers must be more than 1sf 3.2×10^{24} scores 2	3
(c) (i)	**M1** fluorine changes (from 2.7) to 2.8 **M2** lithium changes (from 2.1) to 2	ALLOW fluorine gains one electron ALLOW lithium loses one electron Penalise incorrect number of inner electrons only once	2
(ii)	An explanation that links the three points **M1** strong electrostatic (forces of) attraction **M2** between oppositely charged ions **M3** which require a lot of (heat) energy to break	IGNORE giant ionic structure ALLOW strong (ionic) bonds for M1 only IGNORE more energy 0 marks if any mention of covalent bonds, intermolecular forces or molecules	3
			Total 12

Question number	Answer	Notes	Marks
9 (a) (i)	**C (displacement)** A is not correct as the reaction is not an addition reaction. B is not correct as the reaction is not a combustion reaction. D is not correct as the reaction is not a neutralisation reaction.		1
(ii)	$FeSO_4 + Zn \rightarrow ZnSO_4 + Fe$ **M1** correct formulae of products **M2** fully correct balanced equation $FeSO_4 + Zn \rightarrow ZnSO_4 + Fe$	IGNORE state symbols Penalise use of incorrect letter cases only once	2
(iii)	**M1** Fe^{2+} (is the species in the oxidising agent) **M2** accepts/gains electrons (from zinc) OWTTE	ACCEPT $FeSO_4$/iron(II) sulfate /iron sulfate (is the oxidising agent) REJECT iron/Fe for M1 ALLOW causes zinc to be oxidised/lose (2) electrons IGNORE answers related to loss/gain of oxygen M2 dep on M1	2
(b)	**M1** no (displacement) reaction takes place/iron cannot displace zinc ORA **M2** iron is less reactive than zinc ORA	 Must be a comparison for M2 ACCEPT references to position in the reactivity series	2
(c) (i)	**M1** add barium chloride/barium nitrate (solution)/$BaCl_2$/$Ba(NO_3)_2$ **M2** (gives/forms a) white precipitate	IGNORE reference to addition of an acid unless sulfuric acid is added which scores 0 Apply list principle to any other additional reagents M2 dep on M1	2

(c) (ii)	**M1** removes other ions that would react (with the barium ions) **M2** to prevent other (white) precipitates forming	ALLOW removes impurities ACCEPT removes carbonates for M1 IGNORE false positive	2
			Total 11