



Mark Scheme (Results)

Summer 2025

Pearson Edexcel International GCSE
In Chemistry (4WCH1) Unit 1CR

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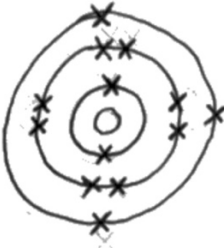
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General Marking Guidance

- 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.

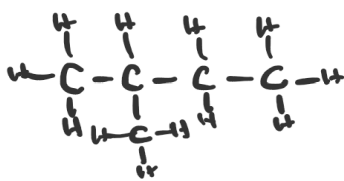
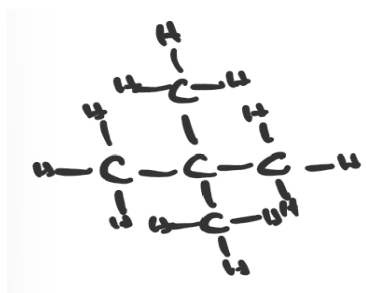
Question number	Answer	Notes	Marks
1 (a) i	K	ALLOW lower case k	1
ii	Xe		1
iii	Be and O / Ag and Xe		1
(b) i	3 (electrons)	ALLOW three IGNORE 2.8.3	1
ii	M1 for three electrons on the outer shell M2 for all electrons correct 	ALLOW other suitable ways to show electrons eg dots instead of crosses	2
(c)	$\frac{(94 \times 32) + (6 \times 34)}{100}$ $= 32.12$	ALLOW 32.1 DO NOT ALLOW 32 without seeing working out ALLOW 3212 or 0.3212 for 1 mark	2
			Total = 8

Question number	Answer	Notes	Marks
2 (a) (i)	freezing		1
(ii)	evaporation		1
(iii)	sublimation		1
(b)	Any 3 from M1 (particles) are far apart M2 (particles) are randomly / irregularly arranged M3 (particles) have (almost) total freedom of movement / move freely M4 particles have high/higher energy M1 comment on spacing M2 comment on arrangement M3 comment on moving M4 comment on energy	ALLOW no arrangement ALLOW random motion	3
			Total = 6

Question number	Answer	Notes	Marks
3 (a)	H ⁺ / hydrogen ion	REJECT H ₂ IGNORE +1 on its own	1
(b)	9	ALLOW 8, 9 or 10 ALLOW a range that uses the numbers 8, 9 or 10 eg 8-10 or 8-9 REJECT 7 or any number below 7	1
(c)	potassium chloride	IGNORE KCl REJECT any other named chemicals	1
(d)	M1 selection of atomic masses of correct atomic masses M2 = $(39 \times 2) + 12 + (3 \times 16)$ M3 = 138	ALLOW 138 with or without working ALLOW 2 marks for final answer of 67, 99, 106 or 162 ALLOW 1 mark for 68	3
(e)	M1 B M2 this is the only metal carbonate that has dissolved / is soluble / solution is colourless / potassium carbonate is a soluble salt / (tube) does not have sediment	ALLOW the clear tube/second tube M2 is dependent on M1 IGNORE clear / potassium carbonate reacting with water	2
			Total = 8

Question number	Answer	Notes	Marks
4 (a)	M1 P M2 (P) has the smallest range / almost specific / only 1(°C) difference	M2 is dependent on M1 ALLOW reverse argument for Q,R and S	2
(b)	A description connecting any 4 of the following: M1 the salt and water solution is heated M2 the water evaporates / boils away / vaporises M3 water vapour is cooled in the condenser / distillation tube / condenser is cold tube so condenses water vapour M4 pure water is collected at the end of the condenser / distillation tube / delivery tube / as distillate / after condensation	REJECT salt melts ALLOW steam	4
			Total = 6

Question number	Answer	Notes	Marks
5 (a)	water oxygen	ALLOW moisture / H ₂ O ALLOW air / O ₂ ALLOW answers in either order	2
(b) (i)	galvanising / galvanisation	IGNORE sacrificial protection	1
(ii)	M1 zinc is more reactive than iron M2 (zinc) is oxidised / reactions with oxygen / loses electrons more readily	IGNORE zinc acts as a barrier ALLOW zinc reacts first / before iron ALLOW (zinc) corrodes instead of iron REJECT zinc displaces iron	2
(c) (i)	Displacement		1
(ii)	$\text{FeSO}_4(\text{aq}) + \text{Mg}(\text{s}) \rightarrow \text{Fe}(\text{s}) + \text{MgSO}_4(\text{aq})$ M1 for correct formulae M2 for correct state symbols on correct formulae	ALLOW multiples	2
			Total = 8

Question number	Answer	Notes	Marks
6 (a)	alkane(s)	not alkene(s)	1
(b)	M1 when sulfur (impurity in fuels) burns /combusts M2 sulfur dioxide / SO_2 forms M3 which dissolves / reacts with (rain) water	ALLOW sulfur reacts with oxygen do not allow acid rain alone as this is in the question IGNORE mention of nitrogen and NO_2 and carbon dioxide M3 dep on M1 or M2	3
(c) (i)	temperature 600-700°C catalyst alumina/silica/aluminosilicates/zeolites / Al_2O_3 / SiO_2		2
(ii)	M1 long-chain alkanes/hydrocarbons have lower demand or are less useful M2 (cracking produces) shorter alkanes that are more flammable / more useful as fuels or petrol or gasoline M3 (cracking produces) alkenes that can be used to make polymers /alcohols	ALLOW short chain hydrocarbons/alkanes are more useful/higher demand	3
(d) (i)	M1 same molecular formula	ALLOW same number of carbons and hydrogens	2
(ii)	M2 different structural/displayed formulae  	ALLOW different of arrangement of atoms	2
			Total = 13

Question number	Answer	Notes	Marks
7 (a) (i)	Any two of the following M1 use a polystyrene cup M2 less heat will be lost M3 leave to reach a steady temperature to record it	ALLOW use a beaker with a lid ALLOW any piece of apparatus which is better insulated	2
(ii)	the zinc/powder/it is in excess		1
(iii)	blue to colourless		1
(b) (i)	M1 $\Delta T = 30.1(^{\circ}\text{C})$ M2 $25 \times 4.2 \times 30.1$ M3 3160.5(J)	ALLOW ecf from M1 ALLOW any number of significant figures from 2	3
(ii)	M1 (moles of CuSO_4) $6.38 \div 159.5$ OR 0.04 mol M2 $3800 \div 0.04$ OR 95 000 M3 division by 1000 = 95 (kJ) M4 -95 kJ/mol	ALLOW ecf from M1 ALLOW ecf from M2 correct answer -95 scores 4 ecf -79 scores 3 (using the energy change from (b)(i))	4
			Total = 11

Question number	Answer	Notes	Marks
8 (a)	A (gold) B is incorrect as lithium is higher in the reactivity series than gold C is incorrect as magnesium is higher in the reactivity series than gold D is incorrect as zinc is higher in the reactivity series than gold		1
(b) (i)	Any one from: waste / spoil heaps dust pollution noise pollution destruction of habitat / ecosystem expensive time consuming	ALLOW any other suitable response IGNORE references to removing impurities / damaging the ore / how deep you need to dig IGNORE dangerous / harmful unless qualified	1
(b) (ii)	M1 0.89×1200 M2 1068	ALLOW 2 marks for 1068 with or without working ALLOW ECF from M1	2
(b) (iii)	M1 copper / smaller atoms arranged in a regular structure M2 some tin / larger atoms in place 	REJECT diagrams showing alternate layers of copper and tin tin atoms larger than copper atoms, with no spaces between the atoms, labelling needs to be correct, copper must be the main atom in the structure with a small number of tin atoms	2
(b) (iv)	M1 there are atoms of different sizes M2 the layers / atoms are disrupted so can no longer slide (over each other) / (regular) lattice arrangement is broken	ALLOW cations / ions / particles in place of atoms throughout REJECT the mention of molecules once only	2
			Total = 8

Question number	Answer	Notes	Marks
9 (a)	solute	REJECT solvent / salt water / aqueous solution IGNORE all chemical names	1
(b) (i)	Any six of the following points: M1 add a measured /known volume of water to a boiling tube M2 add an excess of sodium chloride to the boiling tube (and stir) M3 measure the temperature of the saturated solution M4 weigh an empty evaporating basin M5 pour some of the saturated solution into the evaporating basin M6 weigh the basin and the contents M7 heat the evaporating basin to remove all the water M8 weigh the evaporating basin and the remaining sodium chloride M9 suitable subtraction to find mass of sodium chloride that dissolved <u>Alternative method</u> M1 add a measured / known volume of water to a boiling tube M2 weigh / have a known mass/amount of sodium chloride (added to the water) M3 measure the temperature of the saturated solution M4 add an excess of sodium chloride to the boiling tube (and stir) M5 filter the excess sodium chloride M6 dry the excess sodium chloride / evaporate any water left M7 find the mass/amount of the sodium chloride that did not dissolve	ALLOW other suitable containers e.g. beaker ALLOW amount in place of volume of water ALLOW other suitable containers e.g. beaker ALLOW amount in place of volume of water ALLOW description of drying e.g. place in an oven	6

	M8 suitable subtraction to find mass of sodium chloride that dissolved		
(ii)	M1 $(6.7 \div 18.4) \times 100$ M2 36 (g per 100g of water)	ALLOW 36.413043 or any number of decimal places correctly rounded ALLOW 1 mark for 0.36(413043) or 57(26495726)	2
(c)	temperature	IGNORE heat	1
(d)	M1 $1.42 = (\text{concentration} \times 250) \div 1000$ M2 concentration = $1420 \div 250$ M3 concentration = 5.68 (mol/dm ³)	ALLOW 3 marks for 5.68 with or without working ALLOW any number of significant figures except 1 sf ALLOW 2 marks for POT error eg 5680 ALLOW 1 mark for 0.355 ALLOW 1 mark for $250 \div 1000$ if no other mark awarded	3
			Total = 13

Question number	Answer	Notes	Marks
10 (a)	M1 a substance that is reduced / provides oxygen (to another chemical) M2 (and) gains electrons	REJECT it is oxidised IGNORE it causes oxidation	2
(b)	M1 HNO₃ on left hand side M2 H₂O on right hand side M3 fully balanced equation of correct species $\text{V}_2\text{O}_5 + 2\text{HNO}_3 \rightarrow 2\text{VO}_2(\text{NO}_3) + \text{H}_2\text{O}$	ALLOW multiples	3
(c)	M1 for both $\frac{2.04}{51}$ and $\frac{1.28}{16}$ M2 for both 0.04 and 0.08 M3 for ratio of 1:2 M4 for correct formula of VO₂	ALLOW 4 marks for final correct formula of VO₂ with or without working ALLOW ECF throughout	4
			Total = 9

