Cambridge Assessment International Education
Cambridge International General Certificate of Secondary Education

CHEMISTRY **0620/32**

Paper 3 Theory (Core) **March 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)	E / oxygen / O_2	**1**
1(a)(ii)	A / sodium bromide / NaBr	**1**
1(a)(iii)	E / oxygen / O_2	**1**
1(a)(iv)	C / carbon dioxide / CO_2	**1**
1(a)(v)	A / sodium bromide / NaBr	**1**
1(b)	protons: 8	**1**
	neutrons: 9	**1**
	electrons: 8	**1**
1(c)	glowing splint	**1**
	relights	**1**

Question	Answer	Marks
2(a)(i)	25 (mg)	**1**
2(a)(ii)	potassium / K^+	**1**
2(a)(iii)	magnesium sulfate	**1**
2(a)(iv)	add nitric acid	**1**
	add (aqueous) silver nitrate and white precipitate (1 mark if silver nitrate alone)	**2**
2(b)(i)	circle around COOH group	**1**
2(b)(ii)	$C_3H_6O_3$	**1**

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Question	Answer	Marks
2(c)(i)	removal of oxygen (from a compound)	**1**
2(c)(ii)	46 If 2 marks not obtained: 1 mark for 1 row all correct e.g. hydrogen 6 × 1 = 6 oxygen 1 × 16 = 16	**2**

Question	Answer	Marks
3(a)	one mark each for any 3 of: • (iodine) particles go from solid to solution • diffusion • particles move / particles collide • random (movement of) particles / particles (move) anywhere / particles (move) in all directions • spreading out of particles / intermingling of particles / mixing of particles • (bulk) movement (of particles) from higher to lower concentration	**max 3**
3(b)(i)	density of fluorine: ALLOW: values lower than 1.56 (but not 0 or negative numbers)	**1**
	melting point of chlorine: ALLOW values between –220 and –7 °C (excluding these two values)	**1**
3(b)(ii)	lighter because the trend of colour down (the Group) is towards dark(er) colours / lighter because the trend of colour up (the Group) is towards light(er) colours	**1**
3(b)(iii)	liquid	**1**
	40 °C is between the melting and boiling points / 40 °C is between –7 °C and 59 °C / 40 °C is higher than the melting point **AND** lower than the boiling point	**1**
3(c)	Br_2	**1**
	2 (KBr)	**1**

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Question	Answer	Marks
4(a)	1st and 3rd boxes down ticked (1 mark each)	**2**
4(b)	alkane(s)	**1**
4(c)	**compound** of carbon and hydrogen only / **compound** of hydrogen and carbon with no other elements If 2 marks not scored: 1 mark for : contains carbon and hydrogen only / compound of hydrogen and carbon	**2**
4(d)	structure of ethane correct with all atoms and all bonds H H | | H – C – C – H | | H H	**1**
4(e)(i)	one mark each for any two of: • high temperature • catalyst • high pressure	**max 2**
4(e)(ii)	$C_{11}H_{24}$	**1**
4(f)	steam	**1**
4(g)	monomers	**1**
	addition	**1**

Question	Answer	Marks
5(a)(i)	magnesium floats (on the molten magnesium chloride)	**1**
5(a)(ii)	chlorine	**1**

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Question	Answer	Marks
5(a)(iii)	to stop the magnesium oxidising / to stop the magnesium reacting with the air / to stop it oxidising / to stop it reacting with the air	**1**
5(a)(iv)	argon / krypton / xenon	**1**
5(b)(i)	aluminium	**1**
	has the lowest density / has a low density	**1**
5(b)(ii)	aluminium	**1**
	has the best (electrical) conductivity	**1**
5(b)(iii)	cobalt **AND** nickel	**1**
5(c)	one mark each for any two of: • high melting points / high boiling points • high density • hard / strong • compounds are coloured • form ions with different oxidation states • act as catalysts	**max 2**
5(d)(i)	mixture of metals / mixture of metal and non-metal / mixture of a metal with another element(1)	**1**
5(d)(ii)	alloy is stronger (than pure metal) / alloy is more resistant to corrosion (than pure metal) / alloy is harder	**1**

Question	Answer	Marks
6(a)(i)	methane	**1**
6(a)(ii)	speeds up the reaction / increases the rate of reaction	**1**
6(b)(i)	sulfuric acid	**1**

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Question	Answer	Marks
6(b)(ii)	(chemical) erosion (of buildings) / pitting (of buildings) / corrosion (of metalwork) / weathering	**1**
6(b)(iii)	sulfur dioxide gains oxygen / it gains oxygen	**1**

Question	Answer	Marks
7(a)	one mark each for any 5 points maximum 2 marks for each of the reactions (with calcium oxide, magnesium, indicator) *with calcium oxide:* • forms calcium chloride • forms water • neutralises (calcium oxide) • reaction is exothermic / (reaction mixture) gets hot *with magnesium* • forms magnesium chloride • forms hydrogen • reaction is exothermic / (reaction mixture) gets hot • bubbles / effervesce / fizzes (seen in **one** of the above reactions) • calcium oxide / magnesium disappears (or gets smaller) (seen in **one** of the above reactions) *with indicator* • named acid-base indicator • correct colour of indicator in acidic solution	**max 5**
7(b)(i)	neutralisation	**1**
7(b)(ii)	pH 13	**1**
7(b)(iii)	ammonia	**1**

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Question	Answer	Marks
7(b)(iv)	4th box down ticked	**1**
7(b)(v)	so they do not harm you / no side effects	**1**

Question	Answer	Marks
8(a)(i)	decreases (rate) / slower (rate)	**1**
8(a)(ii)	decreases (rate) / slower (rate)	**1**
8(a)(iii)	increases (rate) / faster (rate)	**1**
8(b)(i)	hematite	**1**
8(b)(ii)	one mark each for any 3 of: • add (hydrochloric) acid • test gas given off with limewater • turns milky / cloudy / white precipitate (this mark dependent on limewater) • carbon dioxide produced	**max 3**
8(c)	bismuth < tin < iron < titanium 1 mark if all reversed / one consecutive pair reversed	**2**

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