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Cambridge International General Certificate of Secondary Education

MARK SCHEME for the May/June 2015 series

0620 CHEMISTRY

0620/23 Paper 2 (Core Theory), maximum raw mark 80

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Abbreviations used in the Mark Scheme

- ; separates marking points
- / separates alternatives within a marking point
- **OR** gives alternative marking point
- **R** reject
- **I** ignore mark as if this material was not present
- **A** accept (a less than ideal answer which should be marked correct)
- **COND** indicates mark is conditional on previous marking point
- owtte or words to that effect (accept other ways of expressing the same idea)
- max indicates the maximum number of marks that can be awarded
- ecf credit a correct statement that follows a previous wrong response
- ( ) the word / phrase in brackets is not required, but sets the context
- ORA or reverse argument

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Question	Answer	Marks	Guidance
1(a)(i)	C / N_2 / nitrogen;	1	
1(a)(ii)	A / NH_3 / ammonia;	1	
1(a)(iii)	B / $NaNO_3$ / sodium nitrate;	1	
1(a)(iv)	E / NaC*l* / sodium chloride;	1	
1(a)(v)	B / $NaNO_3$ / sodium nitrate;	1	
1(b)(i)	sodium nitrate;	1	
1(b)(ii)	gas; molecular; solid; ions; (1 mark each)	4	

Question	Answer	Marks	Guidance
2(a)(i)	temperature rises / heat given off;	1	
2(a)(ii)	structure completed with O ‖ – C – O – H ;	1	**A** –OH in place of – O – H **I** COOH
2(a)(iii)	*Any three of:* • evaporation / heat solution / leave the solution; • to crystallisation point / to form crystals; • filter off crystals / pick out crystals; • dry crystals between filter papers / heat gently / heat to just above 100 °C;	3	**R** heat to dryness / heat until all water comes off NOTE: filtration must be after crystallisation
2(b)	3rd and 5th boxes ticked (one mark each);	2	

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Question	Answer	Marks	Guidance
2(c)	*Any two of:* • bubbles; • fizzing (sound); • magnesium disappears / gets smaller; • change in temperature / gets warmer;	2	**I** pops / explodes **A** gets colder

Question	Answer	Marks	Guidance
3(a)(i)	4^{th} box down ticked (thermal decomposition);	1	
3(a)(ii)	use fume cupboard / fume hood / well-ventilated area;	1	**A** breathing apparatus / safety goggles
3(a)(iii)	liquid; particles close together / touching; particles randomly arranged / no fixed arrangement;	3	**I** reference to gaps **I** particles moving / slide over each other
3(b)(i)	H_2SO_4;	1	**A** any order e.g. SO_4H_2
3(b)(ii)	pH 1;	1	
3(c)	filter funnel and filter paper; either funnel or filter paper labelled;	2	
3(d)(i)	reversible reaction / equilibrium;	1	**A** goes both ways
3(d)(ii)	white; to blue;	2	

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Question	Answer	Marks	Guidance
4(a)	carbon dioxide escapes / gas escapes;	1	**A** carbon dioxide / gas given off
4(b)(i)	decreases; then levels off / remains the same / becomes steady;	2	
4(b)(ii)	42–46 (s);	1	
4(b)(iii)	3.5 (g);	1	
4(b)(iv)	initial gradient steeper and starts at 200 g; ends up at same volume;	2	
4(b)(v)	decreases / slows down;	1	**I** time increases
4(c)(i)	zinc oxide / zinc hydroxide / zinc carbonate;	1	
4(c)(ii)	anode: chlorine / Cl_2; cathode: zinc / Zn;	2	**R** chloride ions / zinc ion

Question	Answer	Marks	Guidance
5(a)(i)	ring around the OH group;	1	
5(a)(ii)	3 / O,C and H;	1	**I** 'molecules'
5(a)(iii)	10;	1	**I** 'molecules'
5(a)(iv)	double bond / C=C;	1	
5(b)(i)	(C), B, E, D, A = 2 marks one pair reversed = 1 mark	2	
5(b)(ii)	boiling point;	1	**I** molecular mass
5(c)(i)	X anywhere in top compartment; H anywhere in bottom pipe or outside bottom pipe;	2	**A** H in bottom compartment

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Question	Answer	Marks	Guidance
5(c)(ii)	any suitable e.g. making chemicals / making ethene;	1	**A** making gasoline / petrol / more fuel
5(d)(i)	animal wastes / gases from animals / bacterial decay / rice paddy fields / fracking / landfill sites / decay of vegetation / melting permafrost;	1	**A** cows / sheep / pigs / bacteria
5(d)(ii)	global warming / greenhouse gas / rise in temperature of atmosphere;	1	**A** effects of global warming e.g. ice caps melt / desertification / extreme weather
5(d)(iii)	alkane(s);	1	

Question	Answer	Marks	Guidance
6(a)(i)	A and B; (very) high melting points;	2	
6(a)(ii)	A; good electrical conductor;	2	
6(a)(iii)	C;	1	
6(b)	*Any four of:* • no reaction between bromine and potassium chloride / reaction mixture remains an orange colour / no colour change; • because chlorine is more reactive than bromine ORA; • solution goes brown with potassium iodide / solution darkens with potassium iodide; • there is a reaction with potassium iodide / potassium bromide formed with potassium iodide / bromine formed with potassium iodide; • iodine less reactive than bromine ORA;	4	**A** there is a colour change
6(c)	kills bacteria / kills microorganisms;	1	**I** to purify water / to make it cleaner
6(d)	pair of electrons between chlorine atoms; 6 non-bonding electrons on outer shell of right hand chlorine atom;	2	**I** inner shell electrons
6(e)(i)	In_2Cl_6;	1	**I** $InCl_3$
6(e)(ii)	49;	1	

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Question	Answer	Marks	Guidance
7(a)	evaporates easily / vaporises readily;	1	**A** has a low boiling point / evaporates at room temperature
7(b)	*Any three of:* • movement of particles; • diffusion; • particles collide with each other / particles bounce off each other; • spreading out of particles; • random (movement of particles); • (particles move) from higher to lower concentration;	3	
7(c)(i)	increases;	1	
7(c)(ii)	no fixed pattern in melting points / melting points are irregular;	1	
7(c)(iii)	third box down ticked (CH_2);	1	
7(c)(iv)	oxygen (on left); water (on right);	2	
7(d)(i)	atoms with same number of protons but different number of neutrons **OR** atoms with same atomic number but different number of neutrons **OR** atoms with same number of protons but different mass number;	1	**A** nucleon number for mass number **A** elements with same number of protons but different number of neutrons **OR** atoms of same elements with different numbers of neutrons
7(d)(ii)	$^{12}_{6}C$;	1	

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