Cambridge Assessment International Education
Cambridge International General Certificate of Secondary Education

CHEMISTRY **0620/32**

Paper 3 Theory (Core) **May/June 2019**

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 May/June 2019 series for most Cambridge IGCSE™, Cambridge International A and AS Level and Cambridge Pre-U components, and some Cambridge O Level components.

This syllabus is regulated for use in England, Wales and Northern Ireland as a Cambridge International Level 1/Level 2 Certificate.

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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)	A / methanol / CH_3OH	**1**
1(a)(ii)	D / calcium oxide / CaO	**1**
1(a)(iii)	C / iron / Fe	**1**
1(a)(iv)	B / sulfur dioxide / SO_2	**1**
1(a)(v)	D / calcium oxide / CaO	**1**
1(b)	atoms of two or more (different) elements chemically combined / bonded	**1**

Question	Answer	Marks
2(a)(i)	$C + O_2 \rightarrow CO_2$ (2) if two marks not scored: 1 mark for $C + 2O \rightarrow CO_2$	**2**
2(a)(ii)	acidic oxide (1) sulfur is a non-metal (oxide) (1)	**2**
2(b)(i)	arrow under the ceramic boat	**1**
2(b)(ii)	direct change from solid to gas (without any liquid state forming)	**1**
2(b)(iii)	any **two** from: • (hot iron(III) chloride is a) vapour / gas • flask is cooler • so iron(III) chloride goes from vapour to solid (where flask cooler)	**2**
2(b)(iv)	idea of one substance forming two or more substances	**1**

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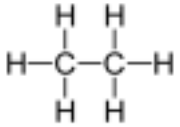
Question	Answer	Marks
2(c)	any **two** from: • oxygen • steam • acid	**2**
2(d)	(add aqueous) sodium hydroxide / (aqueous) ammonia (1) green precipitate (1)	**2**

Question	Answer	Marks
3(a)(i)	0.2%	**1**
3(a)(ii)	oxygen / O_2	**1**
3(a)(iii)	any **two** from: • more aluminium in crust (or reverse argument) • more calcium in crust (or reverse argument) • more iron in crust (or reverse argument) • more silicon in crust (or reverse argument) • more sodium in crust (or reverse argument) • more chlorine in oceans (or reverse argument) • more hydrogen in oceans (or reverse argument) • more oxygen in oceans (or reverse argument)	**2**
3(b)(i)	bauxite	**1**
3(b)(ii)	positive electrode: oxygen / O_2 / O (1) negative electrode: aluminium/ Al (1)	**2**
3(b)(iii)	aluminium is too reactive / aluminium is very reactive / aluminium is high in the reactivity series	**1**

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Question	Answer	Marks
4(a)	*liquid:* particles not arranged regularly / particles randomly arranged / irregular arrangement (1) particles sliding over each other / particles moving randomly (1) *gas:* particles not arranged regularly / particles arranged irregularly/ particles randomly arranged (1) particles moving fast / particles moving randomly / particles moving in any direction (1)	**4**
4(b)	increasing the temperature increases the volume / volume proportional to temperature	**1**
4(c)(i)	chlorine (1) potassium bromide (1)	**2**
4(c)(ii)	chlorine more reactive than bromine / bromine less reactive than chlorine	**1**
4(d)(i)	Br_2 on left (1) 2 (HBr) (1)	**2**
4(d)(ii)	the energy of the reactants is more than the energy of the products / energy of the products is less than the energy of the reactants / the reactants lose energy when they form products	**1**
4(e)	(add nitric acid and aqueous) silver nitrate (1) cream precipitate (1)	**2**

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Question	Answer	Marks
5(a)		**1**
5(b)	butane	**1**
5(c)(i)	larger smaller (1 mark if both correct) molecules (1)	**2**
5(c)(ii)	high temperature (1) catalyst / silicon dioxide / aluminium oxide / zeolites (1)	**2**
5(d)	third box from left ticked	**1**
5(e)(i)	any suitable use e.g. clothing / fishing lines / ropes/nets	**1**
5(e)(ii)	4	**1**
5(f)(i)	carbon-carbon double bond / C=C bond	**1**
5(f)(ii)	aqueous bromine / bromine water / bromine (1) decolourised / turns colourless (1)	**2**

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Question	Answer	Marks
6(a)	any **three** from: • **heat** cobalt carbonate with sulfuric acid • filter off (excess) cobalt carbonate • heat **filtrate** to point of crystallisation / heat (cobalt sulfate) **solution** to point of crystallisation • dry between filter papers / dry in drying oven	**3**
6(b)	155 (2) if 2 marks not scored 1 mark for Co = (1 × 59) = 59 **OR** O (= 4 × 16) = 64	**2**
6(c)	electrons in O = 8 (1) electrons in Co^{2+} = 25 (1) neutrons in O = 9 **AND** neutrons in Co^{2+} = 32 (1) protons in O = 8 (1)	**4**
6(d)	blue (1) to pink (1)	**2**
6(e)(i)	D	**1**
6(e)(ii)	3rd box down ticked / stainless steel	**1**

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Question	Answer	Marks
7(a)	magnesium chloride	1
7(b)(i)	decreases as reaction proceeds (1) gradient of graph decreases as time increases / gradient of graph is steep at first and less steep later (1)	2
7(b)(ii)	34 s	1
7(b)(iii)	line steeper than original and starting from 0 (1) line ends up at same final volume **AND** levels off at or before 100 s (1)	2
7(b)(iv)	9.6 (g)	1

Question	Answer	Marks
8(a)(i)	high temperature furnaces / car engines / lightning	1
8(a)(ii)	breathing difficulties / lung damage / irritation of nose (or eyes or mouth) / breathing problems	1
8(a)(iii)	substance which speeds up a reaction / substance which increases the rate of reaction.	1
8(a)(iv)	pH1	1
8(b)	increase plant growth / make plants grow faster	1
8(c)	lead < tin < manganese < calcium if 2 marks not scored allow 1 mark for 1 consecutive pair reversed	2
8(d)	gas	1

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