CAMBRIDGE INTERNATIONAL EXAMINATIONS

Cambridge International General Certificate of Secondary Education

MARK SCHEME for the May/June 2015 series

0620 CHEMISTRY

0620/22 Paper 2 (Core Theory), maximum raw mark 80

This mark scheme is published as an aid to teachers and candidates, to indicate the requirements of the examination. It shows the basis on which Examiners were instructed to award marks. It does not indicate the details of the discussions that took place at an Examiners' meeting before marking began, which would have considered the acceptability of alternative answers.

Mark schemes should be read in conjunction with the question paper and the Principal Examiner Report for Teachers.

Cambridge will not enter into discussions about these mark schemes.

Cambridge is publishing the mark schemes for the May/June 2015 series for most Cambridge IGCSE®, Cambridge International A and AS Level components and some Cambridge O Level components.

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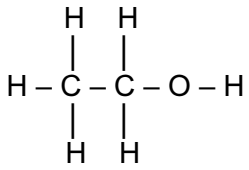
Abbreviations used in the Mark Scheme

- ; 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

Question	Answer	Marks	Guidance
1(a)(i)	E / XeO_4;	1	
1(a)(ii)	C / NH_4NO_3;	1	
1(a)(iii)	A / CaO;	1	
1(a)(iv)	D / CO_2;	1	
1(a)(v)	A and C / CaO and NH_4NO_3;	1	Both required for mark
1(a)(vi)	A and F / CaO and H_2SO_4 ;	1	Both required for mark
1(b)	H_2O on right; **COND** 2 on left;	2	Second mark depends on H_2O on right
1(c)	atoms (in first space); combined (in second space);	2	

Question	Answer	Marks	
2(a)	temperature goes down / temperature decreases / temperature falls OWTTE;	1	
2(b)	*Any 3 of (1 mark each)* • add citric acid from burette to sodium hydroxide / titrate citric acid with sodium hydroxide; • use of indicator / titrate until indicator changes colour; • repeat without indicator / remove indicator with charcoal; • evaporate to crystallisation point / leave to crystallise / partially evaporate; • dry crystals with filter paper / heat gently / put in an oven;	3	**A** Wash crystals with a little water **R** heat to dryness
2(c)	1st and 5th boxes ticked (1 mark each);	2	APPLY: listing if more than two boxes ticked

Question	Answer	Marks	Guidance
2(d)		1	
2(e)	steam (in first space); catalyst (in second space);	2	

Question	Answer	Marks	
3(a)(i)	2 (on left); H_2O on right;	2	NOTE: marks are independent
3(a)(ii)	4th box down ticked (thermal decomposition);	1	
3(b)	pH 8 circled;	1	
3(c)(i)	salt; water / H_2O;	2	NOTE: either order in the spaces
3(c)(ii)	idea of carbon dioxide trapped / idea of gas trapped in bread / idea that gas cannot escape / idea that carbon dioxide cannot escape ORA;	1	
3(c)(iii)	so it doesn't harm you (effect on person);	1	**A** so it doesn't poison you **I** to make sure there are no contaminants
3(d)	liquid; particles close together; particles randomly arranged / no fixed arrangement / irregular arrangement;	3	NOTE: if solid for 1st marking point, can get the 2nd marking point NOTE: if gas for 1st marking point, can get the 3rd marking point

Question	Answer	Marks	Guidance
4(a)	(left box) flask / Erlenmeyer; (right box) (gas) syringe;	2	**I** type of flask
4(b)(i)	increases; then levels off / rate of increase less / stops / slows down / stays constant;	2	
4(b)(ii)	values between 4.6 and 4.9 (min);	1	
4(b)(iii)	35 (cm^3);	1	**A** values between 34.5 and 35
4(b)(iv)	initial gradient steeper; levelling off to same final volume;	2	**R** lines stopping at final volume which clearly would be still increasing in volume
4(c)	(rate) decreases / slower / less / takes more time;	1	
4(d)(i)	(anode) chlorine; (cathode) zinc;	2	**A** Cl_2 / Cl **A** Zn
4(d)(ii)	inert / unreactive;	1	**I** cheaper

Question	Answer	Marks	
5(a)	COOH group ringed;	1	
5(b)(i)	contains (carbon-carbon) double bonds;	1	**R** contains C=O bond
5(b)(ii)	add bromine water / aqueous bromine / bromine; decolourises / goes colourless	2	**I** goes clear / discolourises (second mark dependant on getting bromine)
5(c)	sodium carbonate; water;	2	**A** layout as water + sodium carbonate

Question	Answer	Marks	Guidance
5(d)	idea of monomer as small molecule / monomers join (to make polymer) / monomers (ethene) polymerises; ethene is the monomer; addition polymerisation / idea of addition reaction / monomers (or ethene) add together to form polymer;	3	NOTE: ethene monomers add together to form polymer = 3 marks
5(e)(i)	grind flowers / grind them / crush / blend / use a mortar and pestle; extract with solvent / add solvent / add water; filter (the solution through glass wool);	3	NOTE: grind with solvent = 2 marks **A** filter / filter through filter paper
5(e)(ii)	A and C (both needed for the mark);	1	APPLY: listing

Question	Answer	Marks	
6(a)	copper and iron / Cu and Fe; (very) high density / (very) high melting point;	2	**A** very strong
6(b)(i)	aluminium is a very good conductor / aluminium is a better conductor / aluminium has a low density; aluminium (on its own) is not strong enough / aluminium is (only) fairly strong / iron is very strong / iron gives the cable extra strength / iron is stronger than aluminium;	2	
6(b)(ii)	low melting point / weak / not strong;	1	**I** statements about reactivity
6(c)	cobalt chloride is coloured / calcium chloride is not coloured;	1	
6(d)	silver, aluminium, magnesium lithium;	1	
6(e)(i)	reversible (reaction) / equilibrium (reaction);	1	
6(e)(ii)	lighted splint / flame; **COND** pops / explodes;	2	second mark dependant on getting lighted splint NOTE: glowing splint = 0

Question	Answer	Marks	Guidance
6(f)	*Any 4 of:* • mixture of metals / mixture of metal with non-metal / mixture of metal with another element; • example of alloy e.g. Fe + Cr / Fe + Ti / Fe + C / mild steel / stainless steel etc.; • alloy is more resistant to corrosion / less likely to rust / does not rust / less reactive; • alloy is harder / stronger ; • example of use of an alloy of IRON e.g. car bodies / chemical plant / utensils / buildings / kitchen equipment;	**4**	**I** melting points / boiling points

Question	Answer	Marks	
7(a)	*Any 3 of:* • diffusion; • (bulk) movement of particles from high to low concentration; • particles are in constant motion; • (movement of particles is) random; • bromine particles spread (throughout the solvent particles) / bromine particles mix up (with solvent);	**3**	**A** particles move (from place to place) **A** particles collide with each other / particles hit into each other
7(b)(i)	liquid;	**1**	
7(b)(ii)	increases / higher / goes up;	**1**	
7(b)(iii)	values between 1.6 – 4.9 (Actual = 3.12);	**1**	NOTE: if range given both figures must be within this range
7(b)(iv)	2;	**1**	
7(c)(i)	I_2;	**1**	
7(c)(ii)	chlorine is more reactive than bromine / bromine is less reactive than chlorine;	**1**	**I** reference to bromide / chloride / relative positions of bromine or chlorine in the Group

Question	Answer	Marks	Guidance
7(d)	137;	**2**	NOTE: if answer is incorrect allow 1 mark for both correct atomic masses (Br = 80 and F = 19) **A** ecf from ONE incorrect atomic mass for 1 mark