Cambridge Assessment International Education
Cambridge International General Certificate of Secondary Education

CHEMISTRY **0620/33**

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.

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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 / CH_4 / methane(1) B / NaCl / sodium chloride (1)	**2**
1(a)(ii)	E / Ar / argon	**1**
1(a)(iii)	D / Zn / zinc	**1**
1(a)(iv)	A / CH_4 / methane	**1**
1(a)(v)	B / NaCl / sodium chloride	**1**
1(a)(vi)	A / CH_4 / methane	**1**
1(b)	any **two** from: components / parts / substances in it can be separated (by physical means) chemical properties of components / parts / substances do not change (when mixed) variable composition / substances present can be mixed in different quantities	**2**

Question	Answer	Marks
2(a)(i)	hematite	**1**
2(a)(ii)	iron oxide loses oxygen / oxygen transferred from iron oxide to carbon / carbon takes oxygen away from iron oxide	**1**
2(a)(iii)	energy (level) of the products is greater than the energy of the reactants	**1**
2(a)(iv)	iron is (relatively) low in the reactivity series	**1**
2(b)	any **three** from: high melting point / high boiling point high density forms coloured compounds forms ions with different charges / forms ions with variable valency / form ions with different oxidation numbers forms complex ions can be used as a catalyst	**3**

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Question	Answer	Marks
2(c)(i)	2 (Fe) (1) 3 (Cl_2)	**2**
2(c)(ii)	reversible reaction	**1**
2(d)	$(FeC_6N_6)^{4-}$ / $(Fe(CN)_6)^{4-}$	**1**

Question	Answer	Marks
3(a)(i)	0.7 (%)	**1**
3(a)(ii)	sodium	**1**
3(a)(iii)	any **two** differences e.g.: more chlorine / hydrogen / magnesium / oxygen / sodium in oceans than in biosphere **ORA** less carbon / silicon / calcium in oceans **ORA**	**2**
3(b)(i)	carbon dioxide	**1**
3(b)(ii)	anhydrous copper(II) sulfate / white copper(II) sulfate (1) turns blue (1) **OR** anhydrous cobalt(II) chloride / blue cobalt(II) chloride (1) turns pink / red (1)	**2**

Question	Answer	Marks
4(a)	*solid:* particles arranged regularly / particles ordered / lattice (1) particles (only) vibrating (1) *gas:* particles arranged irregularly / particles randomly arranged (1) particles moving fast / particles moving randomly / particles moving in any direction (1)	**4**
4(b)	pressure increases as temperature increases / pressure is proportional to temperature	**1**
4(c)(i)	chlorine (1) sodium iodide (1)	**2**
4(c)(ii)	chlorine is more reactive than bromine / bromine is less reactive than chlorine	**1**
4(d)	10 (C) (1) 16 (HC*l*)	**2**

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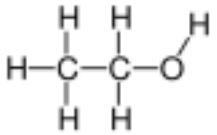
Question	Answer	Marks
5(a)(i)	circle around COOH group only	**1**
5(a)(ii)	3	**1**
5(b)(i)	solid (1) 100 ºC is lower than the melting point / the melting point is higher than 100 ºC (1)	**2**
5(b)(ii)	last box ticked	**1**
5(c)	any **two** chemical properties of acids e.g.: reacts with alkalis / named alkali reacts with metals / named metal reacts with (reactive) metal oxides / named metal oxide reacts with metal carbonates / named metal carbonate turns blue litmus red / turns methyl orange red / turns universal indicator yellow / orange / red	**2**
5(d)(i)	water / H_2O	**1**
5(d)(ii)	speeds up reaction / increases the rate of reaction	**1**
5(d)(iii)		**1**
5(e)(i)	poly(ethene) / polyethene	**1**
5(e)(ii)	clothing	**1**

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Question	Answer	Marks
6(a)	any **three** from: **heat** zinc with sulfuric acid filter off (excess) zinc heat **filtrate** to point of crystallisation / heat (zinc sulfate) **solution** to point of crystallisation dry between filter papers / dry in drying oven	**3**
6(b)(i)	2nd box down ticked (decomposition)	**1**
6(b)(ii)	31.7 (g)	**1**
6(c)	161 (2) if 2 marks not scored 1 mark for O = (4 · 16) = 64 **OR** 1 mark for S = (1 · 32) = 32	**2**
6(d)	electrons in S = 16 (1) electrons in Zn^{2+} = 28 (1) neutrons in S =20 **AND** neutrons in Zn^{2+} = 37 (1) protons in S = 16 (1)	**4**
6(e)	**mixture** of metal with other element(s)	**1**

Question	Answer	Marks
7(a)	magnesium nitrate	**1**
7(b)(i)	any value between and including 92–102 s	**1**
7(b)(ii)	34 (cm^3)	**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 90 s (1)	**2**

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Question	Answer	Marks
7(b)(iv)	increases rate / goes faster	**1**
7(b)(v)	decreases rate / goes slower	**1**
7(c)	aluminium (1) ammonia (1) red **AND** blue (in correct spaces) (1)	**3**

Question	Answer	Marks
8(a)(i)	(combustion of) leaded petrol	**1**
8(a)(ii)	brain damage (in children) / damage to nervous system	**1**
8(b)	bismuth < lead < zinc < chromium (2) if 2 marks not scored allow 1 mark for 1 consecutive pair reversed	**2**
8(c)	**layers** can slide (over each other)	**1**
8(d)	carbon monoxide	**1**
8(e)	pH6	**1**
8(f)(i)	methane	**1**
8(f)(ii)	global warming / more extreme weather / ice caps melting / sea level rising / glaciers melting / corals die / sea acidified	**1**

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