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Mark Scheme (Results)

March 2013

GCSE Chemistry
5CH2H/01

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March 2013
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Question Number	Answer	Acceptable answers	Mark
1(a)	C		**(1)**

Question Number	Answer	Acceptable answers	Mark
1(b)	$CuCl_2$	ensure that 2 is subscript at most half the size of Cl and cases are correct ignore correct charges reject an overall charge	**(1)**

Question Number	Answer	Acceptable answers	Mark
1(c)	D		**(1)**

Question Number	Answer	Acceptable answers	Mark
1(d)	A description including the following • put/mix/react (sodium) carbonate and acid in (conical) flask (1) • put limewater in test tube(1) • (carbon dioxide produced) turns lime water {milky/cloudy/white precipitate} (1)	2 max if reactants and limewater are in the wrong vessels with the correct test marks can be awarded for the first two marking points by labelling the diagram "reactants" for sodium carbonate and acid	**(3)**

Question Number	Answer	Acceptable answers	Mark
1(e)	A description including three of the following • make {solutions/dissolve}/ {mix/react} <u>solutions</u> (1) • precipitate (of copper carbonate) (1) • filter (1) • wash (with water) (1) • leave to dry/dry in oven/dry between filter paper (1)	max 2 marks if clear error in process, e.g. heat/add acid/evaporate ignore colours of precipitate accepts forms a solid for precipitate	**(3)**

Question Number	Answer	Acceptable answers	Mark
2(a)(i)	Independent marking points • a curve/line starting at the origin showing a lower gradient than the 50^{o} curve (1) • levels out at the same volume as the 50^{o} curve (1)		**(2)**

Question Number	Answer	Acceptable answers	Mark
2(a)(ii)	An explanation linking the following • (zinc powder) has a larger surface area (1) • therefore there are <u>more</u> (frequent) collisions (between the particles) (1)	reject particle size is smaller more particles <u>in contact</u> more successful collisions reject increase in energy for 2^{nd} marking point	**(2)**

Question Number	Answer	Acceptable answers	Mark
2(a)(iii)	2		**(1)**

Question Number	Answer	Acceptable answers	Mark
2(a)(iv)	An explanation linking the following • breaking bonds requires/needs {heat/energy} / breaking bonds is an endothermic process (1) • forming bonds produces/releases {heat/energy} / forming bonds is an exothermic process (1) • more {heat/energy} is given out than is taken in (1)		**(3)**

Question Number	Answer	Acceptable answers	Mark
2(b)	makes the reaction go faster/increases speed/increase rate	lower activation energy	**(1)**

Question Number	Answer	Acceptable answers	Mark
3(a)(i)	B		**(1)**

Question Number	Answer	Acceptable answers	Mark
3(b)(i)	• electrons {shared / between} atoms (1) • {2 pairs of/four} electrons {shared / between} two atoms (1) • 4 additional electrons on both oxygen atoms (1)	ignore any inner electrons shown 3rd Mark is dependent on 2nd	**(3)**

Question Number	Answer	Acceptable answers	Mark
3(b)(ii)	An explanation linking the following second marking point is dependent on the first • forces (between the molecules) are weak (1) • therefore little {<u>heat/energy</u>} needed to separate molecules/break these forces (1)	intermolecular forces/bonds <u>between molecules</u> reject intramolecular force/covalent bond/ionic bond	**(2)**

Question Number	Answer	Acceptable answers	Mark
3(c)	A description including three from • (liquid air enters) (fractionating) column (1) • (liquid air) warms/heats/boils (1) • (gaseous) {nitrogen/lower boiling point} from top of column (1) • (liquid) {oxygen/higher boiling point} from bottom of column (1)	ignore references to cooling air etc. can be separated because they have different boiling points (1) alternative to last two marking points	**(3)**

(Total for question =9 marks)

Question Number	Answer	Acceptable answers	Mark
4(a)(i)	12 + 16 +16 (= 44)	44 with no working	**(1)**

Question Number	Answer	Acceptable answers	Mark
4(a)(ii)	40+12+(3x16)/($CaCO_3$)100 (1) gives 40+16 /(CaO) 56 (1) 25 (tonnes) gives 56x$\frac{25}{100}$ (tonnes) (1)	 allow ecf 14 (tonnes) correct answer no working (3)	**(3)**

Question Number	Answer	Acceptable answers	Mark
4(b(i)	theoretical yield is calculated yield/ value calculated from balanced equation/maximum yield possible/maximum amount of product when reactants have fully reacted.		**(1)**

Question Number	Answer	Acceptable answers	Mark
4(b)(ii)	An explanation linking two of the following • reaction may be incomplete • product/reactant lost • other (side-)reactions may occur	 impure reactants unwanted reactions	**(2)**

Question Number	Answer	Acceptable answers	Mark
4(c)	A suggestion including two of the following • save money/improve profit/disposal of waste costs money (1) • waste product may be harmful to the environment/cause pollution/damage the environment (1)	 any specific examples ignore references to landfill	**(2)**

(Total for question = 9 marks)

Question Number	Answer		Mark
5(a)	D		**(1)**

Question Number	Answer	Acceptable answers	Mark
5(b)	An explanation linking two of the following • reaction produces heat/exothermic (1) • (sodium) has low melting point (1) • (sodium) has low density/density less than water (1)	 ignore sodium floats on water	**(2)**

Question Number	Answer		Mark
5(c)	$2Na + 2H_2O \rightarrow 2NaOH + H_2$ LHS formulae (1) RHS formulae (1) balancing correct formulae (1)	ensure that 2 is subscript at most half the size of H and cases are correct	**(3)**

Question Number		Indicative content	Mark
QWC	***5(d)**	**similarities** • both in the same group/group 1/alkali metal • react in a similar way • same number of outer electrons/one outer electron • both produce hydrogen/fizz (when reacted with water) • both produce hydroxide/alkaline solution (when reacted with water) **differences** • potassium more reactive • potassium catches on fire/lilac flame • potassium outer electron further from nucleus • potassium has more shells • potassium has more shielding • potassium has less attraction of outer electron by nucleus • potassium outer electron more easily lost	**(6)**
Level	**0**	No rewardable content	
1	**1-2**	• a limited explanation e.g. both in group 1 because one electron in outer shell • the answer communicates ideas using simple language and uses limited scientific terminology • spelling, puncuation and grammar are used with limited accuracy	
2	**3-4**	• a simple explanation e.g. sodium and potassium have similar reactions because they are in the same group but potassium is more reactive. • the answer communicates ideas showing some evidence of clarity and organisation and uses scientific terminology appropriately • spelling, puncuation and grammar are used with some accuracy	
3	**5-6**	• a detailed explanation e.g. sodium and potassium have similar reactions because they are both have one outer electron but potassium is more reactive because its outer electron is more easily lost because it has an extra shell of electrons causing the attraction of the nucleus to be reduced • the answer communicates ideas clearly and coherently uses a range of scientific terminology accurately • spelling, puncuation and grammar are used with few errors	

Question Number	Answer	Acceptable answers	Mark
6(a)(i)	2.3		**(1)**

Question Number	Answer	Acceptable answers	Mark
6(a)(ii)	A		**(1)**

Question Number	Answer	Acceptable answers	Mark
6(a)(iii)	<table><tr><th>particle</th><th>relative mass</th><th>relative charge</th></tr><tr><td>electron</td><td></td><td>-1</td></tr><tr><td>neutron</td><td>1</td><td>0 /neutral/no charge</td></tr><tr><td>proton</td><td>1</td><td></td></tr></table> 4 correct = 2 marks 2/3 correct = 1 mark 1/0 correct = 0 mark		**(2)**

Question Number		Indicative content	Mark
QWC	***6(b)**	An explanation linking some of the following **Structure of boron-11** boron-11 atom has • 5 /same number of protons • 5 /same number of electrons • 6 neutrons / one more neutron than boron 10 **Working out RAM** relative atomic mass is 10.8 because • weighted mean • more boron-11 than boron-10 • boron-11 atoms are heavier • (therefore) relative atomic mass nearer 11 than 10 OR • in sample given 20/100 of the atoms have a mass of 10 • in sample given 80/100 of the atoms have a mass of 11 • 20/100*10=2 • 80/100*11=8.8 • 2+8.8=10.8 NB the diagram in part (a) gives the structure for boron-10 so do not give credit for this (even if claimed to be structure of boron-11 by referring to it as 'it')	**(6)**
Level	**0**	No rewardable content	
1	**1-2**	• a limited description e.g. boron-11 has 5 protons and 6 neutrons • the answer communicates ideas using simple language and uses limited scientific terminology • spelling, puncuation and grammar are used with limited accuracy	
2	**3-4**	• a simple explanation e.g. boron-11 has 5 protons, 5 electrons and 6 neutrons and is heavier than boron-10. • 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 explanation e.g. boron-11 has 5 protons, 5 electrons and 6 neutrons, is heavier than boron-10 and there is more of boron-11 therefore relative atomic mass nearer to 11 than 10. • the answer communicates ideas clearly and coherently uses a range of scientific terminology accurately • spelling, puncuation and grammar are used with few errors	

Question Number	Answer	Acceptable answers	Mark
6(c)	Answer should include one idea from each list <u>similarities</u> both put • elements into groups / periods (1) • elements with similar properties in same group (1) • metals and non-metals in separately (1) <u>differences</u> Mendeleev's table • was arranged by relative atomic mass(1) • had gaps (1) • had fewer elements (1) • did not include the noble gases (1)	reverse argument for modern periodic table specific examples e.g germanium	**(2)**

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