Cambridge Assessment International Education
Cambridge International General Certificate of Secondary Education

CHEMISTRY **0620/32**

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

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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)	chlorine / Cl_2	1
1(a)(ii)	ammonia / NH_3	1
1(a)(iii)	neon / Ne	1
1(a)(iv)	carbon monoxide / CO	1
1(a)(v)	ethene / C_2H_4	1
1(b)(i)	(molecules) made up of two atoms	1
1(b)(ii)	shared pair of electrons (between two atoms)	1
1(c)	bonding pair of electrons	1
	6 non-bonded electrons in each Cl atom	1

Question	Answer	Marks
2(a)(i)	72 (%)	1
2(a)(ii)	hydrogen / H_2	1
2(b)(i)	breathing difficulties / irritates nose / irritates eyes / asthma attacks	1
2(b)(ii)	2 (NO_2)	1
	2 (NaOH)	1
2(b)(iii)	sodium nitrate	1
2(c)(i)	compound with no double C=C bonds / <u>only</u> contains single bonds.	1

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Question	Answer	Marks
2(c)(ii)	**compound** of carbon and hydrogen only / **compound** of hydrogen and carbon with no other elements **IF** 2 marks not scored: 1 mark for carbon and hydrogen only / **compound** of hydrogen and carbon	**2**
2(d)	98.5 (%)	**1**

Question	Answer	Marks
3(a)(i)	5	**1**
3(a)(ii)	ring around the OH group	**1**
3(a)(iii)	(substance which) speeds up a reaction / increases the rate of reaction	**1**
3(a)(iv)	idea of very long chains of repeating units / idea of lots of monomers joined together	**1**
3(b)(i)	any typical property of an acid e.g. reacts with sodium hydroxide / reacts with hydroxides / reacts with carbonates / reacts with metals / has pH below 7 / colourless / turns litmus red	**1**
3(b)(ii)	structure of ethanoic acid correct	**1**
3(c)(i)	solid	**1**
	–120 °C is below the melting point / it is below the melting point / it has not yet reached its melting point / melts above –120 °C	**1**
3(c)(ii)	addition	**1**
	ethene	**1**
	high	**1**
	catalyst	**1**

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Question	Answer	Marks
4(a)	One mark each for any 3 of: ∞ particles go from solid to liquid ∞ diffusion ∞ random movement of particles / particles move anywhere / particles move in all directions / particles move away ∞ spreading out of particles / intermingling of particles / mixing of particles / particles collide / particles bounce (off each other) / particles slide over each other ∞ (bulk) movement of particles from higher to lower concentration / movement of particles **down** concentration gradient	**3**
4(b)	addition of oxygen (to a substance) / loss of electrons / increase in oxidation number	**1**
4(c)(i)	glowing splint	**1**
	relights	**1**
4(c)(ii)	4 (HCl)	**1**
	2 (H_2O)	**1**
4(d)	lead<tin<manganese<magnesium **IF** 2 marks not scored: 1 mark if all reversed / one consecutive pair reversed	**2**

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Question	Answer	Marks
4(e)	One mark each for any 3 of: ∞ Mn has high melting point / boiling point / ORA for Na ∞ Mn has high density / ORA for Na ∞ Mn has catalytic activity / ORA for Na ∞ Mn forms coloured compounds / ORA for Na ∞ Mn compounds have variable oxidation states / form ions with different charges / ORA for Na ∞ Mn is hard / Na is soft / Mn is strong / Na is weak ∞ one suitable difference in chemical properties e.g. Mn is less reactive than Na ORA / Na reacts with cold water / Mn does not react with cold water	**3**

Question	Answer	Marks
5(a)(i)	test tubes of solution covering each electrode	**1**
5(a)(ii)	cathode	**1**
5(a)(iii)	negative electrode: hydrogen / H_2	**1**
	positive electrode: chlorine / Cl_2	**1**
5(a)(iv)	carbon / platinum	**1**
5(b)(i)	150 (g)	**1**
5(b)(ii)	decreases the melting point / melting point is not sharp	**1**
5(c)	evaporation/ crystallisation	**1**

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Question	Answer	Marks
6(a)	One mark each for any 5 of: ∞ protons in the nucleus / centre (of the atom) / middle ∞ neutrons in the nucleus / centre (of the atom) / middle ∞ electrons outside the nucleus / electrons surrounding the nucleus / electrons orbiting the nucleus ∞ 7 protons ∞ 7 electrons ∞ 8 neutrons	**5**
6(b)	atoms (of an element) with the same number of protons but different number of neutrons **IF** 2 marks not scored: 1 mark for idea of same number of protons but different number of neutrons	**2**
6(c)	any suitable use e.g. measuring the thickness of paper / energy from nuclear reactors / finding leaks (in pipelines) / smoke alarms / energy production	**1**

Question	Answer	Marks
7(a)(i)	density of iodine: values between 3.10 and 6.35 (excluding these two values)	**1**
	melting point of At_2 values greater than 114 °C but less than 500 °C	**1**
	colour of At_2: black / grey-black	**1**
7(a)(ii)	it is a gas (at room temperature)	**1**
7(a)(iii)	(boiling point) increases down (the group) / (boiling point) decreases up (the group) / increases from chlorine to astatine ORA	**1**
7(b)	iodine	**1**

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Question	Answer	Marks
	potassium bromide	1
7(c)	171 **IF** 2 marks not scored: 1 mark for C = 12, F = 19 C*l* = 35.5	2

Question	Answer	Marks
8(a)	One mark each for any 2 of: ∞ distance of flame from can ∞ length of wick ∞ same can ∞ volume of water used / amount of water / mass of water ∞ same amount of stirring of the water	2
8(b)	**B**	1
8(c)	solvent / for making named chemical (e.g. ethanoic acid)	1
8(d)(i)	oxygen (on left)	1
	water (on right)	1
8(d)(ii)	exothermic because energy level of reactants above energy level of products / exothermic because the arrow is going downwards	1
8(e)(i)	<u>mixture</u> of metals / <u>mixture</u> of metal and non-metal / mixture of metal with another element	1

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Question	Answer	Marks
8(e)(ii)	arrangement: in layers / regular / lattice	**1**
	motion: (only) vibrating	**1**
8(e)(iii)	(stainless steel / it) is more resistant to corrosion (than pure metal)	**1**

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