edexcel

Mark Scheme (Results)

Summer 2015

Pearson Edexcel GCSE in Chemistry (5CH2F/01) Paper 01

Unit C2: Discovering Chemistry

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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.

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)	<table><tr><th>colour</th><th>physical state</th></tr><tr><td>(yellow-)green (1)</td><td>gas</td></tr><tr><td>red-brown (1)</td><td>liquid</td></tr><tr><td>grey</td><td>solid (1)</td></tr></table>	chlorine: any shade of green eg light/pale do not allow any colour in combination with green except yellow do not allow yellow on its own bromine: accept brown or red alone OR any shade of red or brown eg light/dark brown reject orange/combinations with orange reject yellow/combinations with yellow	**(3)**

Question Number	Answer	Acceptable answers	Mark
1(b)	A description linking any two of use fume cupboard (1) do not inhale/breathe in vapour (1) (use) gloves (1) do not spill on the skin (1)	 keep room well ventilated use gas mask ignore face mask/respirator goggles/safety glasses/safety spectacles /do not splash in the eyes Ignore wear protective clothing/equipment Ignore cover mouth Ignore do not spill it/drink it/eat it/swallow it/spill on surfaces/wash off spills Ignore burns skin	**(2)**

Question Number	Answer	Acceptable answers	Mark
1(c)	magnesium + bromine → magnesium bromide LHS (1) RHS (1)	allow reactants in either order allow = instead of arrow if formulae are used, do not allow MG or BR or superscripts $Mg + Br_2$ $MgBr_2$ Ignore formulae if both names and formulae given for any substance do not allow a mixture of words and formulae for both marks eg magnesium + bromine → $MgBr_2$ scores 1 mark	**(2)**

Question Number	Answer	Acceptable answers	Mark
1(d)	C NaCl		**(1)**

Total for Question 1 = 8 marks

Question Number	Answer	Acceptable answers	Mark
2(a)(i)	Y 0 marks if any additional letters		**(1)**

Question Number	Answer	Acceptable answers	Mark
2(a)(ii)	Y and Z 0 marks if any additional letters	in either order both needed for the mark	**(1)**

Question Number	Answer	Acceptable answers	Mark
2(b)	D a separating funnel		**(1)**

Question Number	Answer	Acceptable answers	Mark
2(c)	C low poor		**(1)**

Question Number	Answer	Acceptable answers	Mark
2(d)	$H_2 + Cl_2 \rightarrow 2HCl$ M1 correct formulae on LHS and RHS **(1)** M2 correctly balanced **(1)**	In M1 do not allow incorrect use of upper/lower case/subscripts but M2 can be awarded for correct balancing dependent on M1 being awarded (but note special case above) accept multiples	**(2)**

Question Number	Answer	Acceptable answers	Mark
2(e)	M1 shared pair of electrons between one H and one Cl **(1)** M2 remaining outer electrons correct (**1**)	Accept all permutations of dots and crosses for electrons If any indication of ionic bonding including charges 0/2 symbols not required ignore incorrect symbols eg C/CL M2 dependent on M1 electrons do not need to be in pairs ignore inner shells electrons can be on/in ring or no ring	**(2)**

Total for Question 2 = 8 marks

Question Number	Answer	Acceptable answers	Mark
3(a)	B Na^+		**(1)**

Question Number	Answer	Acceptable answers	Mark
3(b)(i)	C K_2CO_3		**(1)**

Question Number	Answer	Acceptable answers	Mark
3(b)(ii)	A description linking M1 (bubble gas through) limewater/calcium hydroxide solution (1) M2 turns cloudy/milky/white precipitate (1)	 if limewater added directly to the solution/mixture then only M1 can be awarded white ppt second mark dependent on use of limewater if mention any gas other than carbon dioxide or make reference to any other gas test/result then max 1	**(2)**

Question Number	Answer	Acceptable answers	Mark
3(c)		maximum 2 marks if heat or evaporate or crystallisation method used on mixture or filtrate	**(3)**
	First mark filter (the mixture) **(1)**	description or diagram of filtering ie (filter) 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 barium sulphate/the solid/the residue/precipitate is left on (filter) paper/in the funnel (1)		
	wash/rinse (the solid/residue/barium sulfate with distilled water) **(1)**	pour water over/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)**	eg in an oven /on a windowsill / on a radiator /with filter paper warm it heat it evaporate the water Allow 'leave to dry' Do not allow just "dry it (out/off)" must have filtered and/or washed to score the mark for drying	

Question Number	Answer	Acceptable answers	Mark
3(d)	An explanation linking **transfer of electrons (1)** **correct direction of transfer (1)** **two** electrons (transferred) **(1)**	Marks can be scored from diagrams If any reference to electrons shared **0/3** If any reference to covalent bonds MAX 2 transfer of atoms/ions in place of electrons MAX 2 if transfer of electrons to/from ions MAX 2 Ignore charges on ions	**(3)**

Question Number	Answer	Acceptable answers	Mark
3(e)	(24 + 16) (1) (= 40)	40 (with no working)	**(1)**

Total for Question 3 = 11 marks

Question Number	Answer	Acceptable answers	Mark
4(a)	An explanation linking (aq) (means) aqueous/dissolved in water (1) (l) (means) liquid (1)	 ignore diluted ignore can be dissolved in water/ magnesium chloride is soluble in water do not allow mixed with a solution/a liquid solution	**(2)**

Question Number	Answer	Acceptable answers	Mark
4(b)	effervescence/bubbles/ fizzing OR magnesium/solid/it disappears OR temperature rise	ignore hydrogen/gas released/ formed /given off dissolves / gets smaller ignore reacts ignore heat given out but any incorrect observation scores 0	**(1)**

Question Number	Answer	Acceptable answers	Mark
4(c)(i)	(gas) syringe	(upturned) burette/measuring cylinder/graduated flask (filled with water)	**(1)**

Question Number	Answer	Acceptable answers	Mark
4(c)(ii) Clip (iii) + graph	140	range 136-144	**(1)**

Question Number	Answer	Acceptable answers	Mark
4(c)(iii) Clip (ii) + graph	curve above original(1) levels at same volume (1)	curve must start at origin does not need to finish at same time as original curve no marks for over-writing original curve (after 10 cm^3 volume)	**(2)**

Question Number	Answer	Acceptable answers	Mark
4(d)	Explanation linking (rate of reaction/it) increases (1) larger surface area (1)	 speed (of reaction) increases reaction/it is faster/quicker ignore takes less time more frequent collisions more collisions per second ignore just more collisions ignore greater chance of collisions	**(2)**

Question Number	Answer	Acceptable answers	Mark
4(e)	An explanation linking: increase in temperature (1) (so) exothermic (reaction) (1)	 temperature went up (by 41ºC) it got hot(ter) ignore just 'heat increases' heat (energy) produced/released /given out/lost	**(2)**

Total for Question 4 = 11 marks

Question Number	Answer	Acceptable answers	Mark
5(a)	<table><tr><th>particle</th><th>relative mass</th></tr><tr><td>proton</td><td>1</td></tr><tr><td>neutron</td><td>**1** (1)</td></tr><tr><td>electron</td><td>1/1837 / negligible / very small **(1)**</td></tr></table>	if any minus sign(s) MAX 1 anything less than 1/1500 or 0.00067/(almost) 0	**(2)**

Question Number	Answer	Acceptable answers	Mark
5(b)	**B** the same number of electrons and protons		**(1)**

Question Number	Answer	Acceptable answers	Mark
5(c)	3 protons **(1)** {4/7-3} neutrons **(1)** maximum 1 mark if electrons mentioned	if numbers incorrect but state both protons and neutrons (and not electrons) allow (1) but can score both marks if clearly stated electrons not in nucleus eg in shells	**(2)**

Question Number		Indicative Content	Mark
QWC	***5(d)**	A description and explanation including some of the following points **CREDIT CAN BE GIVEN FOR LABELS/ANNOTATIONS ON DIAGRAM** **Parts of the periodic table** • periods • (periods) are (horizontal) rows • groups • (groups) are (vertical) columns • group 1 are alkali metals • group 7 are halogens • group 0 are noble gases • transition elements in the middle of the table • metals on the left (and centre) • non-metals on the right **Position of element/Atomic structure** • elements arranged in order of increasing atomic number/number of protons • group number is equal to number of electrons in outer shell • period number is equal to the number of shells **Position of element/Chemical properties** • elements in same group have similar chemical properties • eg elements in group 1 become more reactive with increasing atomic number/down group • eg elements in group 7 become less reactive with increasing atomic number /down group	**(6)**

Level	0	No rewardable content
1	1 - 2	• a limited description e.g. correctly identifies one part of the periodic table **OR** states one aspect of positioning/atomic structure **OR** one aspect of positioning/chemical property of elements • 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. identifies some/several parts of the periodic table **OR** identifies one part of the periodic table and attempts to link the position of an element(s) to either atomic structure or chemical properties • 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. identifies some/several parts of the periodic table **AND** attempts to link the position of an element(s) to at least two aspects of atomic structure and/or chemical properties • relate atomic structure to at least two aspects of positioning and/or chemical properties of the elements • 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 = 11 marks

Question Number	Answer	Acceptable answers	Mark
6(a)	An explanation linking any two of • giant (covalent structure)/ giant molecule /macromolecule /large number of bonds (1) • strong (covalent) bonds (1) • large amount of heat /energy (needed to break bonds) (1)	Any reference to ionic bonding or intermolecular forces scores 0/2 lattice lots of/many bonds hard to break ignore hard to melt/high temperature needed	**(2)**

Question Number	Answer	Acceptable answers	Mark
6(b)(i)	(40/111) (1) x 100 (1) (= 36.04)	36.(04) alone scores 2 marks If first mark not awarded allow second mark for any fraction x 100	**(2)**

Question Number	Answer	Acceptable answers	Mark
6(b)(ii)	D soluble insoluble		**(1)**

Question Number		Indicative Content	Mark
QWC	***6(c)**	A description / explanation including some of the following points **CREDIT CAN BE GIVEN FOR LABELS/ANNOTATIONS ON DIAGRAM** **Structure of a metal** • positive ions/cations/atoms • in regular arrangement/lattice • delocalised/sea of electrons **Metals are malleable** • malleable means can be bent/hammered into shape because • rows/sheets/layers of ions/ atoms • slide over each other • electrons fill spaces **Metals conduct electricity** • free electrons • (electrons) can move/flow • through structure • (electrons) transfer charge	**(6)**
Level	**0**	No rewardable content	
1	**1 - 2**	• a limited description eg a limited description of one of structure, malleability, and conduction • 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 eg a limited description of **two** from structure, malleability and conduction **OR** an explanation of **one** of structure, malleability and conduction • 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 eg a description of all three of structure, malleability, and conduction **OR** a detailed explanation of one of them and a limited description of another • 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 = 11 marks

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