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Mark Scheme (results)

Summer 2014

Pearson Edexcel GCSE in Chemistry (5CH2F/01)

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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.
- For questions worth more than one mark, the answer column shows how partial credit can be allocated. This has been done by the inclusion of part marks eg (1).
- 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.

Quality of Written Communication

Questions which involve the writing of continuous prose will expect candidates to:

- Write legibly, with accurate spelling, grammar and punctuation in order to make the meaning clear
- Select and use a form and style of writing appropriate to purpose and to complex subject matter
- Organise information clearly and coherently, using specialist vocabulary when appropriate.

Full marks will be awarded if the candidate has demonstrated the above abilities.

Questions where QWC is likely to be particularly important are indicated (QWC) in the mark scheme, but this does not preclude others.

Question Number	Answer	Acceptable answers	Mark
1(a)(i)	D the transition metals		**(1)**

Question Number	Answer	Acceptable answers	Mark
1(a)(ii)	D malleable		**(1)**

Question Number	Answer	Acceptable answers	Mark
1(b)(i)	non-flammable		**(1)**

Question Number	Answer	Acceptable answers	Mark
1(b)(ii)	has a low density		**(1)**

Question Number	Answer	Acceptable answers	Mark
1(c)(i)	A description including (yellow-) green (1) gas (1)	 any shade of green do not allow just 'yellow' do not allow green in combination with other colours eg blue-green	 **(2)**

Question Number	Answer	Acceptable answers	Mark
1(c)(ii)	hydrogen + chlorine → hydrogen chloride lhs (1) rhs (1) Ignore formulae in addition to all of the names	if formulae are used, do not allow h or CL or superscripts H_2 + Cl_2 on lhs 2HCl on rhs reactants in either order do not allow a mixture of words and formulae for both marks eg H_2 + Cl_2 → hydrogen chloride scores 1 mark for rhs do not allow hydrochloric acid /hydrochloride/hydrogen chlorine	**(2)**

(Total for Question 1 = 8 marks)

Question Number	Answer	Acceptable answers	Mark
2(a)(i)	A metal		**(1)**

Question Number	Answer	Acceptable answers	Mark
2(a)(ii)	Any one of Li B C N O F Ne Ignore numbers with the symbols eg $^{7}_{3}$Li		**(1)**

Question Number	Answer	Acceptable answers	Mark
2(b)(i)	4 (protons) (1) 4 (electrons) (1) 5 (neutrons) (1)		**(3)**

Question Number	Answer	Acceptable answers	Mark
2(b)(ii)	C -1		**(1)**

Question Number	Answer	Acceptable answers	Mark
2(c)	An explanation linking 5 electrons (1) (in the) {outer/last/final/end} {shell/energy level} (1)	 it has 5 {outer/valence} electrons fully correct diagram showing electronic configuration **and** electron(s) labelled the group (number) is the number of electrons in the outer shell orbit/ring for shell fully correct diagram showing electronic configuration without labelled electron **OR** 5 in the {outer/last} {shell / energy level} do not allow just '5 at the end' do not award the first mark if proton/neutron/atom (in the outer shell)	**(2)**

(Total for Question 2 = 8 marks)

Question Number	Answer	Acceptable answers	Mark
3(a)	C precipitation		**(1)**

Question Number	Answer	Acceptable answers	Mark
3(b)	copper carbonate (s) (1) sodium nitrate (aq)(1)		**(2)**

Question Number	Answer	Acceptable answers	Mark
3(c)	$CuCO_3$ Ignore any 'balancing' number in front of $CuCO_3$ Ignore any working to find the formula	$Cu(CO_3)/Cu^{2+}CO_3^{2-}$ / $(Cu)^{2+}(CO_3)^{2-}$ / $(Cu^{2+})(CO_3^{2-})$ do not allow superscript 3 ie $CuCO^3$ do not allow $Cu(CO)_3$	**(1)**

Question Number	Answer	Acceptable answers	Mark
3(d)		Maximum **2** marks if another chemical is added to the original mixture Maximum **2** marks if heat or evaporate is used on the original mixture or the filtrate	
	First mark filter/filtration/filtering (1)	description or diagram of filtering ie funnel **and** filter paper do not allow sieving/ sifting/ draining /decanting do not allow separating funnel	
	Second and third marks A description including **two** of the following		
	wash/rinse (with distilled water) (1)	pour water through solid in filter paper / clean solid with water do not allow this mark if washing is done after drying	
	any method of drying (1)	leave to dry do not allow just 'dry'	
	{lead iodide/the solid/the precipitate/the insoluble salt} is {the residue/left on the paper} (1)	do not allow other {solids/salts} left with the lead iodide	**(3)**

Question Number	Answer	Acceptable answers	Mark
3(e)(i)	potassium / K^+	K	**(1)**

Question Number	Answer	Acceptable answers	Mark
3(e)(ii)	chloride / Cl^-	chlorine (ion) / Cl do not allow Cl_2	**(1)**

(Total for Question 3 = 9 marks)

Question Number	Answer	Acceptable answers	Mark
4(a)(i)	**2** Na **(1)** + Cl_2 → **2** NaCl (1) Ignore + in front of the 2s	maximum 1 mark if any balancing number is added in front of Cl_2 or if any of the formulae are changed eg 4Na + 2Cl_2 → 4NaCl or Na + 1/2 Cl_2 → NaCl score (1) do not allow negative signs in front of balancing numbers	**(2)**

Question Number	Answer	Acceptable answers	Mark
4(a)(ii)	2.5 / 4.0 (1) their fraction x 100 (1) (=62.5)	0.625 or 5/8 62.5/63 with {no/incorrect} working correct working with {no/wrong}	**(2)**

Question Number	Answer	Acceptable answers	Mark
4(a)(iii)	A ionic		**(1)**

Question Number	Answer	Acceptable answers	Mark
4 (a)(iv)	23 + 35.5 (=58.5) Ignore g	58.5 with {no/incorrect} working 23 + 35.5 with {no/wrong} answer do not allow 58/59 without working	**(1)**

Question Number	Answer	Acceptable answers	Mark
4(b)	$\frac{24}{120}$ (1) their fraction x 100 (1) (=20%)	1/5 or 0.2 20 with {no/incorrect} working correct working with {no/wrong} answer	**(2)**

Question Number	Answer	Acceptable answers	Mark
4(c)(i)	CH_3	2 CH_3 / C_1H_3 / H_3C do not allow just 1:3	**(1)**

Question Number	Answer	Acceptable answers	Mark
4(c)(ii)	An explanation linking any **two** from weak {forces/attractions} (1) between {molecules/particles/them}/ intermolecular (1) little {heat/energy} needed {to separate the molecules/overcome force(s) between molecules} (1)	maximum **1** mark if breaking bonds between atoms/breaking down {molecules/ particles}/breaking covalent bonds specific weak forces eg Van der Waals/London weak bonds do not allow covalent bonds are weak /weak bonds between atoms ignore weak hydrogen bonds weak bonds between {molecules / particles} do not allow intramolecular 'little energy is needed to break the bonds' only if it is clear that {covalent/single} bonds are not being broken	**(2)**

(Total for Question 4 = 11 marks)

Question Number	Answer	Acceptable answers	Mark
5(a)(i)	A description including carbon (1) atom(s) (1)		**(2)**

Question Number	Answer	Acceptable answers	Mark
5(a)(ii)	covalent Ignore giant molecular		**(1)**

Question Number	Answer	Acceptable answers	Mark
5(b)	fractional distillation (2)	distillation fractionation	**(2)**

Question Number	Answer	Acceptable answers	Mark
5(c)	**A** 0.25		**(1)**

Question Number		Indicative Content	Mark
QWC	***5(d)**	A description/explanation including some of the following points content could be shown in diagram(s) **practical procedure** • ignite magnesium /put magnesium in (Bunsen) flame • use of tongs/crucible / tube or gas jar of {oxygen/air} • lift lid (to let air in)- if crucible used • magnesium burns/oxidises/exothermic reaction • (bright) white {flame/light} • white powder/ash/solid formed **bonding** • magnesium atoms have 2 electrons in the outer shell • magnesium atoms {lose/transfer} electrons • form Mg^{2+}/ions with positive charge • oxygen atoms have 6 electrons in the outer shell • oxygen atoms gain electrons • forms O^{2-}/ions with negative charge • {8 electrons in /full/complete} outer shell • two electrons transferred/gained/lost • ions with opposite charges attract each other/ Mg^{2+} attracts O^{2-} ions	**(6)**
Level	**0**	No rewardable content	
1	**1 - 2**	• a limited description e.g. magnesium burns / magnesium atoms lose electrons • the answer communicates ideas using simple language and uses limited scientific terminology • spelling, punctuation and grammar are used with limited accuracy	
2	**3 - 4**	• a simple description e.g. magnesium burns with a white flame / magnesium forms positive ions and oxygen forms negative ions • the answer communicates ideas showing some evidence of clarity and organisation and uses scientific terminology appropriately • spelling, punctuation and grammar are used with some accuracy	
3	**5 - 6**	• a detailed description including the experiment and bonding e.g. magnesium burns with a white flame, magnesium atoms give their 2 outer electrons to oxygen atoms • the answer communicates ideas clearly and coherently uses a range of scientific terminology accurately • spelling, punctuation and grammar are used with few errors	

(Total for Question 5 = 12 marks)

Question Number	Answer	Acceptable answers	Mark
6(a)(i)	An explanation linking {the temperature/it} {increased / went up (by 26°C)} (1) (so the reaction is) exothermic (1)	 it got hotter/it gets hot heat (energy){released /given out} ignore incorrect temperature rise do not allow just 'heat increases'	**(2)**

Question Number	Answer	Acceptable answers	Mark
6(a)(ii)	$ZnSO_4$ (1) Cu (1)	allow formulae in either order maximum if additional formulae are included maximum if balancing numbers added do not allow upper case N /superscript 4	**(2)**

Question Number	Answer	Acceptable answers	Mark
6(b)	An explanation linking **First mark – relating concentration to time** (as the concentration/amount of acid increases) the time (taken for the magnesium to react) decreases (1) Ignore any reference to negative correlation Ignore time gets faster/quicker **Second mark – effect on rate** (so){ the rate/it} increases/reaction becomes {faster/quicker} (1) Ignore any reference to positive correlation	Reverse arguments if candidate has related time and rate to decreasing concentration of acid {less/shorter} time	**(2)**

Question Number		Indicative Content	Mark
QWC	***6(c)**	A description including some of the following points **Experiment 1** • measure volume of acid/stated volume • measure mass of marble chips/stated mass • add acid to marble or marble to acid in a suitable container eg flask, beaker, boiling tube, test tube • collect the gas in a {gas syringe/measuring cylinder over water/ tube over water}/bubble gas through limewater/bubble gas through water • measure {amount/volume} of carbon dioxide/count the bubbles/fixed volume of carbon dioxide • measure mass/mass loss (on a balance) • time/measure how long the reaction takes **Experiment 2** • do another experiment with different size marble chips • use the same mass of marble chips • use the same {volume/concentration/mass} of acid/same acid • crush the marble/use powdered marble **Results** • smaller chips (of marble) have a more vigorous reaction/produce more {fizzing/bubbles} ORA • smaller chips take less time to {react/produce a certain volume of gas /have a certain mass loss} ORA • smaller chips have a larger surface area ORA • smaller chips react faster ORA • larger surface gives a faster reaction	**(6)**
Level	**0**	No rewardable content	
1	**1 - 2**	• a limited description e.g. crush the marble chips/smaller marble chips give more fizzing • the answer communicates ideas using simple language and uses limited scientific terminology • spelling, punctuation and grammar are used with limited accuracy	
2	**3 - 4**	• a simple description e.g. put marble chips and acid in a flask and repeat with the same mass of small marble chips / collect the gas in a syringe, smaller pieces of marble react faster • the answer communicates ideas showing some evidence of clarity and organisation and uses scientific terminology appropriately • spelling, punctuation and grammar are used with some accuracy	
3	**5 - 6**	• a detailed description e.g. put marble chips and acid in a flask, repeat the experiment with the same mass of crushed marble, crushed marble takes less time to react • the answer communicates ideas clearly and coherently uses a range of scientific terminology accurately • spelling, punctuation and grammar are used with few errors	

(Total for Question 6 = 12 marks)

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