AQA GCSE Chemistry | 8462

SPECIFICATION POINT 4.1.2.6

Group 7

Mark schemes and examiner comments

Tier	**Foundation**
Question groups	**20**
Available paper years	**2008–2025**

Using this booklet

1. Booklet answer numbers match the question booklet.
2. Use the original question number within marking tables.
3. Examiner comments are included where available.

Name: _____ **Date:** _____

Where a precise marking extract is unavailable, the full source document is included in an appendix. Any missing mark scheme is explicitly identified.

4.1.2.6 Group 7

Answer 01 · Mark scheme

June 2008 | CHY3F | Original Q2 | Legacy

question	answers	extra information	mark
2(a)(i)	floated / (moved on) surface	accept does not sink ignore it melted	1
2(a)(ii)	melted / molten	ignore heat is given off	1
2(a)(iii)	hydrogen	allow H_2	1
2(b)(i)	potassium / rubidium / caesium / francium	accept: K / Rb / Cs / Fr	1
2(b)(ii)	they are metals they form ions with a 1+ charge		1 1
2(c)(i)	atomic weight		1
2(c)(ii)	similar		1
2(c)(iii)	groups		1
2(d)	left gaps owtte		1
Total			**10**

4.1.2.6 Group 7

Answer 01 · Mark scheme

June 2008 | CHY3F | Original Q2 | Legacy

COMPONENT NUMBER: CHY3F

COMPONENT NAME: Chemistry

STATUS: Final

DATE: June 2008

Answer 02 · Mark scheme

March 2010 | CHY1AP | Original Q5 | Legacy

Five	**A**	Anaesthetic **A**	**2**
	B	Anaesthetic **B**	**4**
	C	Anaesthetic **C**	**3**
	D	Anaesthetic **D**	**1**

	A	**B**	**C**	**D**

4.1.2.6 Group 7

Answer 03 · Mark scheme

June 2010 | CHY3F | Original Q3 | Legacy

Question 3

question	answers	extra information	mark
3(a)(i)	**A**		1
3(a)(ii)	**F**		1
3(a)(iii)	**E**		1
3(a)(iv)	**C**		1
3(a)(v)	**A or B**		1
3(b)(i)	Rb K Na	allow rubidium, potassium, sodium do **not** accept RB or NA	1
3(b)(ii)	decrease **or** become lower / smaller / less	allow from 180° C to 27° C	1
3(c)	They are harder than Group 1 metals. They have higher melting points than Group 1 metals. They often form coloured compounds but Group 1 compounds are usually white.		1 1 1
Total			**10**

4.1.2.6 Group 7

Answer 03 · Mark scheme

June 2010 | CHY3F | Original Q3 | Legacy

CHY3F

4.1.2.6 Group 7

Answer 04 · Mark scheme

Question 1

question	answers	extra information	mark
1(a)(i)	B		1
1(a)(ii)	E		1
1(a)(iii)	F		1
1(a)(iv)	D		1
1(a)(v)	C		1
1(b)(i)	Br	do not accept BR or br or bR ignore numbers allow written in table if answer blank	1
1(b)(ii)	I Br Cl	allow iodine, bromine, chlorine allow I,B,C allow capitals or lower case allow 184, 58, –34 ignore numbers	1
1(c)	they are halogens they become less reactive down Group 7		1 1
Total			9

4.1.2.6 Group 7

Answer 04 · Mark scheme

January 2011 | CHY3F | Original Q1 | Legacy

CHY3F

4.1.2.6 Group 7

Answer 05 · Mark scheme

June 2011 | CHY3F | Original Q1 | Legacy

Question 1

question	answers	extra information	mark
1(a)(i)	Sb		1
1(a)(ii)	Se		1
1(a)(iii)	Sn		1
1(a)(iv)	Si		1
1(b)(i)	elements		1
1(b)(ii)	potassium (K)		1
1(b)(iii)	0		1
Total			7

4.1.2.6 Group 7

Answer 05 · Mark scheme

June 2011 | CHY3F | Original Q1 | Legacy

CHY3F

4.1.2.6 Group 7

Answer 06 · Mark scheme

June 2013 | CH2FP | Original Q1 | Legacy

Question 1

question	answers	extra information	Mark
1(a)	1 / one		1
1(b)(i)	protons		1
1(b)(ii)	neutrons		1
1(b)(iii)	7		1
1(c)(i)	losing		1
1(c)(ii)	a positive		1
1(c)(iii)	electrostatic		1
1(d)	high melting points strong bonds		1 1
1(e)(i)	58.5		1
1(e)(ii)	mole		1
1(f)	very small (particles) **or** 1-100nm in size **or** (particle with a) few hundred atoms	ignore tiny / small / smaller / microscopic etc.	1
Total			**12**

4.1.2.6 Group 7

Answer 07 · Mark scheme

Question 5

question	Answers	extra information	Mark
5(a)(i)	gas		1
5(a)(ii)	Increases		1
5(b)(i)	–1	allow Cl^- allow – allow negative	1
5(b)(ii)	sodium + chlorine → sodium chloride	allow correct symbol equation	1
5(c)	reduce microbes	accept sterilise accept prevent diseases allow disinfect allow kill bacteria / germs / microbes/micro-organisms allow to make it safe to drink ignore get rid of bacteria	1
5(d)	any **one** from: • no freedom of choice • fluoride in toothpaste • too much can cause fluorosis	 allow unethical allow too much can cause damage to teeth	1
Total			**6**

4.1.2.6 Group 7

Answer 08 · Mark scheme

June 2014 | CH1FP | Original Q2 | Legacy

Question	Answers	Extra information	Mark	AO / Spec. Ref.	ID
2(a)	argon / Ar		1	1 / 1.1.2b	G
2(b)(i)	0		1	1 / 1.1.2b	A
2(b)(ii)	unreactive		1	1 / 1.1.2b	A
2(c)(i)	94.96(%)		1	2 / 1.7.2c	E
2(c)(ii)	any **two** from: • plants or photosynthesis • absorbed in oceans / *seas* • locked up in *(*sedimentary*)* rocks • locked up in fossil fuels	allow oceans store **or** take in **or** dissolve carbon dioxide	2	2 / 1.7.2f/g/h	E
Total			**6**		

4.1.2.6 Group 7

Answer 08 · Mark scheme

June 2014 | CH1FP | Original Q2 | Legacy



4.1.2.6 Group 7

Answer 09 · Mark scheme

June 2014 | CH3FP | Original Q1 | Legacy

Question	Answers	Extra information	Mark	AO / Spec. Ref.	ID
1(a)(i)	atomic weight		1	1 / 3.1.1a	A
1(a)(ii)	groups		1	1 / 3.1.1a	A
1(a)(iii)	left a gap		1	1 / 3.1.1b	A
1(a)(iv)	had not been discovered by 1869		1	3 / 3.1.1b	A
1(b)	protons electrons	*must be in correct order*	1 1	1 / 3.1.2a/b	G
1(c)	sodium and nickel are both metals sodium is more reactive than nickel		1 1	1 / 3.1.3c	A
1(d)(i)	bromine	allow Br_2 / *Br* do **not** allow bromide	1	2 / 3.1.3g	E
1(d)(ii)	iodine is less reactive (than bromine)	*it = iodine* allow converse do **not** allow bromide	1	1 / 3.1.3g	E
Total			**10**		

4.1.2.6 Group 7

Answer 09 · Mark scheme

June 2014 | CH3FP | Original Q1 | Legacy



4.1.2.6 Group 7

Answer 10 · Mark scheme

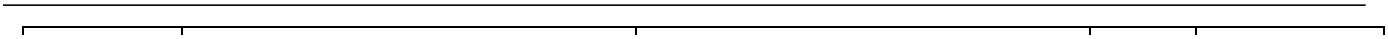
June 2015 | CH3FP | Original Q9 | Legacy

Question	Answers	Extra information	Mark	AO / Spec. Ref.
9(a)	increase		1	**AO1** 3.1.3.f
9(b)(i)	Na^+ **and** Br^-	both required	1	**AO1** 3.1.3.a/e
9(b)(ii)	sodium chloride	allow NaCl do **not** allow sodium chlorine	1	**AO2** 3.1.3.g
9(b)(iii)	chlorine is more reactive than bromine	allow converse argument allow symbols Cl, Cl_2, Br and Br_2 allow chlorine / it is more reactive. do **not** allow chloride **or** bromide	1	**AO1** 3.1.3.g
9(b)(iv)	fluorine	allow F / F_2. do **not** allow fluoride.	1	**AO2** 3.1.3.g
Total			**5**	

4.1.2.6 Group 7

Answer 10 · Mark scheme

June 2015 | CH3FP | Original Q9 | Legacy



4.1.2.6 Group 7

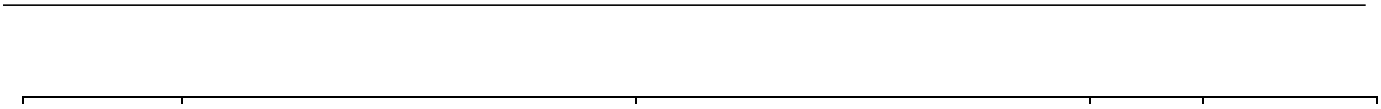
Answer 11 · Mark scheme

Question	Answers	Extra information	Mark	AO / Spec. Ref.
2(a)	hydrogen	allow H ignore numbers	1	AO2 1.1.2
2(b)	about 100		1	AO1 1.1.1a
2(c)	same number of electrons in the outer shell similar chemical reactions		1 1	AO1 1.1.2a
2(d)	noble transition	ignore inert	1 1	AO1 1.1.2b 1.3.3a
2(e)	ions molecules	in this order	1 1	AO2 1.1.3a
Total			8	

4.1.2.6 Group 7

Answer 11 · Mark scheme

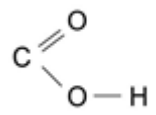
June 2017 | CH1FP | Original Q2 | Legacy



4.1.2.6 Group 7

Answer 12 · Mark scheme

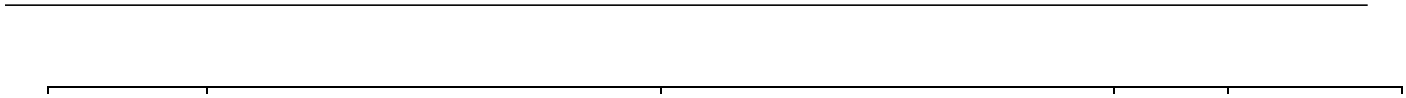
June 2017 | CH3FP | Original Q1 | Legacy

Question	Answers	Extra information	Mark	AO / Spec. Ref.
1 (a)(i)	numbers	allow number allow numbers circled in the box	1	AO1 3.1.2b
1 (a)(ii)	electrons	allow electron allow electrons circled in the box	1	AO1 3.1.2b
1 (b)(i)	Cl/chlorine	allow CL / cL / cl	1	AO1 3.1.3f
1 (b)(ii)	Cu/copper	allow CU / cU / cu	1	AO2 3.1.3c
1 (b)(iii)	7/seven		1	AO1 3.1.3e
1(c)(i)	tick (✓) by: displacement		1	AO1 3.1.3g
1(c)(ii)	tick (✓) by: Fluorine		1	AO3 3.1.3g
1(d)	tick (✓) by: yellow		1	AO1 3.4.1e
1(e)(i)	circle around: 		1	AO2 3.6.2a
1(e)(ii)	carbon dioxide	allow carbon dioxide circled in the box	1	AO2 3.6.2b
1(e)(iii)	esters	allow esters circled in the box allow ethers	1	AO2 3.6.2b
Total			11	

4.1.2.6 Group 7

Answer 12 · Mark scheme

June 2017 | CH3FP | Original Q1 | Legacy



Answer 13 · Mark scheme

June 2018 | 8462/1F | Original Q2

The full source mark scheme begins on page 36. Follow original question 2 in that document.

Answer 14 · Mark scheme

June 2018 | 8462/1F | Original Q4

The full source mark scheme begins on page 36. Follow original question 4 in that document.

Answer 15 · Mark scheme

Question 8

Question	Answers	Extra information	Mark	AO / Spec. Ref.
08.1	any **one** from: • so elements / iodine / tellurium were in groups with similar properties • iodine has similar properties to Br / Cl / F / Group 7 • iodine has different properties to Se / S / O / Group 6	ignore reference to atomic structure ignore references to Cr, Mn and Mo allow corresponding argument in terms of tellurium	1	AO1 4.1.2.2
08.2	Mendeleev had predicted properties of missing elements elements were discovered (that filled the spaces / gaps) properties (of these elements) matched Mendeleev's predictions	ignore reference to atomic structure allow atomic weights (of these elements) fitted in the spaces / gaps if no other mark awarded, allow **1** mark for in previous versions of the periodic table the pattern of similar properties broke down	1 1 1	AO1 4.1.2.2
08.3	relative atomic mass		1	AO1 4.1.1.6
08.4	(increasing) atomic / proton number	ignore (increasing) electron number do **not** accept relative atomic / proton number	1	AO1 4.1.2.1
08.5	(formula) At_2 (state) solid	ignore incorrect state symbol allow (s) ignore s	1 1	AO1 4.1.2.6

4.1.2.6 Group 7

Answer 15 · Mark scheme

08.6	any **two** from: • flame • (white) solid forms • colour of gas / chlorine disappears / fades	allow burns allow (white) smoke forms	2	AO1 4.1.2.5
Total			**10**	

4.1.2.6 Group 7

Answer 16 · Mark scheme

November 2020 | 8462/1F | Original Q1

Question 1

Question	Answers	Extra information	Mark	AO / Spec. Ref.
01.1	gas		1	AO2 4.1.2.6 4.2.2.1
01.2	-35 (°C)	allow any value between -35 °C and -100 °C	1	AO2 4.1.2.6 4.2.2.1
01.3	increase increase	 allow become stronger	1 1	AO1 AO2 4.1.2.6 4.2.2.4
01.4	chlorine gas is toxic		1	AO3 4.1.2.6
01.5	increased chlorine (atoms) are now part of the solid (iron chloride) **or** the mass of the chlorine (atoms) is now also measured		1 1	AO2 4.1.2.6 4.3.1.3
01.6	burns very vigorously	allow burns violently allow brighter (orange) glow allow (orange) flame allow explodes	1	AO3 4.1.2.1 4.1.2.6

Question 1 continued

Question	Answers	Extra information	Mark	AO / Spec. Ref.
01.7	$2\ Fe + 3\ Br_2 \longrightarrow 2\ FeBr_3$	allow multiples	1	AO2 4.1.1.1 4.1.2.6
01.8	56 + (3 × 80) = 296	 ignore units	1 1	AO2 4.3.1.2
Total			**11**	

4.1.2.6 Group 7

Answer 17 · Mark scheme

June 2022 | 8462/1F | Original Q4

Question 4

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.1	for elements that had not been discovered (at that time) **or** so that elements with similar properties are grouped together	ignore references to atomic number / mass / weight allow for missing elements	1	AO1 4.1.2.2

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.2	Mendeleev		1	AO1 4.1.2.2

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.3	noble gases		1	AO3 4.1.2.2 4.1.2.4

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.4	the elements all have one electron in the outer shell		1	AO1 4.1.2.5

4.1.2.6 Group 7

Answer 17 · Mark scheme

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.5	63 (°C)	allow a value in the range 49 to 88 (°C)	1	AO3 4.1.2.5

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.6	any **one** from: • floats • moves (on the surface) • melts • fizzes / bubbles • flame	allow forms a ball ignore colour of flame allow explodes / disappears ignore references to heat / temperature / sounds	1	AO1 4.1.2.5

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.7				AO3 4.1.2.6

Element	State at 150 °C	Symbol	Formula of the compound with hydrogen
Fluorine	gas	F	HF
Chlorine	**gas**	Cl	HCl
Bromine	gas	Br	HBr
Iodine	liquid	I	HI
Astatine	solid	At	**HAt**

1

1

4.1.2.6 Group 7

Answer 17 · Mark scheme

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.8	Br_2		1	AO1 4.1.2.6

Total Question 4		9

4.1.2.6 Group 7

Answer 18 · Mark scheme

June 2024 | 8462/1F | Original Q6

Question 6

Question	Answers	Extra information	Mark	AO / Spec. Ref.
06.1	ions can move through the molten substance to the electrodes		1	AO1 4.4.3.1

Question	Answers	Mark	AO / Spec. Ref.
06.2	<table><tr><th>Molten compound</th><th>Product at negative electrode</th><th>Product at positive electrode</th></tr><tr><td>Lead chloride</td><td>Lead</td><td>Chlorine</td></tr><tr><td>Potassium iodide</td><td>Potassium</td><td>Iodine</td></tr><tr><td>Zinc bromide</td><td>Zinc</td><td>Bromine</td></tr></table>	1 1 1	AO2 4.4.3.2

Question	Answers	Extra information	Mark	AO / Spec. Ref.
06.3	$2Al_2O_3 \rightarrow 4Al + 3O_2$	allow **1** mark for 4 Al allow **1** mark for 3 O_2	2	AO2 4.1.1.1 4.4.3.3

Question	Answers	Extra information	Mark	AO / Spec. Ref.
06.4	(M_r =) (27 × 2) + (16 × 3) = 102		1 1	AO2 4.3.1.2

4.1.2.6 Group 7

Answer 18 · Mark scheme

June 2024 | 8462/1F | Original Q6

Question	Answers	Extra information	Mark	AO / Spec. Ref.
06.5	(by electrolysis) any **one** from: • potassium / K • lithium / Li	allow aluminium / Al allow sodium / Na allow calcium / Ca allow magnesium / Mg	1	AO3 4.4.1.2 4.4.1.3 4.4.3.3
	(by carbon reduction) any **one** from: • zinc / Zn • tin / Sn	allow iron / Fe allow copper / Cu	1	

Total Question 6	10

4.1.2.6 Group 7

Answer 19 · Mark scheme

June 2024 | 8462/1F | Original Q9

Question 9

Question	Answers	Extra information	Mark	AO / Spec. Ref.
09.1	(similarity) both have one outer (shell) electron	allow energy level for shell allow same number of outer (shell) electrons	1	AO1 4.1.2.1
	(difference) sodium has 3 shells but potassium has 4 shells	allow potassium has more shells allow (different) number of shells	1	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
09.2	any **two** from: • effervescence / bubbles / fizzing • (potassium) floats • (potassium) moves around • (potassium) becomes smaller • (potassium) melts • flame • explosion	ignore gas produced allow (potassium) forms a ball ignore colour of flame	2	AO1 4.1.2.5 4.4.1.2

Question	Answers	Extra information	Mark	AO / Spec. Ref.
09.3	blue / violet / purple		1	AO2
	(the solution is) alkaline	allow (the solution) contains OH^- (ions) allow (the solution) contains hydroxide ions allow the solution is basic	1	AO1 4.1.2.5 4.4.2.4

4.1.2.6 Group 7

Answer 19 · Mark scheme

Question	Answers	Extra information	Mark	AO / Spec. Ref.
09.4	all five points correctly plotted	allow a tolerance of ± ½ a small square allow **1** mark for three or four points correctly plotted	2	AO2 4.1.2.4

Question	Answers	Extra information	Mark	AO / Spec. Ref.
09.5	3.4 (mg/cm^3)	allow a value in the range 3.0 to 3.8 (mg/cm^3)	1	AO3 4.1.2.4

Question	Answers	Extra information	Mark	AO / Spec. Ref.
09.6	chlorine and potassium bromide		1	AO2 4.1.2.6

Question	Answers	Extra information	Mark	AO / Spec. Ref.
09.7	relative molecular mass increases and boiling point increases		1	AO1 4.1.2.6

Total Question 9	**11**

4.1.2.6 Group 7

Answer 20 · Mark scheme

June 2025 | 8462/1F | Original Q5

Question 5

Question	Answers	Mark	AO / Spec. Ref.
05.1	molten compound: copper chloride; product at the negative electrode: **copper**; product at the positive electrode: chlorine — 1 molten compound: potassium bromide; product at the negative electrode: potassium; product at the positive electrode: **bromine** — 1	1 1	AO2 4.4.3.2

Question	Answers	Extra information	Mark	AO / Spec. Ref.
05.2	O_2		1	AO1 4.1.1.1 4.2.1.4

Question	Answers	Extra information	Mark	AO / Spec. Ref.
05.3	aluminium ions are positive(ly charged)		1	AO1 4.4.3.1 4.4.3.2 4.4.3.3
	(so) are attracted to the negative electrode	allow (and) opposite charges attract	1	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
05.4	(the mixture) has a lower melting point (than aluminium oxide)		1	AO3
	(so) less energy is required		1	AO1 4.4.3.3

4.1.2.6 Group 7

Question	Answers	Extra information	Mark	AO / Spec. Ref.
05.5	carbon reacts with the oxygen produced		1	AO1 4.4.3.3

Question	Answers	Extra information	Mark	AO / Spec. Ref.
05.6	3.4 cm^3		1	AO2 4.4.3.4 RPA3

Question	Answers	Extra information	Mark	AO / Spec. Ref.
05.7	hydrogen is less reactive than magnesium		1	AO1 4.4.3.4 RPA3

Question	Answers	Extra information	Mark	AO / Spec. Ref.
05.8	the volume of hydrogen collected depends on **both** the current and the time		1	AO3 4.4.3.4 RPA3

4.1.2.6 Group 7

Answer 20 · Mark scheme

Question	Answers	Extra information	Mark	AO / Spec. Ref.
05.9	(change in volume = 3.8 – 1.9 =) 1.9 (cm^3)	allow any correct matching pairs of values of volume and time for **2** marks	1	AO2 4.4.3.4 RPA3
	(change in time = 5 – 2.5 =) 2.5 (min)		1	
	(gradient =) $\frac{1.9}{2.5}$	allow correct use of incorrectly determined values of volume and / or time	1	
	= 0.76 (cm^3/min)	allow correct use of incorrectly determined values of volume and / or time	1	

Total Question 5	**15**

4.1.2.6 Group 7

AQA

GCSE
CHEMISTRY

8462/1F - PAPER 1 FOUNDATION TIER

Mark scheme

8462

June 2018

Version/Stage: 1.0 Final

4.1.2.6 Group 7

Mark schemes are prepared by the Lead Assessment Writer and considered, together with the relevant questions, by a panel of subject teachers. This mark scheme includes any amendments made at the standardisation events which all associates participate in and is the scheme which was used by them in this examination. The standardisation process ensures that the mark scheme covers the students' responses to questions and that every associate understands and applies it in the same correct way. As preparation for standardisation each associate analyses a number of students' scripts. Alternative answers not already covered by the mark scheme are discussed and legislated for. If, after the standardisation process, associates encounter unusual answers which have not been raised they are required to refer these to the Lead Assessment Writer.

It must be stressed that a mark scheme is a working document, in many cases further developed and expanded on the basis of students' reactions to a particular paper. Assumptions about future mark schemes on the basis of one year's document should be avoided; whilst the guiding principles of assessment remain constant, details will change, depending on the content of a particular examination paper.

Further copies of this mark scheme are available from aqa.org.uk

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4.1.2.6 Group 7

MARK SCHEME – GCSE CHEMISTRY – 8462/1F – JUNE 2018

Information to Examiners

1. General

The mark scheme for each question shows:

- the marks available for each part of the question
- the total marks available for the question
- the typical answer or answers which are expected
- extra information to help the Examiner make his or her judgement
- the Assessment Objectives and specification content that each question is intended to cover.

The extra information is aligned to the appropriate answer in the left-hand part of the mark scheme and should only be applied to that item in the mark scheme.

At the beginning of a part of a question a reminder may be given, for example: where consequential marking needs to be considered in a calculation; or the answer may be on the diagram or at a different place on the script.

In general the right-hand side of the mark scheme is there to provide those extra details which confuse the main part of the mark scheme yet may be helpful in ensuring that marking is straightforward and consistent.

2. Emboldening and underlining

2.1 In a list of acceptable answers where more than one mark is available 'any **two** from' is used, with the number of marks emboldened. Each of the following bullet points is a potential mark.

2.2 A bold **and** is used to indicate that both parts of the answer are required to award the mark.

2.3 Alternative answers acceptable for a mark are indicated by the use of **or**. Different terms in the mark scheme are shown by a / ; eg allow smooth / free movement.

2.4 Any wording that is underlined is essential for the marking point to be awarded.

3. Marking points

3.1 Marking of lists

This applies to questions requiring a set number of responses, but for which students have provided extra responses. The general principle to be followed in such a situation is that 'right + wrong = wrong'.

Each error / contradiction negates each correct response. So, if the number of error / contradictions equals or exceeds the number of marks available for the question, no marks can be awarded.

However, responses considered to be neutral (indicated as * in example 1) are not penalised.

Example 1: What is the pH of an acidic solution?

[1 mark]

Student	Response	Marks awarded
1	green, 5	0
2	red*, 5	1
3	red*, 8	0

Example 2: Name two planets in the solar system.

[2 marks]

Student	Response	Marks awarded
1	Neptune, Mars, Moon	1
2	Neptune, Sun, Mars, Moon	0

3.2 Use of chemical symbols / formulae

If a student writes a chemical symbol / formula instead of a required chemical name, full credit can be given if the symbol / formula is correct and if, in the context of the question, such action is appropriate.

3.3 Marking procedure for calculations

Marks should be awarded for each stage of the calculation completed correctly, as students are instructed to show their working. Full marks can, however, be given for a correct numerical answer, without any working shown.

3.4 Interpretation of 'it'

Answers using the word 'it' should be given credit only if it is clear that the 'it' refers to the correct subject.

3.5 Errors carried forward

Any error in the answers to a structured question should be penalised once only.

Papers should be constructed in such a way that the number of times errors can be carried forward is kept to a minimum. Allowances for errors carried forward are most likely to be restricted to calculation questions and should be shown by the abbreviation ecf in the marking scheme.

3.6 Phonetic spelling

The phonetic spelling of correct scientific terminology should be credited **unless** there is a possible confusion with another technical term.

3.7 Brackets

(…..) are used to indicate information which is not essential for the mark to be awarded but is included to help the examiner identify the sense of the answer required.

3.8 Allow

In the mark scheme additional information, 'allow' is used to indicate creditworthy alternative answers.

3.9 Ignore

Ignore is used when the information given is irrelevant to the question or not enough to gain the marking point. Any further correct amplification could gain the marking point.

3.10 Do not accept

Do **not** accept means that this is a wrong answer which, even if the correct answer is given as well, will still mean that the mark is not awarded.

4. Level of response marking instructions

Extended response questions are marked on level of response mark schemes.

- Level of response mark schemes are broken down into levels, each of which has a descriptor.
- The descriptor for the level shows the average performance for the level.
- There are two marks in each level.

Before you apply the mark scheme to a student's answer, read through the answer and annotate it (as instructed) to show the qualities that are being looked for. You can then apply the mark scheme.

Step 1: Determine a level

Start at the lowest level of the mark scheme and use it as a ladder to see whether the answer meets the descriptor for that level. The descriptor for the level indicates the different qualities that might be seen in the student's answer for that level. If it meets the lowest level then go to the next one and decide if it meets this level, and so on, until you have a match between the level descriptor and the answer.

When assigning a level you should look at the overall quality of the answer. Do **not** look to penalise small and specific parts of the answer where the student has not performed quite as well as the rest. If the answer covers different aspects of different levels of the mark scheme you should use a best fit approach for defining the level.

Use the variability of the response to help decide the mark within the level, ie if the response is predominantly level 2 with a small amount of level 3 material it would be placed in level 2 but be awarded a mark near the top of the level because of the level 3 content.

Step 2: Determine a mark

Once you have assigned a level you need to decide on the mark. The descriptors on how to allocate marks can help with this.

The exemplar materials used during standardisation will help. There will be an answer in the standardising materials which will correspond with each level of the mark scheme. This answer will have been awarded a mark by the Lead Examiner. You can compare the student's answer with the example to determine if it is the same standard, better or worse than the example. You can then use this to allocate a mark for the answer based on the Lead Examiner's mark on the example.

You may well need to read back through the answer as you apply the mark scheme to clarify points and assure yourself that the level and the mark are appropriate.

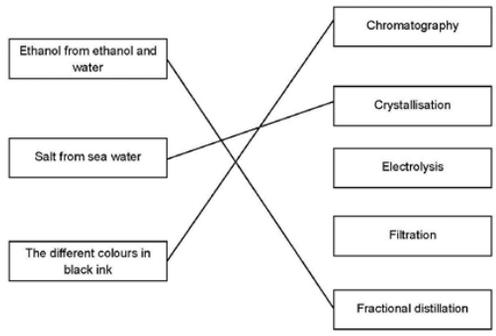
Indicative content in the mark scheme is provided as a guide for examiners. It is not intended to be exhaustive and you must credit other valid points. Students do **not** have to cover all of the points mentioned in the indicative content to reach the highest level of the mark scheme.

You should ignore any irrelevant points made. However, full marks can be awarded only if there are no incorrect statements that contradict a correct response.

An answer which contains nothing of relevance to the question must be awarded no marks.

4.1.2.6 Group 7

MARK SCHEME – GCSE CHEMISTRY – 8462/1F – JUNE 2018

Question	Answers	Extra information	Mark	AO / Spec. Ref.
01.1			1 1 1	AO1 4.1.1.2
01.2	include a (filter) funnel	allow funnel drawn on the diagram ignore clamp stand	1	AO3 4.1.1.2
01.3	evaporate condense	must be this order	1 1	AO1 4.1.1.2
01.4	$\frac{2}{20} \times 100$ = 10 (%)	an answer of 10 (%) scores **2** marks an answer of 11.1(%) **or** 90 (%) scores **1** mark	1 1	AO2 4.2.2.7
01.5	an alloy		1	AO1 4.2.2.7
01.6	the layers in the mixture are distorted		1	AO1 4.2.2.7

4.1.2.6 Group 7

MARK SCHEME – GCSE CHEMISTRY – 8462/1F – JUNE 2018

Question	Answers	Extra information	Mark	AO / Spec. Ref.
01.7	8000 nm^3		1	AO2 4.2.4.1
Total			**11**	

4.1.2.6 Group 7

MARK SCHEME – GCSE CHEMISTRY – 8462/1F – JUNE 2018

Question	Answers	Extra information	Mark	AO / Spec. Ref.
02.1	7		1	AO1 4.1.2.6
02.2	small molecule		1	AO2 4.1.2.6 4.2.2.4
02.3	F_2		1	AO1 4.1.1.1 4.1.2.6
02.4	the reactivity decreases (going down Group 7) (because) chlorine displaces bromine and iodine (and) bromine displaces iodine **or** iodine does not react	allow the reactivity decreases from chlorine to iodine allow (because) chlorine has two reactions allow (because) neither bromine nor iodine can displace chlorine allow (and) bromine has one reaction **or** iodine has no reactions allow (and) iodine cannot displace bromine	1 1 1	AO1 4.1.2.6 AO3 4.1.2.6 AO3 4.1.2.6
02.5	80		1	AO2 4.3.1.2

4.1.2.6 Group 7

MARK SCHEME – GCSE CHEMISTRY – 8462/1F – JUNE 2018

Question	Answers	Extra information	Mark	AO / Spec. Ref.
02.6	(1.2 kg =) 1200 (g) **or** (900 g =) 0.9 (kg)	an answer of 75 (%) scores **2** marks	1	AO2 4.3.3.1
	$(\frac{900}{1200} \times 100) = 75(\%)$ **or** $(\frac{0.9}{1.2} \times 100) = 75(\%)$	allow an answer correctly calculated from: $(\frac{900}{\text{incorrect attempt at conversion of 1.2}} \times 100)$ **or** $(\frac{\text{incorrect attempt at conversion of 900}}{1.2} \times 100)$	1	
Total			**9**	

4.1.2.6 Group 7

MARK SCHEME – GCSE CHEMISTRY – 8462/1F – JUNE 2018

Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.1	nucleus neutron neutron electron proton	must be in this order	1 1 1 1 1	AO1 4.1.1.3 4.1.1.4 4.1.1.5
03.2	$(A_r)\ \frac{(63 \times 70) + (65 \times 30)}{100}$ = 63.6	an answer of 63.6 scores **2** marks	1 1	AO2 4.1.1.6
03.3	copper / Cu	allow ecf from answer to question **03.2**	1	AO2 4.1.1.1
03.4	$\frac{1.2 \times 10^{-10}}{10\,000}$ **or** $1.2 \times 10^{-10} \times 1 \times 10^{-4}$ $= 1.2 \times 10^{-14}$ (m)	an answer of 1.2×10^{-14} (m) scores **2** marks a correct answer not in standard form scores **1** mark	1 1	AO2 4.1.1.5
Total			**10**	

4.1.2.6 Group 7

MARK SCHEME – GCSE CHEMISTRY – 8462/1F – JUNE 2018

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.1	3.6 (cm^3)		1	AO2 4.4.3.4
04.2	hydrogen line only		1	AO3 4.4.3.4
04.3	both lines		1	AO3 4.4.3.4
04.4	graphite has delocalised electrons		1	AO1 4.2.3.2
04.5	**cathode** zinc (1) **anode** chlorine (1) hydrogen (1) bromine (1)	do **not** accept chloride allow **1** mark if chlorine and zinc the wrong way around do **not** accept bromide allow **1** mark if bromine and hydrogen the wrong way around	1+1 1+1	AO2 4.4.3.2 4.4.3.4
Total			**8**	

4.1.2.6 Group 7

MARK SCHEME – GCSE CHEMISTRY – 8462/1F – JUNE 2018

Question	Answers	Extra information	Mark	AO / Spec. Ref.
05.1	gas		1	AO1 4.2.2.2
05.2	the gas escapes	allow carbon dioxide escapes do **not** accept references to evaporation	1	AO1 4.3.1.3
05.3	5.12 (g)		1	AO2 4.3.1.3
05.4	4.00 (g) trial 1	allow 2.89 written in either space, or ringed in the table, unless contradicted by mass of copper carbonate or trial number	1	AO3 4.3.1.3
05.5	reheat (and reweigh) until constant mass	 an answer of heat to constant mass scores **2** marks if no other mark scored allow for **1** mark heat for longer **or** (heat at a) higher temperature **alternative approach**: (1) continue heating and pass gas through limewater (1) until the (lime)water stops bubbling **or** until the limewater no longer turns cloudy	1 1	AO3 4.3.1.3

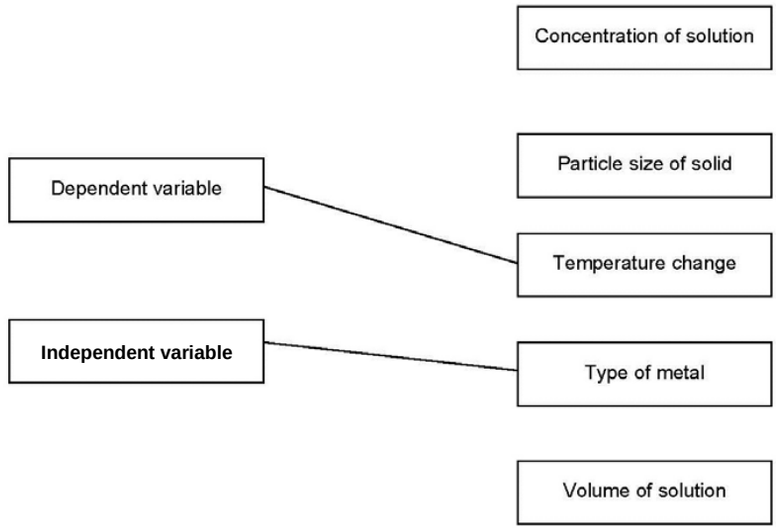
4.1.2.6 Group 7

MARK SCHEME – GCSE CHEMISTRY – 8462/1F – JUNE 2018

Question	Answers	Extra information	Mark	AO / Spec. Ref.
05.6	straight line of best fit	must touch at least 5 of the 6 plots	1	AO2 4.3.1.3
05.7	correct value read from line of best fit in Figure 8	allow tolerance of ± ½ small square	1	AO2 4.3.1.3
05.8	(mass =) $168 \times \frac{\text{answer from question } \mathbf{05.7}}{8.4}$	a correctly calculated value from their answer to question **05.7** scores **2** marks allow (mass =) answer from question **05.7** × 20	1	AO2 4.3.1.3
	correctly calculated value (g)		1	
Total			**10**	

4.1.2.6 Group 7

MARK SCHEME – GCSE CHEMISTRY – 8462/1F – JUNE 2018

Question	Answers	Extra information	Mark	AO / Spec. Ref.
06.1	 allow **one** mark if answers are reversed		1 1	AO1 4.5.1.1
06.2	polystyrene is a better insulator		1	AO3 4.5.1.1
06.3	both bars labelled both bars correctly plotted	 allow tolerance of ± ½ small square ignore width and spacing of bars if no other mark scored, allow **1** mark for any one bar correctly plotted and labelled	1 1	AO2 4.5.1.1

MARK SCHEME – GCSE CHEMISTRY – 8462/1F – JUNE 2018

Question	Answers	Extra information	Mark	AO / Spec. Ref.
06.4	temperature increases **or** temperature does not decrease	ignore because it is exothermic allow (because) energy / 'heat' is transferred to the surroundings energy / 'heat' is not taken in from the surroundings allow the energy of the products is less than the energy of the reactants	1	AO3 4.5.1.1
06.5	(most reactive) magnesium (zinc) nickel	this order only	1	AO3 4.5.1.1 4.4.1.2
06.6	suitable method described the observations / measurements required to place in order an indication of how results would be used to place the unknown metal in the reactivity series **approaches that could be used:** **approach 1:** add the unknown metal to copper sulfate solution (1) measure temperature change (1) place the metals in order of temperature change (1)		1 1 1	AO3 4.4.1.2 4.5.1.1

4.1.2.6 Group 7

MARK SCHEME – GCSE CHEMISTRY – 8462/1F – JUNE 2018

Question	Answers	Extra information	Mark	AO / Spec. Ref.
06.6 cont.	**approach 2:** add the metal to salt solutions of the other metals **or** heat the metal with oxides of the other metals (1) measure temperature change (only if salt solutions used) **or** observe whether a chemical change occurs (1) compare temperature change or whether there is a reaction to place in correct order (1) **approach 3:** add all of the metals to an acid (1) measure temperature change or means of comparing rate of reaction (1) place the metals in order of temperature change or rate of reaction (1) **approach 4:** set up electrochemical cells with the unknown metal as one electrode and each of the other metals as the other electrode (1) measure the voltage of the cell (1) place the metals in order of voltage (1)			
06.7	D		1	AO1 4.5.1.2
06.8	C		1	AO1 4.5.1.2
Total			**12**	

4.1.2.6 Group 7

MARK SCHEME – GCSE CHEMISTRY – 8462/1F – JUNE 2018

Question	Answers	Extra information	Mark	AO / Spec. Ref.
07.1	sodium oxide	allow Na_2O	1	AO2 4.1.1.1 4.1.2.5 4.4.1.1
07.2	oxidation		1	AO1 4.4.1.1
07.3	13		1	AO1 4.4.2.4
07.4	sodium hydroxide		1	AO2 4.1.1.1
07.5	OH^-		1	AO1 4.4.2.4
07.6	(volume =) $\frac{250}{1000}$ or ¼ or 0.25 (dm^3) **or** (mass per cm^3 =) $\frac{40}{1000}$ (g) or 0.04 (g) ($\frac{250}{1000}$ × 40 =) 10 (g)	an answer of 10 (g) scores **2** marks	1 1	AO2 4.3.2.5

4.1.2.6 Group 7

MARK SCHEME – GCSE CHEMISTRY – 8462/1F – JUNE 2018

Question	Answers	Extra information	Mark	AO / Spec. Ref.
07.7	all points correct	allow a tolerance of ± ½ a small square allow **1** mark for 3 points correct ignore any attempt at a line of best fit	2	AO2 4.1.2.5
07.8	39 (°C)	allow any value from 34 to 46 (°C)	1	AO2 4.1.2.5
Total			**10**	

4.1.2.6 Group 7

MARK SCHEME – GCSE CHEMISTRY – 8462/1F – JUNE 2018

Question	Answers	Extra information	Mark	AO / Spec. Ref.
08.1	any **one** from: • metal • (metal) hydroxide • (metal) carbonate • alkali	allow named example allow correct formula ignore base allow ammonium hydroxide allow ammonium carbonate allow soluble base allow ammonia	1	AO1 4.4.2.1 4.4.2.2 4.4.2.3
08.2	$Ca(NO_3)_2$	allow $Ca^{2+}(NO_3^-)_2$	1	AO2 4.4.2.2

4.1.2.6 Group 7

MARK SCHEME – GCSE CHEMISTRY – 8462/1F – JUNE 2018

Question	Answers	Mark	AO / Spec. Ref.
01.3	**Level 3:** The method would lead to the production of a valid outcome. All key steps are identified and logically sequenced.	5–6	AO1 4.4.2.3
	Level 2: The method would not necessarily lead to a valid outcome. Most steps are identified, but the method is not fully logically sequenced.	3–4	
	Level 1: The method would not lead to a valid outcome. Some relevant steps are identified, but links are not made clear.	1–2	
	No relevant content	0	
	Indicative content • use magnesium oxide and sulfuric acid • add sulfuric acid to a beaker • warm sulfuric acid • add magnesium oxide • stir • continue adding until magnesium oxide is in excess • filter • using a filter paper and funnel • to remove excess magnesium oxide • heat solution in an evaporating basin • to crystallisation point • leave to crystallise • pat dry with filter paper credit may be given for diagrams		
Total		**8**	

4.1.2.6 Group 7

MARK SCHEME – GCSE CHEMISTRY – 8462/1F – JUNE 2018

Question	Answers	Extra information	Mark	AO / Spec. Ref.
09.1	FeS_2	do **not** accept equations	1	AO2 4.2.1.3
09.2	 26 30 26	must be this order	 1 1 1	AO2 4.1.1.4 4.1.1.5
09.3	 any **two** from: • iron has a high(er) melting / boiling point • iron is dense(r) • iron is hard(er) • iron is strong(er) • iron is less reactive • iron has ions with different charges • iron forms coloured compounds • iron can be a catalyst	allow the converse statements for sodium allow transition metal for iron allow Group 1 metal for sodium ignore references to atomic structure ignore iron rusts allow iron is less malleable / ductile allow specific reactions showing difference in reactivity allow iron is magnetic	 2	AO1 4.1.2.5 4.1.3.1 4.1.3.2

4.1.2.6 Group 7

MARK SCHEME – GCSE CHEMISTRY – 8462/1F – JUNE 2018

Question	Answers	Extra information	Mark	AO / Spec. Ref.
09.4	carbon is more reactive (than nickel)	allow converse	1	AO1 4.4.1.2 4.4.1.3
	(so) carbon will displace / replace nickel (from nickel oxide) **or** (so) carbon will remove oxygen (from nickel oxide)	allow (so) nickel ions gain electrons allow (so) carbon transfers electrons to nickel (ions)	1	
09.5		an answer of 67.8 (%) scores **3** marks an answer of 67.8160919 (%) or correctly rounded answer to 2, 4 or more sig figs scores **2** marks an incorrect answer for one step does **not** prevent allocation of marks for subsequent steps		AO2 4.3.3.2
	(total M_r of reactants =) 87		1	
	(percentage atom economy) $= \frac{59}{87} \times 100$	allow (percentage atom economy) $= \frac{59}{\text{incorrectly calculated } M_r} \times 100$	1	
	= 67.8 (%)	allow an answer from an incorrect calculation to 3 sig figs	1	
Total			**11**	

4.1.2.6 Group 7

MARK SCHEME – GCSE CHEMISTRY – 8462/1F – JUNE 2018

Question	Answers	Extra information	Mark	AO / Spec. Ref.
10.1	copper, zinc, sodium chloride solution		1	AO2 4.5.2.1
10.2	a reactant is used up	allow the reaction stops allow electrolyte / electrode / ions / metal / metal hydroxide / alkali for reactant	1	AO1 4.5.2.1
10.3	the reaction is not reversible		1	AO1 4.5.2.1
10.4	$2H_2 + O_2 \rightarrow 2H_2O$	allow fractions / multiples allow **1** mark for O_2	2	AO1 AO2 4.1.1.1 4.5.2.2

<table>
<tr><th>Question</th><th>Answers</th><th>Mark</th><th>AO / Spec. Ref.</th></tr>
<tr><td rowspan="5">10.5</td><td>Level 3: A judgement, strongly linked and logically supported by a sufficient range of correct reasons, is given.</td><td>5–6</td><td rowspan="5">AO3

AO3

AO2

4.4.3.4
4.5.2.1
4.5.2.2</td></tr>
<tr><td>Level 2: Some logically linked reasons are given. There may also be a simple judgement.</td><td>3–4</td></tr>
<tr><td>Level 1: Relevant points are made. This is not logically linked.</td><td>1–2</td></tr>
<tr><td>No relevant content</td><td>0</td></tr>
<tr><td colspan="2">Indicative content

reasons why fuel cells could be judged as better

<table><tr><th>from the table</th><th>from other knowledge</th></tr><tr><td>• time for refuelling a fuel cell is faster than recharging
or
a fuel cell does not need to be recharged
• a fuel cell has a greater range</td><td>• hydrogen can be renewable if made by electrolysis using renewable energy
• lithium-ion batteries can catch fire
• produces only water
or
no pollutants produced
• lithium-ion batteries may release toxic chemicals on disposal
• lithium-ion batteries (eventually cannot be recharged so) have a finite life</td></tr></table>
reasons why the lithium-ion battery could be judged as better

<table><tr><th>from the table</th><th>from other knowledge</th></tr><tr><td>• lithium-ion uses energy more efficiently
• cost of lithium-ion car much less
• cost of recharging much less than refuelling with hydrogen</td><td>• hydrogen is often made from fossil fuels so is not renewable
• charging points are more widely available than hydrogen filling stations
• hydrogen takes up a lot of space
or
is difficult to store
• hydrogen can be highly flammable / explosive
• no emissions produced
• (catalyst in the hydrogen fuel-cell eventually becomes poisoned so) have a finite life</td></tr></table></td><td></td></tr>
<tr><td>Total</td><td colspan="2"></td><td>11</td></tr>
</table>

4.1.2.6 Group 7

Answer 13 · Examiner comments

June 2018 | 8462/1F | Original Q2

Question 2 (low and standard demand)

02.1 42% of students did not realise that the number of outer shell electrons would be the same as the Group number.

02.2 19% of students were able to deduce that hydrogen bromide exists as small molecules. The majority of answers were fairly evenly split between giant covalent and ionic lattice.

02.3 59% of students were able to select F_2 as the correct formula for fluorine, with most of the others opting for F.

02.4 26% of students scored two or more marks, usually for giving the correct trend in reactivity and stating that iodine had no reactions or no changes.

Very few students could articulate their reasoning in terms of displacement. Several tried to answer in terms of reactivity of the potassium halides rather than the halogens, or were misusing the term ‘halide’ instead of ‘halogen’, making it difficult to gain any credit. Others thought that darkness of colour was an indication of reactivity, whilst some referred to melting or boiling points, which were not relevant.

Some students tried to answer in terms of ease of gaining an electron, rather than by using the information in the table as intended. Those who did so were given credit, with the most common mark being for a description of the iodine atom being larger than the chlorine atom.

02.5 74% of students were able to calculate the M_r of TiO_2 correctly. Of those who didn’t gain credit, often they didn’t recognise that there are two oxygen atoms, giving an answer of 64

02.6 This question discriminated well with 32% of students achieving both marks. Many students could convert 1.2 kg to 1200 g. However, many used the mass of reactant, 500 g, as either the numerator or denominator in the percentage yield expression. Others inverted the % yield expression or tried to subtract values.

4.1.2.6 Group 7

Answer 14 · Examiner comments

June 2018 | 8462/1F | Original Q4

Question 4 (low and standard demand)

04.1 72% of students could read off the volume correctly, although 4.4 cm^3 was a popular wrong answer. Some students seem unfamiliar with 'upside down' apparatus.

04.2 This question was answered well, with 70% of students recognising a straight line through the origin as showing proportionality. The idea that neither line showed proportionality was more popular than that both showed proportionality.

04.3 77% of students recognised that both lines showed a positive correlation.

04.4 All four statements about graphite were true and 70% of students could pick out 'delocalised electrons' as the reason for graphite's electrical conductivity.

Answer 14 · Examiner comments

June 2018 | 8462/1F | Original Q4

04.5 Students found this question tough. Full marks were very rare, although 27% of students did achieve three marks.

Most suggested potassium, rather than hydrogen, would be a product from the electrolysis of potassium bromide solution. Partial credit was given for the correct products at the opposite electrodes. As a result many students achieved a mark for having zinc and chlorine the wrong way round.

4.1.2.6 Group 7

Answer 15 · Examiner comments — June 2019 | 8462/1F | Original Q8

Question 8 (standard demand)

08.1 Less than 10% of students scored this mark which required an appropriate reference to the properties of tellurium and/or iodine.

Many referred to atomic number or electron arrangement rather than properties.

08.2 Students found this question difficult. In many cases, they simply repeated the information in the question that Mendeleev thought there were undiscovered elements.

Less than 20% of students gained any marks. The most commonly scored mark was for the idea that these elements were eventually discovered.

08.3 Approximately 70% of students correctly identified relative atomic mass as the modern name for atomic weight.

08.4 Approximately 40% of students scored this mark.

The most common correct response was ‘atomic number’.

Answer 15 · Examiner comments — June 2019 | 8462/1F | Original Q8

Common responses seen that were not credited included:

- reactivity
- relative atomic mass
- mass
- number of electrons in the outer shell.

08.5 Approximately 60% of students scored 0 marks on this question, with approximately 10% not attempting it.

More students scored the mark for the state of astatine than for its formula. For the formula, At_2, the correct casing for the letters needed to be used; also, a subscript for the number.

08.6 Students appeared to be unfamiliar with the reaction in this question.

Many students described the reaction of sodium with water rather than chlorine, referring to the sodium floating, dissolving, fizzing, etc.

The observation of a flame was the most common correct response.

4.1.2.6 Group 7

Answer 17 · Examiner comments — June 2022 | 8462/1F | Original Q4

Question 4 (Low and standard demand)

04.1 This was well answered, with the majority of students giving a correct answer. Most answered in terms of elements that had not been discovered; very few answered in terms of preserving the pattern of similar properties in the same group.

04.2 Nearly three-quarters of students correctly identified Mendeleev as the scientist.

04.3 The majority of students correctly identified the missing group as the noble gases, but a significant minority gave a response of halogens.

04.4 This was well answered with over 70% of students giving the correct answer.

Answer 17 · Examiner comments — June 2022 | 8462/1F | Original Q4

04.5 Nearly all students gave a sensible estimate of the melting point.

04.6 This was well answered, with over 80% of students giving a correct observation. Most described fizzing or bubbling. A few gave observations that could not be seen, such as popping sounds.

04.7 The vast majority of students managed to score at least one mark but fewer than 60% scored both. Liquid was a common incorrect answer, as were At and HAT.

04.8 Nearly half of the students chose the correct formula. The most popular incorrect response was Br, which is the formula of an atom, not a molecule.

Answer 18 · Examiner comments — June 2024 | 8462/1F | Original Q6

Question 6 (low and standard demand)

06.1 Fewer than a half of students identified the reason why molten substances can be electrolysed. The incorrect distractor that electrons can move through the substance was almost as popular.

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4.1.2.6 Group 7

Answer 18 · Examiner comments June 2024 | 8462/1F | Original Q6

06.2 Nearly three quarters of students could name all three substances correctly. The most common errors were iodide instead of iodine and zinc bromine instead of zinc bromide.

06.3 Nearly a half of students gave a completely balanced equation. The oxygen was correctly balanced more often than the aluminium.

06.4 Nearly three fifths of students set out their work clearly and obtained the correct answer. The most common incorrect answers were 27 + 16 = 43 and 27 × 16 = 432.

06.5 Fewer than two thirds of students scored one or two marks, with fewer than one third scoring both marks. It was expected that students would chose appropriate metals from the list provided, but other correct answers were accepted. Gold was not given credit, since students should know that gold is found in the Earth as the metal itself, so does not need chemical extraction. Carbon was often given as a response.

4.1.2.6 Group 7

Answer 19 · Examiner comments — June 2024 | 8462/1F | Original Q9

Question 9 (standard demand)

09.1 This question discriminated well, with one in six students scoring both marks and more than two fifths scoring at least one. Many students did not read the question fully and gave similarities and differences in properties rather than electronic structures. These responses gained no credit. Of those who did reference the electronic structure, most stated correctly that both have one electron on the outer shell, but were less successful in giving a correct difference. Sometimes the wrong number of shells was given for the two elements: usually 2 shells for sodium and 3 for potassium. Some stated that potassium has more outer shells than sodium. This is not correct as the phrase 'outer shell' is always taken to mean the single outermost shell.

09.2 More than a third of students could give two correct observations, and more than four fifths could give one, with bubbling, floating and a flame being the most popular. 'Gas produced' did not gain credit as it is not an observation but a deduction from the observation of bubbling. 'Fizzing' is taken to mean effervescence, so fizzing and bubbling are the same thing rather than two different observations. Credit was not given for any observation requiring extra equipment such as a thermometer or an indicator.

09.3 Only two fifths of students could give a correct colour and even fewer could express the reason in terms of the solution being alkaline; many thought it would be neutral. Some students gave purple as the colour, but gave potassium burning with a purple flame as their reason.

09.4 Nearly three fifths of students scored both marks for plotting the data, with the vast majority scoring at least one. The most commonly mis-plotted point was (86, 9.1) which was often plotted at (92, 9.1). There was no expectation that a line of best fit would be drawn.

09.5 Students were good at estimating the missing value, with nearly three quarters scoring the mark. Sometimes incorrect and inappropriate methods were seen which produced values in the allowed range, such as averaging all five values, or finding the difference between the points adjacent to the missing one. These were not given credit.

09.6 Over a third of students identified the reagents. There was an even distribution of incorrect responses.

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09.7 Two fifths of students identified the correct pair of trends. The most popular error was to identify that the boiling point decreases down the group.

4.1.2.6 Group 7

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Question 5 (low and standard demand)

05.1 This was very well answered, although a few said bromide rather than bromine. Four fifths of students scored both marks.

05.2 Three quarters of students chose the correct formula. The most popular distractor was O^2.

05.3 Students found this question difficult and one in ten did not attempt it. Many stated that aluminium, rather than aluminium ions, is positive. The attraction between the positive ions and the negative electrode was better expressed.

05.4 Again, students found this difficult despite the data provided as a prompt, and again one in ten made no attempt. Few students stated clearly that the mixture has a lower melting point, and even fewer that less energy is therefore required. Some stated that the melting point is lowered by cryolite, which was not accepted; the melting point of aluminium oxide is a fixed value. Some did not make a clear reference to energy, referring to fuel or heat instead. Many referred to boiling points instead of melting points, despite also quoting the given values of melting point. Just over a quarter of students scored 1 mark but only one in 20 scored both.

05.5 About half of students gave the correct answer, with the two distractors both being very popular.

05.6 Three quarters of students gave the correct value, with 2.7 cm^3 being the more popular distractor.

05.7 Three fifths of students gave the correct reason, though a surprising number thought that hydrogen is more reactive than magnesium.

05.8 Only a half of students gave the correct answer, with nearly as many thinking that the volume did not depend on the time.

05.9 There were very many fully correct answers, with a half of students scoring full marks. A few measured the change in volume as 1.8 cm^3 instead of 1.9 cm^3, and some inverted

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the expression for gradient even though it was provided. Any matching pairs of change in volume and change in time were accepted. Even those who read incorrectly from the graph were able to gain partial credit for showing how to manipulate their values correctly.