Cambridge Assessment International Education
Cambridge International General Certificate of Secondary Education

CHEMISTRY **0620/32**

Paper 3 Theory (Core) **March 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 March 2019 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)	B	**1**
1(a)(iii)	E	**1**
1(a)(iv)	B	**1**
1(a)(v)	D	**1**
1(b)	4 electrons in outer shell (1) 2,8 in inner shell AND not more than 3 shells (1)	**2**

Question	Answer	Marks
2(a)(i)	electrons: 92 (1) neutrons: 143 (1)	**2**
2(a)(ii)	energy production	**1**
2(b)	atoms (1) element (1) neutrons (1)	**3**
2(c)	1 mark each for any two of: • conducts electricity • conducts heat • malleable • ductile • shiny / lustrous	**2**

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Question	Answer	Marks
2(d)	3 (H_2) (1) ⇌ (1) 2 (UH_3) (1)	**3**
2(e)	308 (2) if 2 marks not scored: 1 mark for (O = 2 × 16) = 32 OR F = (2 × 19) = 38	**2**

Question	Answer	Marks
3(a)(i)	Br^- / bromide	**1**
3(a)(ii)	potassium bromide	**1**
3(a)(iii)	11 (mg)	**1**
3(a)(iv)	e^-	**1**
3(b)	(acidified and add aqueous) barium chloride / barium nitrate forms white precipitate (2) if 2 marks not scored: 1 mark for barium chloride / barium nitrate	**2**
3(c)(i)	idea of solid turning (directly) to gas	**1**
3(c)(ii)	2 (H_2SO_4) (1) 3 (SO_2) (1)	**2**
3(c)(iii)	• add (organic) solvent to the mixture (and stir until all sulfur dissolves) (1) • filter off the zinc / filter off the residue (1) • let solvent evaporate from zinc / residue (1) • evaporate the sulfur solution / evaporate the solvent from the solution / evaporate solvent from filtrate (1)	**4**

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Question	Answer	Marks
3(d)	SF_6O	**1**

Question	Answer	Marks
4(a)	zinc chloride	**1**
4(b)(i)	54 (cm^3)	**1**
4(b)(ii)	S on any portion of the graph above 2.0 min and below 3.8 min	**1**
4(b)(iii)	steeper gradient starting at 0-0 (1) ends up at same volume (70 cm^3) (1)	**2**
4(b)(iv)	decreases rate / goes slower (1) increases rate / goes faster (1)	**2**
4(c)	lighted splint (1) pops / explodes (1)	**2**
4(d)	all 5 in correct order (2) strontium magnesium zinc iron mercury if 2 marks not scored: 1 mark for 1 consecutive pair reversed / all reversed	**2**
4(e)	4.85 (g)	**1**

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Question	Answer	Marks
5(a)	***reaction with acid*** 1 mark for each of (max 3 marks) • forms a salt (1) • correctly named salt from correctly named acid (1) • water formed (1) • neutralisation reaction (1) ***reaction with ammonium salt*** 1 mark for each of (max 3 marks) • ammonia produced / NH_3 produced (1) • forms a (different) salt (1) • correctly named salt from named ammonium salt (1) • water formed (1) • gas turns (damp) red litmus blue (1) ***reaction with named indicator*** (max 1 mark) litmus turns blue **OR** methyl orange turns yellow	**5**
5(b)	pH 10	**1**

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Question	Answer	Marks
5(c)	2nd box down ticked (potassium chloride) (1) 3rd box down ticked (sodium phosphate) (1)	**2**
5(d)(i)	from car engines / lightning / high temperature furnaces	**1**
5(d)(ii)	irritates eyes / nose / mouth / skin / lungs	**1**
5(d)(iii)	carbon dioxide / methane	**1**

Question	Answer	Marks
6(a)(i)	chromium is a reactive metal / chromium is high in the reactivity series / chromium is too reactive to be made by reduction with carbon	**1**
6(a)(ii)	positive electrode: oxygen (1) negative electrode: chromium (1)	**2**
6(b)(i)	chromium(III) oxide loses oxygen / it loses oxygen / oxidation number of chromium decreases	**1**
6(b)(ii)	energy of reactants greater than energy of products	**1**
6(c)	1 mark each for any 2 of: • high melting point / high boiling point for Cr or ORA for Na • high density for Cr or ORA for Na • forms coloured compounds for Cr or ORA for Na • has more than one oxidation state / forms ions with different charges for Cr or ORA for Na • forms complex ions for Cr or ORA for Na • catalyst for Cr or ORA for Na • hard for Cr or ORA for Na • idea that Cr less reactive than Na ORA	**2**

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Question	Answer	Marks
6(d)(i)	cathode (spoon) correctly labelled (1) electrolyte correctly labelled (1)	**2**
6(d)(ii)	spoon silvery in colour	**1**
6(d)(iii)	more corrosion resistant / more attractive appearance	**1**
6(e)	K	**1**

Question	Answer	Marks
7(a)(i)	increases as number of carbon atoms increases / decreases as number of carbon atoms decreases	**1**
7(a)(ii)	propane	**1**
7(a)(iii)	liquid AND –50 °C is between the melting point and boiling point / –50 °C is above melting point and below boiling point (1)	**1**
7(b)(i)	bonding pair of electrons between each C and H and no other electrons on hydrogen or outer shell of carbon	**1**
7(b)(ii)	carbon dioxide (1) water (1)	**2**
7(c)	hydrocarbons (1) chemical (1) functional (1)	**3**
7(d)	3 correct (2) 1 or 2 correct (1) bitumen → making roads kerosene → fuel for aircraft naphtha → making chemicals	**2**

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