Cambridge Assessment International Education
Cambridge International General Certificate of Secondary Education

CHEMISTRY **0620/31**

Paper 3 Core Theory **October/November 2018**

MARK SCHEME

Maximum Mark: 80

Published

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 International will not enter into discussions about these mark schemes.

Cambridge International is publishing the mark schemes for the October/November 2018 series for most Cambridge IGCSE™, Cambridge International A and AS Level components and some Cambridge O Level components.

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Generic Marking Principles

These general marking principles must be applied by all examiners when marking candidate answers. They should be applied alongside the specific content of the mark scheme or generic level descriptors for a question. Each question paper and mark scheme will also comply with these marking principles.

GENERIC MARKING PRINCIPLE 1:

Marks must be awarded in line with:

- the specific content of the mark scheme or the generic level descriptors for the question
- the specific skills defined in the mark scheme or in the generic level descriptors for the question
- the standard of response required by a candidate as exemplified by the standardisation scripts.

GENERIC MARKING PRINCIPLE 2:

Marks awarded are always **whole marks** (not half marks, or other fractions).

GENERIC MARKING PRINCIPLE 3:

Marks must be awarded **positively**:

- marks are awarded for correct/valid answers, as defined in the mark scheme. However, credit is given for valid answers which go beyond the scope of the syllabus and mark scheme, referring to your Team Leader as appropriate
- marks are awarded when candidates clearly demonstrate what they know and can do
- marks are not deducted for errors
- marks are not deducted for omissions
- answers should only be judged on the quality of spelling, punctuation and grammar when these features are specifically assessed by the question as indicated by the mark scheme. The meaning, however, should be unambiguous.

GENERIC MARKING PRINCIPLE 4:

Rules must be applied consistently e.g. in situations where candidates have not followed instructions or in the application of generic level descriptors.

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GENERIC MARKING PRINCIPLE 5: Marks should be awarded using the full range of marks defined in the mark scheme for the question (however; the use of the full mark range may be limited according to the quality of the candidate responses seen).
GENERIC MARKING PRINCIPLE 6: Marks awarded are based solely on the requirements as defined in the mark scheme. Marks should not be awarded with grade thresholds or grade descriptors in mind.

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Question	Answer	Marks
1(a)(i)	C	**1**
1(a)(ii)	C	**1**
1(a)(iii)	E	**1**
1(a)(iv)	D	**1**
1(a)(v)	A	**1**
1(b)	electrons in K^+: 18 (1) neutrons in C–14: 8 (1) protons in C 6 **AND** K^+ 19 (1)	**3**

Question	Answer	Marks
2(a)(i)	Mg^{2+} / magnesium	**1**
2(a)(ii)	potassium chloride	**1**
2(a)(iii)	0.032 (g)	**1**
2(a)(iv)	sodium chloride	**1**
2(b)	flame test / description of flame test (1) flame coloured lilac (1)	**2**
2(c)	carbohydrate	**1**
2(d)(i)	OH ringed	**1**
2(d)(ii)	$C_3H_7NO_3$	**1**

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Question	Answer	Marks
3(a)(i)	(Liebig) condenser (1)	**1**
3(a)(ii)	One mark each for any three of: • water has lower boiling point than copper(II) sulfate • heat the aqueous copper(II) sulfate • water turns to steam but copper(II) sulfate remains (in flask) • steam turns to liquid in condenser	**3**
3(b)	colourless liquid collects / condenses at top of the tube (1) copper(II) sulfate turns white (1)	**2**
3(c)(i)	H_2O	**1**
3(c)(ii)	filtration / filter	**1**
3(d)	oxygen removed from the copper oxide / copper oxide loses oxygen / it loses oxygen (1)	**1**
3(e)	(copper + nitric acid) → copper nitrate + nitrogen dioxide + water (2) If 2 marks not scored: 1 mark for correct names of two products	**2**

Question	Answer	Marks
4(a)(i)	has C=C (double bond)	**1**
4(a)(ii)	aqueous bromine / bromine water / bromine **AND** (bromine) decolourised / goes colourless (2) aqueous bromine / bromine water / bromine (for 1 mark)	**2**
4(b)	correct structure of carboxylic acid group showing C=O and –O-H	**1**

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Question	Answer	Marks
4(c)	compounds (1) chemical (1) functional (1)	**3**
4(d)(i)	One mark each for any two of: • not much increase / gradual increase in pH at first • sudden increase in pH as more sodium hydroxide added • not much increase / gradual increase in pH when sodium hydroxide in excess	**2**
4(d)(ii)	pH 2.4	**1**
4(d)(iii)	23 (cm^3)	**1**

Question	Answer	Marks
5(a)(i)	P = melting (1) Q = condensing (1)	**2**
5(a)(ii)	***liquid:*** motion: moving (more) slowly / sliding over each other / moving randomly / restricted movement (1) separation: close together / touching (1) ***gas:*** motion: moving rapidly / moving randomly / move everywhere (1) separation: far apart (1)	**4**
5(b)(i)	2 (Li) (1) 2 (H_2O) (1)	**2**

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Question	Answer	Marks
5(b)(ii)	lithium hydroxide	**1**
5(c)(i)	positive electrode: oxygen (1) negative electrode: hydrogen (1)	**2**
5(c)(ii)	bubbles / effervescence (1)	**1**
5(c)(iii)	graphite is inert / unreactive / does not react with the electrolyte ORA	**1**

Question	Answer	Marks
6(a)(i)	S (1) U (1)	**2**
6(a)(ii)	R (1) U (1)	**2**
6(a)(iii)	S (1)	**1**
6(a)(iv)	T (1)	**1**
6(b)(i)	2 (P_2O_5)	**1**
6(b)(ii)	acidic because phosphorus is a non-metal	**1**
6(c)(i)	NO_3^-	**1**
6(c)(ii)	to promote plant growth / to replenish minerals from the soil which have been absorbed by crop plants	**1**

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Question	Answer	Marks
7(a)(i)	carbon dioxide released / gas released	**1**
7(a)(ii)	2.2 (g)	**1**
7(a)(iii)	initial gradient of line steeper and starts at 250–0 (1) levels out at 247.8 g (1)	**2**
7(a)(iv)	20 °C → 0.16 40 °C → 0.64 30 °C → 0.32	**1**
7(b)	hematite (1) dioxide (1) slag (1)	**3**

Question	Answer	Marks
8(a)(i)	106 (2) If 2 marks not given: 1 mark for (Na) = 23, (C) = 12 and (O) = 16	**2**
8(a)(ii)	absorbs heat / takes in heat	**1**
8(a)(iii)	neutralisation	**1**
8(b)(i)	oxygen / O_2	**1**
8(b)(ii)	carbon + oxygen → carbon dioxide	**1**
8(b)(iii)	reactants on the left and product on the right (both required)	**1**
8(c)(i)	any suitable use e.g. filling (old-fashioned light) bulbs / lamps / inert gas in stopping oxidations / welding	**1**

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Question	Answer	Marks
8(c)(ii)	1st box ticked (argon unreactive) (1) 3rd box ticked (argon monoatomic) (1)	**2**

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