

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

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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)	E / XeO ₄ ;	1	
1(a)(ii)	C / NH ₄ NO ₃ ;	1	
1(a)(iii)	A / CaO;	1	
1(a)(iv)	D / CO ₂ ;	1	
1(a)(v)	A and C / CaO and NH ₄ NO ₃ ;	1	Both required for mark
1(a)(vi)	A and F / CaO and H ₂ SO ₄ ;	1	Both required for mark
1(b)	H ₂ O on right; COND 2 on left;	2	Second mark depends on H ₂ O 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)	<i>Any 3 of (1 mark each)</i> - 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)	1 st and 5 th boxes ticked (1 mark each);	2	APPLY: listing if more than two boxes ticked

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Question	Answer	Marks	Guidance
2(d)	$ \begin{array}{c} \text{H} \quad \text{H} \\ \quad \\ \text{H} - \text{C} - \text{C} - \text{O} - \text{H} \\ \quad \\ \text{H} \quad \text{H} \end{array} $	1	
2(e)	steam (in first space); catalyst (in second space);	2	

Question	Answer	Marks	
3(a)(i)	2 (on left); H ₂ O on right;	2	NOTE: marks are independent
3(a)(ii)	4 th box down ticked (thermal decomposition);	1	
3(b)	pH 8 circled;	1	
3(c)(i)	salt; water / H ₂ O;	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 1 st marking point, can get the 2 nd marking point NOTE: if gas for 1 st marking point, can get the 3 rd marking point

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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 / decolourises (second mark dependant on getting bromine)
5(c)	sodium carbonate; water;	2	A layout as water + sodium carbonate

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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 <u>very</u> strong
6(b)(i)	aluminium is a <u>very good</u> 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

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Question	Answer	Marks	Guidance
6(f)	<i>Any 4 of:</i> - 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)	<i>Any 3 of:</i> - 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

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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