



Mark Scheme (Results)

Summer 2026

Pearson Edexcel International GCSE in Chemistry

4CH1/1C

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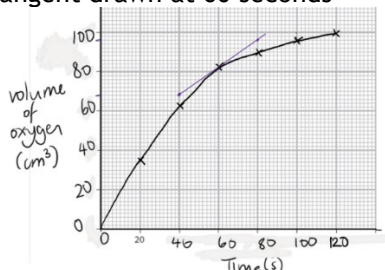
General Marking Guidance

- 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 (NH₄⁺) 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 (CO₃²⁻) 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)	$(14 \div 17) \times 100 = 82(.35)\%$	Allow ecf from (ii)	1

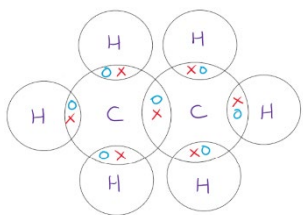
	(d)	(iv)	M1 (ammonia is an alkali as it) forms/source of hydroxide/OH^- ions M2 (ammonia is a base as it) accepts protons/H^+ ions	ALLOW (an alkali) is a soluble base ALLOW references to neutralising an acid for M2 IGNORE pH references	2
Total 10					

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 $0.25 \div 23$ (= 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 ($0.25 \div 39$ (= 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)	$4\text{Na(s)} + (1)\text{O}_2\text{(g)} \rightarrow 2\text{Na}_2\text{O(s)}$ 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 ³ s ⁻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 = $88.2 \div 12 = 7.35$ (mol) M2 amount of H = $11.8 \div 1 = 11.8$ (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 = $50 \div 68 = 0.735$ mol M3 amount of CO_2 = $0.735 \times 5 = 3.7$ 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 = $0.050 \times 139 = 6.95$ g M2 % yield = $(0.212 \div 6.95) \times 100$ M3 3.05 % (2 dp only) OR M1 - moles of X = $0.212/139$ (= 0.001525) M2 - % yield = $M1/0.0500 \times 100$ 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 M2 temperature gradient / hotter at bottom / shorter chain alkanes rise higher in the column ORA M3 more long chain hydrocarbons are produced than can be used directly / not enough short chain (alkanes) / greater demand for short chain (alkanes) ORA 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 M7 (cracking) produces alkenes	Must make reference to a temperature linked to boiling/condensing Credit can be given for M1 and M2 even if fractionation is described after cracking. ACCEPT a named example e.g. not enough gasoline Must refer to supply / demand issues. ALLOW products which are more flammable IGNORE 'more useful' ALLOW products which are used to make polymers/ plastics	6
(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 M2 (sulfur) burns/combusts/reacts in (air/oxygen) to form sulfur dioxide/SO₂ M3 sulfur dioxide/SO₂ dissolves in/reacts with rain/water M4 (to form) acid rain	IGNORE C/CO/CO₂ REJECT nitrogen for M1 Accept correct equation for M2 IGNORE sulfur oxide/sulfur trioxide for M2. IGNORE mixes Accept correct equation for M3	4
			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 $\begin{array}{c} \text{H} & \text{H} \\ & \\ \text{H}-\text{C} & - & \text{C}-\text{H} \\ & \\ \text{H} & \text{Br} \end{array}$	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)	$x = (5.25 \div 1.75) = 3$		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) $\text{CuO} + \text{H}_2\text{SO}_4 \rightarrow \text{CuSO}_4 + \text{H}_2\text{O}$ 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 1
(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		
			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 $F_2 = 100 \div 38 = 2.63$ (mol) M3 no. of molecules = M2 $\times (6.0 \times 10^{23}) = 1.6 \times 10^{24}$	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)	$\text{FeSO}_4 + \text{Zn} \rightarrow \text{ZnSO}_4 + \text{Fe}$ M1 correct formulae of products M2 fully correct balanced equation $\text{FeSO}_4 + \text{Zn} \rightarrow \text{ZnSO}_4 + \text{Fe}$	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 / $\text{Ba}(\text{NO}_3)_2$ 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