AQA GCSE Chemistry | 8462

SPECIFICATION POINT 4.1.2.5

Group 1

Mark schemes and examiner comments

Tier	**Foundation**
Question groups	**51**
Available paper years	**2007–2025**

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.

4.1.2.5 Group 1

Answer 01 · Mark scheme January 2007 | CHY1F | Original Q1 | Legacy

Question 1

	answers	extra information	mark
(a)	made of one sort of atom	accept it is in the periodic table accept it only has lithium atoms	1
(b)	nucleus labelled correctly electron labelled correctly		1 1
total			3

Answer 02 · Mark scheme June 2007 | CHY1A | Original Q2 | Legacy

Two	**A**	gold (Au)	**3**
	B	lithium (Li)	**4**
	C	calcium (Ca)	**1**
	D	sulfur (S)	**2**

Answer 03 · Mark scheme November 2007 | CHY1A | Original Q1 | Legacy

One	**A**	atoms	**1**
	B	compounds	**3**
	C	elements	**4**
	D	molecules	**2**

4.1.2.5 Group 1

Answer 04 · Mark scheme

Question 1

question	answers	extra information	mark
(a)(i)	B		1
(a)(ii)	A		1
(a)(iii)	E		1
(a)(iv)	D		1
(b)(i)	Mendeleev and Newlands		1
(b)(ii)	atomic weight		1
(b)(iii)	chemical reactions		1
(b)(iv)	electrons		1
total			8

4.1.2.5 Group 1

Answer 04 · Mark scheme

January 2008 | CHY3F | Original Q1 | Legacy

CHY3F

4.1.2.5 Group 1

Answer 05 · Mark scheme

Question 4

question	answers	extra information	mark
(a)	calcium **or** magnesium	Ca / Ca^{2+} allow Ca^{+} Mg / Mg^{2+} allow Mg^{+}	1
(b)	sodium	allow Na / Na^{+}	1
(c)	hard water before: scum / precipitate / solid soft water after: lather / bubbles equal volumes of water **or** soap	 allow same temperature allow same soap allow shake	1 1 1
total			5

4.1.2.5 Group 1

Answer 05 · Mark scheme

January 2008 | CHY3F | Original Q4 | Legacy

CHY3F

Answer 06 · Mark scheme

June 2008 | CHY2F | Original Q1 | Legacy

question	answers	extra information	mark
1(a)(i)	(phosphoric) acid	allow phosphoric acid	1
1(a)(ii)	hydrogen		1
1(b)(i)	faster / quicker / speeds it up (owtte)	allow answers based on activation energy ignore helps it to react	1
1(b)(ii)	most of the starting materials end up as useful products		1
1(b)(iii)	H_2O	allow HOH **or** OH_2	1
Total			**5**

4.1.2.5 Group 1

Answer 07 · Mark scheme

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**

4.1.2.5 Group 1

Answer 07 · Mark scheme

COMPONENT NUMBER: CHY3F

COMPONENT NAME: Chemistry

STATUS: Final

DATE: June 2008

4.1.2.5 Group 1

Answer 08 · Mark scheme

June 2008 | CHY3F | Original Q7 | Legacy

question	answers	extra information	mark
7(a)	reasonable smooth curve	do **not** allow straight lines joining dot to dot curve must extend from 0 and 30 °C	1
7(b)	solubility curve changes direction	allow solubility decreases (after 35 °C) **or** solubility goes up and down	1
7(c)	(experiments were) repeated	allow they were an average	1
7(d)	35	accept any value from 34 to 35	1
7(e)	14	accept any value from 13 to 15	1
7(f)	27	correct answer = **2** marks accept 46 **or** 19 for **1** mark	2
7(g)	no more solid / gas can be dissolved	owtte allow unable to dissolve any more **or** no more can go into solution ignore absorbs	1
Total			**8**

4.1.2.5 Group 1

Answer 09 · Mark scheme

Question 2

question	answers	extra information	mark
2(a)	carbon dioxide	must be name do **not** accept carbon oxide	1
2(b)(i)	the temperature of the solution will decrease	(list principle)	1
2(b)(ii)	energy is taken in from the surroundings	(list principle)	1
Total			**3**

4.1.2.5 Group 1

Answer 09 · Mark scheme

June 2009 | CHY2F | Original Q2 | Legacy

CHY2F

Answer 10 · Mark scheme

November 2009 | CHY1AP | Original Q5 | Legacy

Five	**A**	Calcium (Ca)	**2**
	B	Lithium (Li)	**3**
	C	Gold (Au)	**1**
	D	Iron (Fe)	**4**

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

4.1.2.5 Group 1

Answer 11 · Mark scheme

Question 8

question	answers	extra information	mark
8(a)	gas / g	accept low density / low boiling point **or** weak intermolecular forces **or** small molecules **or** simple molecules **or** simple molecular (structure) accept volatile **or** easy to evaporate ignore very light ignore incorrect name of gas	1
8(b)	filter / filtration	accept filter paper accept decant / centrifuge ignore filter funnel / sieving / drained off / funnelling ignore names of compounds ignore evaporation / heating if after filtration do **not** accept crystallisation	1
8(c)	evaporation / crystallisation	accept heating / boiling accept 'leave for a few days' owtte allow cool do **not** allow freeze ignore filtration	1

Question 8 continues on next page

4.1.2.5 Group 1

CHY2F

Question 8 continued

question	answers	extra information	mark
8(d)	candidates can gain marks from any two of the three linked pairs		
	hydrogen chloride escaped / released (into atmosphere) **or** (hydrogen chloride) damaged vegetation / harmful	to get both of these **2** marks hydrogen chloride must be mentioned ignore HCl formed / produced / made	1
	used to make chlorine / bleach	ignore sale of hydrogen chloride	1
	unpleasant smell (of calcium sulfide) **or** waste of calcium (sulfide)	ignore calcium sulphide alone allow calcium / calcium sulfate for calcium sulphide to get both of these 2 marks calcium (sulphide) must be mentioned	1
	converted to sulfur **or** used to make sulfuric acid	ignore sale of calcium sulfide	1
	unreacted coal (1) recycled / burnt / used / sold (1)	must be linked to first coal point	
Total			**7**

4.1.2.5 Group 1

Answer 12 · Mark scheme

Question 1

question	answers	extra information	mark
1(a)(i)	E		1
1(a)(ii)	B		1
1(a)(iii)	C		1
1(a)(iv)	A		1
1(b)(i)	quickly melted	allow melts in contact with water, allow bp 100 °C (of water) shows mp is low ignore one other piece of information	1
1(b)(ii)	easily cut	ignore one other piece of information	1
1(b)(iii)	effervescence / fizzing / bubbling	ignore named gas ignore one other piece of information	1
Total			**7**

4.1.2.5 Group 1

Answer 12 · Mark scheme

CHY3F

4.1.2.5 Group 1

Answer 13 · 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**

4.1.2.5 Group 1

Answer 13 · Mark scheme

June 2010 | CHY3F | Original Q3 | Legacy

CHY3F

4.1.2.5 Group 1

Answer 14 · Mark scheme

Question 6

question	answers	extra information	mark
6(a)	the ions can move / travel / flow / are free **or** the ions carry the charge / current	accept particles / they for ions allow delocalised ions ignore delocalised / free electrons ignore references to collisions accept converse with reference to solid ignore ions carry electricity	1
6(b)	any **one** from: • because they are negative / anion • opposite charges / attract	allow Cl^- ignore chlorine	1
6(c)	13		1
6(d)(i)	reasonable attempt at straight line which misses the anomalous point	must touch all five crosses do **not** allow multiple lines	1
6(d)(ii)	40	ignore 2.2	1

Question 6 continues on the next page

4.1.2.5 Group 1

CHY2F

Question 6

question	answers	extra information	mark
6(d)(iii)	any **two** sensible errors from: • gas escapes • weighing error • error in measuring (volume / amount) of hydrogen • error in measuring (volume / amount) of water • incorrect concentration • timing error • change in voltage / current • change in temperature • recording / plotting error	ignore systematic / human / apparatus / zero /experimental / random / measurement / reading errors unless qualified allow NaCl not measured correctly allow error in measuring volume / scale for **1** mark if neither hydrogen or water mentioned allow NaCl not fully dissolved **or** spilled **or** impure allow faulty power supply	2
6(d)(iv)	any **one** from: • repeat the experiment • results compared with results from /other students / other groups / other laboratories / internet / literature. • results compared with another method	ignore 'do more tests'	1
6(d)(v)	increases owtte	allow directly proportional or positive correlation allow rate / it is faster / quicker	1
Total			**9**

4.1.2.5 Group 1

Answer 14 · Mark scheme

CHY2F

4.1.2.5 Group 1

Answer 15 · 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**

4.1.2.5 Group 1

Answer 15 · Mark scheme

CHY3F

4.1.2.5 Group 1

Answer 16 · Mark scheme

Question 2

question	answers	extra information	mark
2(a)	stop them reacting	owtte	1
2(b)(i)	fizzing / bubbles / effervescence	owtte	1
2(b)(ii)	(g)		1
2(b)(iii)	limewater		1
2(c)	yellow		1
2(d)(i)	barium chloride		1
2(d)(ii)	white		1
2(d)(iii)	eg don't see what is being bought **or** a comment about quality / purity eg may be impure / contaminated	ignore references to cost	1
Total			**8**

4.1.2.5 Group 1

Answer 16 · Mark scheme

CHY3F

4.1.2.5 Group 1

Answer 17 · Mark scheme

Question 5

question	answers	extra information	mark
5(a)(i)	smooth curve through all points	do **not** accept multiple lines	1
5(a)(ii)	36.9 to 37.2	if outside range accept correct reading from candidate's own curve +/- half small square	1
5(a)(iii)	35.8 (at 20°C) correctly calculated answer to their (a)(ii) – 35.8	 ignore units ecf from incorrect reading of 35.8 or incorrect transfer of (a)(ii) correct answer from (a)(ii) without working = **2** marks	1 1
5(b)	some recognition that the (y-axis) scales are different **or** some indication of the effect this has eg in **B**: values compressed / not fine enough **or** scale in **B** less precise / larger range	do **not** accept x-axis scale is different accept converse for **A** ignore precise graph	1
Total			**5**

4.1.2.5 Group 1

Answer 17 · Mark scheme

CHY3F

4.1.2.5 Group 1

Answer 18 · 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

4.1.2.5 Group 1

Answer 18 · Mark scheme

June 2011 | CHY3F | Original Q1 | Legacy

CHY3F

4.1.2.5 Group 1

Answer 19 · Mark scheme

June 2012 | CH2FP | Original Q7 | Legacy

Question 7

question	answers	extra information	mark
7(a)	Marks awarded for this answer will be determined by the Quality of Written Communication (QWC) as well as the standard of the scientific response. Examiners should also refer to the information on page 2, and apply a 'best-fit' approach to the marking.		6

0 marks	Level 1 (1-2 marks)	Level 2 (3-4 marks)	Level 3 (5-6 marks)
No relevant content.	There is a simple description of a laboratory procedure for obtaining potassium chloride.	There is a clear description of a laboratory procedure for obtaining potassium chloride from potassium hydroxide solution and hydrochloric acid that does not necessarily allow the procedure to be completed successfully by another person. The answer must include the use of an indicator or a method of obtaining crystals.	There is a detailed description of a laboratory procedure for obtaining potassium chloride from potassium hydroxide solution and hydrochloric acid that can be followed by another person. The answer must include the use of an indicator and a method of obtaining crystals

examples of the chemistry points made in the response:

- One reagent in beaker (or similar)
- Add (any named) indicator
- Add other reagent
- Swirl or mix
- Add dropwise near end point
- Stop addition at change of indicator colour
- Note volume of reagent added
- Repeat without indicator, adding same volume of reagent **or** remove indicator using charcoal
- Pour solution into basin / dish
- Heat (using Bunsen burner)
- Leave to crystallise / leave for water to evaporate / boil off water

Accept any answers based on titration

Question 7 continues on the next page . .

4.1.2.5 Group 1

CH2FP

Question 7 cont'd..

question	answers	extra information	mark
7(b)	nitric (acid)	allow HNO_3 ignore incorrect formula	1
7(c)(i)	because it is a fertiliser / helps plants grow	allow plant food do **not** accept pesticide / herbicide / neutralising soil	1
7(c)(ii)	tick by: 'Should farmers stop using ammonium nitrate on their land?' any **two** from: • cannot be done by experiment • based on opinion / view • ethical **or** economic issue	 accept difficult to get / not enough evidence allow must be done by survey if top box ticked allow **1** mark for drinking water varies from place to place	1 2
Total			**11**

UMS Conversion Calculator www.aqa.org.uk/umsconversion

4.1.2.5 Group 1

Answer 20 · Mark scheme

question	answers	extra information	mark
7(a)	because sulfur / S forms which is insoluble / a solid / a precipitate		1 1
7(b)(i)	32	correct answer with or without working gains **2** marks accept evidence of 31 + 33 / 2 for **1** mark allow 35 for **1** mark	2
7(b)(ii)	reaction rate increases because of more particles (per unit volume) and because there is an increase in frequency of collisions	if incorrect reference to energy = max **2** allow because particles are closer together accept because particles are more likely to collide **or** higher chance of collision ignore more (successful) collisions	1 1 1
Total			7

4.1.2.5 Group 1

Answer 20 · Mark scheme

January 2013

CH2FP

4.1.2.5 Group 1

Answer 21 · Mark scheme

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**

4.1.2.5 Group 1

Answer 22 · Mark scheme

Question 3

question	Answers	extra information	Mark
3(a)	number 0	 allow 8	1 1
3(b)	beryllium **or** magnesium **or** strontium **or** barium **or** radium	allow correct symbols	1
3(c)(i)	an alkali metal		1
3(c)(ii)	a transition metal		1
3(d)	for undiscovered elements	accept so elements with similar properties were in the same groups accept so elements fitted the pattern of properties	1
Total			**6**

4.1.2.5 Group 1

Answer 23 · Mark scheme

June 2013 | CH3FP | Original Q7 | Legacy

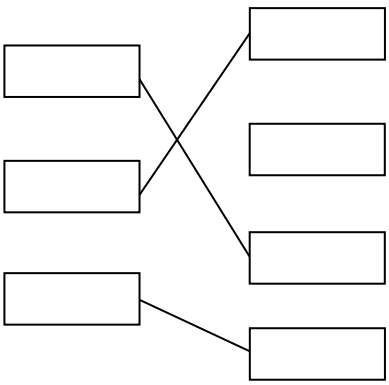
Question 7

question	Answers	extra information	Mark
7(a)(i)	hydrogen	accept H_2 allow H	1
7(a)(ii)	hydroxide	accept OH^- allow OH do **not** accept lithium hydroxide	1
7(b)	any **two** from: potassium: • reacts / dissolves faster • bubbles / fizzes faster • moves faster (on the surface) • melts • produces (lilac / purple) flame	'it' = potassium accept converse for lithium allow reacts more vigorously / quickly / violently / explodes ignore reacts more allow fizzes more allow more gas allow moves more allow forms a sphere allow catches fire / ignites do **not** accept other colours	2
Total			**4**

4.1.2.5 Group 1

Answer 24 · Mark scheme

June 2014 | CH1FP | Original Q1 | Legacy

Question	Answers	Extra information	Mark	AO / Spec. Ref.	ID
1(a)(i)	a proton		1	1 / 1.1.1d	A
1(a)(ii)	nucleus		1	1 / 1.1.1c	A
1(a)(iii)	12 4	order must be correct	1 1	2 / 1.1.1g	G
1(b)(i)	5 / five (%)		1	1 / 1.4.3a	G
1(b)(ii)	Carbon dioxide>global warming Sulfur dioxide>acid rain Water>no pollution 		1 1 1	1 / 1.4.3a/c	G
Total			8		

4.1.2.5 Group 1

Answer 24 · Mark scheme

June 2014 | CH1FP | Original Q1 | Legacy



4.1.2.5 Group 1

Answer 25 · 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**		

4.1.2.5 Group 1

Answer 25 · Mark scheme

June 2014 | CH3FP | Original Q1 | Legacy



4.1.2.5 Group 1

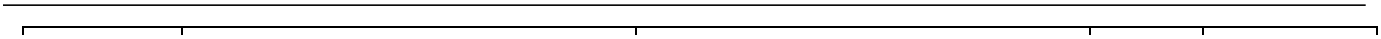
Answer 26 · Mark scheme

Question	Answers	Extra information	Mark	AO / Spec. Ref.
2(a)(i)	Na	allow sodium	1	**AO1** 3.1.3.a
2(a)(ii)	Cu	allow copper	1	**AO2** 3.1.3.c
2(a)(iii)	C	allow carbon	1	**AO2** 3.1.2.b
2(a)(iv)	He	allow helium	1	**AO1** 3.1.2.b
2(b)	H	allow hydrogen do **not** allow H_2	1	**AO2** 3.1.2.b
Total			**5**	

4.1.2.5 Group 1

Answer 26 · Mark scheme

June 2015 | CH3FP | Original Q2 | Legacy



4.1.2.5 Group 1

Answer 27 · Mark scheme

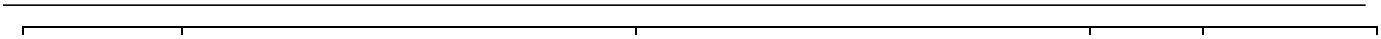
June 2015 | CH3FP | Original Q7 | Legacy

Question	Answers	Extra information	Mark	AO / Spec. Ref.
7(a)(i)	(19.5 + 18.5 + 19.0)/3	allow (23.0 +19.5 + 18.5 + 19.0)/4 for **1** mark	2	**AO2/ AO3** 3.4.1.g
7(a)(ii)	R P Q	allow Q P R for **1** mark	2	**AO3** 3.4.1.g
7(b)	any **two** from: • repeat more times • calculate a mean • measure to one decimal place		2	**AO3** 3.4.1.g
7(c)	both students get similar results / similar pattern		1	**AO3** 3.4.1.g
Total			**7**	

4.1.2.5 Group 1

Answer 27 · Mark scheme

June 2015 | CH3FP | Original Q7 | Legacy



4.1.2.5 Group 1

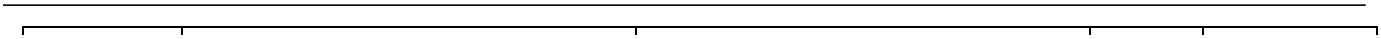
Answer 28 · Mark scheme

Question	Answers	Extra information	Mark	AO / Spec. Ref.
8(a)	(iron) is a metal	accept transition element allow (iron) had different properties (to oxygen and sulfur) ignore electrons	1	**AO2** 3.1.1.a
8(b)	so that elements with similar properties could be placed together	allow to make the pattern fit ignore undiscovered elements	1	**AO1** 3.1.1.b
8(c)	atomic number(s)	allow proton number(s)	1	**AO1** 3.1.2.a
8(d)	all have one electron in the outer shell (highest energy level) (so they) have similar properties **or** react in the same way	allow same number of electrons in the outer shell (highest energy level) allow specific reactions e.g. with water	1 1	**AO1** 3.1.2.b
Total			**5**	

4.1.2.5 Group 1

Answer 28 · Mark scheme

June 2015 | CH3FP | Original Q8 | Legacy



4.1.2.5 Group 1

Answer 29 · Mark scheme

June 2015 | CH3FP | Original Q10 | Legacy

Question	Answers	Extra information	Mark	AO / Spec. Ref.
10(a)	(calcium or magnesium) ions causing water hardness are dissolved from rocks	ignore named anions allow limestone	1 1	AO1/ AO2 3.2.1.b

10(b) Marks awarded for this answer will be determined by the Quality of Written Communication (QWC) as well as the standard of the scientific response. Examiners should also refer to the information on page 5, and apply a 'best-fit' approach to the marking.

AO1/ AO3
3.2.1.g
3.2.2.b

0 marks	Level 1 (1–2 marks)	Level 2 (3–4 marks)	Level 3 (5–6 marks)
No relevant content	There is a statement about one of the methods **or** one advantage of one of the methods	There is a description of one method of water softening **and** one advantage of a method is given	There is a description of both methods of water softening **and** a comparison of the two methods by giving an advantage of at least one of them

general:

- hard water contains calcium/magnesium (ions)
- softening water involves removal of calcium/magnesium (ions)

ion exchange:

- resin
- contains sodium/hydrogen ions
- which are exchanged with calcium/magnesium ions
- resin needs periodic replenishment with sodium ions/hydrogen ions or sodium chloride (disadvantage)
- increases sodium content of water (if sodium ions used) (disadvantage)
- easy/quick method to use (advantage)
- continuous process (advantage)

sodium carbonate:

- sodium carbonate is added to hard water
- calcium/magnesium ions precipitate out
- as calcium/magnesium carbonate
- batch process (disadvantage)
- leaves a residue of precipitated carbonate in the water (disadvantage)
- increases sodium content of water (disadvantage)
- easy method to use (advantage)
- relatively cheap (advantage)

Total			8

4.1.2.5 Group 1

Answer 30 · Mark scheme

June 2016 | CH1FP | Original Q1 | Legacy

Question 1

Question	Answers	Extra information	Mark	AO / Spec. Ref.
1(a)(i)	7		1	AO2 1.1.1g
1(a)(ii)	-1		1	AO1 1.1.1d
1(a)(iii)	neutrons		1	AO1 1.1.1c
1(b)	number of protons		1	AO1 1.1.1f
1(c)	atom **Y**		1	AO2 1.1.1 h; 1.1.2a
1(d)(i)	Ne	allow neon	1	AO2 1.1.2a/b
1(d)(ii)	has a full outer shell **or** full outer energy level **or** has 8 electrons in its outer shell	allow in Group 0 allow a noble gas allow the shells are full ignore in Group 8	1	AO2 1.1.2b; 1.1.3a
Total			**7**	

4.1.2.5 Group 1

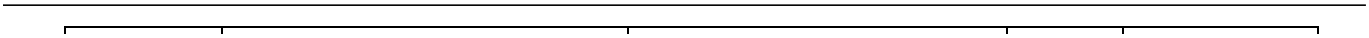
Answer 31 · Mark scheme June 2016 | CH2FP | Original Q1 | Legacy

Question	Answers	Extra information	Mark	AO / SpecRef
1(a)(i)	7 / seven		1	AO1 2.1.1e
1(a)(ii)	1 Electron	do **not** accept -1	1 1	AO1 2.3.1b
1(a)(iii)	isotopes		1	AO1 2.3.1d
1(b)(i)	(sodium +) fluorine → sodium fluoride		1	AO2 2.1.1d,e
1(b)(ii)	compounds		1	AO1 2.1.1a
1(b)(iii)	mole		1	AO1 2.3.1g
1(b)(iv)	 sodium (atom) loses fluorine (atom) gains one electron ions formed	**max 3** if reference to incorrect particle / bonding allow sodium forms positive (ion) **or** fluorine forms negative (ion) allow form ionic bond allow to gain a full outer shell of electrons allow forms noble gas structure	 1 1 1 1	AO1 / AO2 2.1.1b,c,d,e,f
1(b)(v)	Dissolve in water High melting point		1 1	AO1 2.2.2a,b
Total			**13**	

4.1.2.5 Group 1

Answer 31 · Mark scheme

June 2016 | CH2FP | Original Q1 | Legacy



4.1.2.5 Group 1

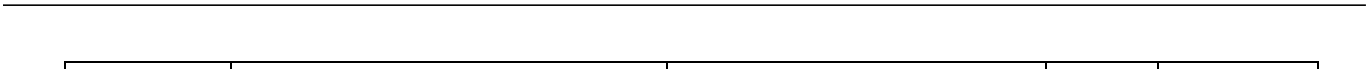
Answer 32 · Mark scheme June 2016 | CH2FP | Original Q4 | Legacy

Question	Answers	Extra information	Mark	AO / SpecRef
4(a)	sulfur dioxide	accept SO_2	1	AO2 2.6.1a
4(b)(i)	curved line of best fit between the 4 non-anomalous points		1	AO2 2.4.1a
4(b)(ii)	temperature was lower (than 40 °C)	accept student missed the moment when the cross disappeared accept smaller volume of acid or acid more dilute	1	AO3 2.4.1c
4(b)(iii)	0.005 **or** 1/200	correct answer with or without working gains **2** marks if answer incorrect, allow **1** mark for 0.32 / 64	2	AO2 2.4.1a
4(b)(iv)	The particles move faster. The particles collide with more energy.		1 1	AO1 2.4.1c
4(b)(v)	activation		1	AO1 2.4.1.b
Total			**8**	

4.1.2.5 Group 1

Answer 32 · Mark scheme

June 2016 | CH2FP | Original Q4 | Legacy



4.1.2.5 Group 1

Answer 33 · Mark scheme

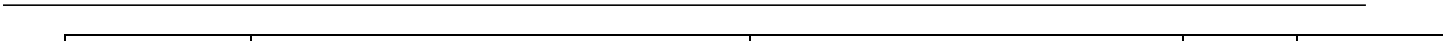
June 2016 | CH2FP | Original Q5 | Legacy

Question	Answers	Extra information	Mark	AO / SpecRef
5(a)(i)	5.75 **or** 5.8	correct answer with or without working gains **2** marks correct working showing addition of any four results and division by 4 gains **1** mark **OR** 6(.04) for **1** mark	2	AO2/AO3 2.5.1a,c
5(a)(ii)	use a polystyrene cup **or** lid to prevent energy/heat gain **OR** use a digital thermometer easier to read (to 0.1°C)	accept insulate the beaker accept to prevent energy/heat transfer do **not** accept energy/heat loss allow use a data logger	1 1	AO3 2.5.1a,c
5(b)	(as mass increases) the final temperature increases then stays constant correct reference to a value above 8 g up to and including 10 g as mass when the trend changes		1 1 1	2AO2 / 1AO3 2.5.1b
Total			7	

4.1.2.5 Group 1

Answer 33 · Mark scheme

June 2016 | CH2FP | Original Q5 | Legacy



4.1.2.5 Group 1

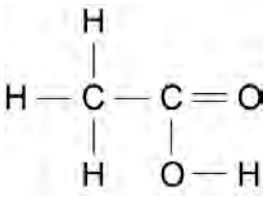
Answer 34 · Mark scheme

Question	Answers	Extra information	Mark	AO / SpecRef
1(a)	atomic weights electrons proton numbers	must be in this order	1 1 1	AO1 3.1.1a, 3.1.2a
1(b)(i)	H/hydrogen	allow H_2 or h	1	AO3 3.1.3b,c
1(b)(ii)	one / 1	allow alkali metals	1	AO2 3.1.3a
1(b)(iii)	Potassium (K)		1	AO1 3.1.3b
1(b)(iv)	Iron has a higher density than potassium Iron forms ions that have different charges		1 1	AO1/AO2 3.1.3c,d
1(c)	any **three** from: • melts • fizzes / bubbles / effervesces • sodium floats • size of the sodium decreases • sodium moves	allow gas produced allow dissolves / disappears allow two marks for moves around on the surface of the water	3	2AO1 / 1AO2 3.1.3a
Total			**11**	

4.1.2.5 Group 1

Answer 35 · Mark scheme

June 2016 | CH3FP | Original Q5 | Legacy

Question	Answers	Extra information	Mark	AO / SpecRef
5(a)(i)	fizz / effervescence / bubbles	allow calcium carbonate decreases in size or dissolves	1	AO2/AO3 3.4.1d, 3.6.2b
	because carbon dioxide produced / released	allow because gas produced / released	1	
	limewater turns cloudy / milky / white		1	
	because (a precipitate of or solid) calcium carbonate forms	allow because of carbon dioxide if not already credited	1	
5(a)(ii)		allow –OH do not allow lower case 'h'	1	AO1 3.6.2a
5(a)(iii)	acid	must be in this order ignore any name of an acid	1	AO1 3.6.2b
	ester(s)		1	
5(b)	white (precipitate) no change no change no change	all four correct 2 marks any two correct 1 mark	2	AO2 3.4.1e,f
5(c)(i)	lilac red	must be in this order allow purple	1 1	AO1 3.4.1a
5(c)(ii)	colours are masked / changed by each flame colour		1	AO3 3.4.1a
Total			12	

4.1.2.5 Group 1

Answer 35 · Mark scheme

<table>
<tr><th>Question</th><th>Answers</th><th>Extra information</th><th>Mark</th><th>AO / SpecRef</th></tr>
<tr><td>6</td><td></td><td></td><td>6</td><td rowspan="6">2AO1 / 3AO2 / 1AO3 3.4.1g</td></tr>
<tr><td colspan="4">Marks awarded for this answer will be determined by the Quality of Written Communication (QWC) as well as the standard of the scientific response. Examiners should also refer to the information on page 5 and apply a ‘best-fit’ approach to the marking.</td></tr>
<tr><td colspan="4"><table>
<tr><th>0 marks</th><th>Level 1 (1–2 marks)</th><th>Level 2 (3–4 marks)</th><th>Level 3 (5–6 marks)</th></tr>
<tr><td>No relevant content.</td><td>There is a simple description of using some of the apparatus.</td><td>There is a description of an experimental method including addition of acid to alkali which may include an indicator or colour change and may include a measurement of volume.</td><td>There is a description of titrations that would allow a comparison to be made between the two solutions of hydrochloric acid.</td></tr>
</table></td></tr>
<tr><td colspan="4">examples of chemistry points made in the response could include:
• acid in burette or flask
• alkali/sodium hydroxide or acid in burette or flask
• volume of acid or alkali measured using the pipette
• indicator in flask
• white tile under the flask
• slow addition
• swirling/mixing
• colour change of indicator
• burette volume measured</td></tr>
<tr><td colspan="4"></td></tr>
<tr><td>Total</td><td></td><td></td><td>6</td><td></td></tr>
</table>

4.1.2.5 Group 1

Answer 36 · Mark scheme

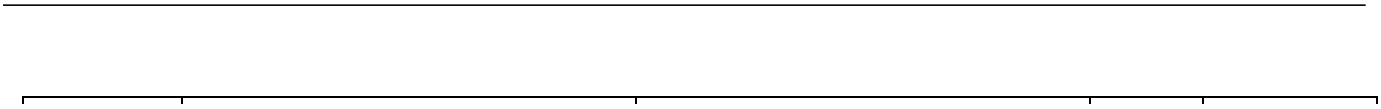
June 2017 | CH1FP | Original Q2 | Legacy

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	

4.1.2.5 Group 1

Answer 36 · Mark scheme

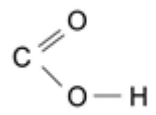
June 2017 | CH1FP | Original Q2 | Legacy



4.1.2.5 Group 1

Answer 37 · Mark scheme

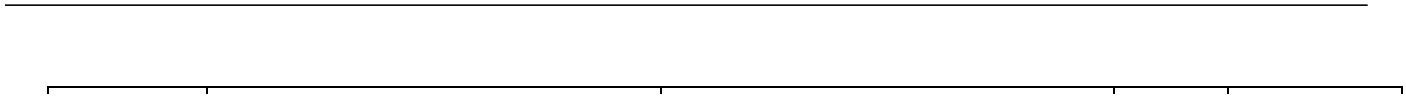
June 2017 | CH3FP | Original Q1 | Legacy

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	

4.1.2.5 Group 1

Answer 37 · Mark scheme

June 2017 | CH3FP | Original Q1 | Legacy



4.1.2.5 Group 1

Answer 38 · Mark scheme

June 2017 | CH3FP | Original Q4 | Legacy

Question	Answers	Extra information	Mark	AO / Spec. Ref.
4(a)	any **two** from: • floats • moves around • fizzes / bubbles / gas • melts / spherical • dissolves / gets smaller / disappears • (lilac) flame / burns / sparks	ignore hydrogen	2	**AO1** **AO2** 3.1.3a
4(b)(i)	burette		1	**AO1** 3.4.1g
4(b)(ii)	indicator	allow any named indicator	1	**AO1** 3.4.1g
4(b)(iii)	add alkali until end point / until acid is neutralized / colour change any **one** from: • swirl • add dropwise / slowly • take reading of volume of alkali used.	ignore clear accept read initial and final volumes of alkali	1 1 1	**AO1** **AO3** 3.4.1g
4(b)(iv)	any **one** from: • volume of acid • concentration of acid • concentration of hydroxide.	allow amount of acid	1	**AO3** 3.4.1g
4(c)(i)	(18.2 + 19.0 + 18.6)/3 = 18.6	correct answer with or without working gains 2 marks allow ((23.8 + 18.2 + 19.0 + 18.6)/4 =)19.9 for 1 mark	1 1	**AO2** **AO3** 3.4.1g

4.1.2.5 Group 1

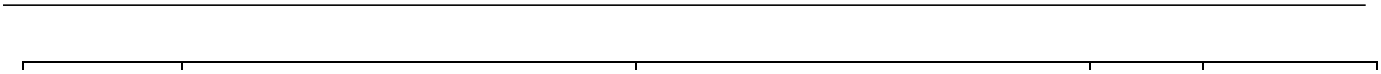
Answer 38 · Mark scheme

4(c)(ii)	any **two** from: • repeat more times • (calculate) a mean • measure to one decimal place.		2	**AO3** 3.4.1g
Total			**12**	

4.1.2.5 Group 1

Answer 38 · Mark scheme

June 2017 | CH3FP | Original Q4 | Legacy



Answer 39 · Mark scheme

June 2018 | 8462/1F | Original Q7

The full source mark scheme begins on page 89. Follow original question 7 in that document.

Answer 40 · Mark scheme

June 2018 | 8462/1F | Original Q9

The full source mark scheme begins on page 89. Follow original question 9 in that document.

4.1.2.5 Group 1

Answer 41 · Mark scheme

June 2019 | 8462/1F | Original Q8

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

4.1.2.5 Group 1

Answer 41 · Mark scheme

June 2019 | 8462/1F | Original Q8

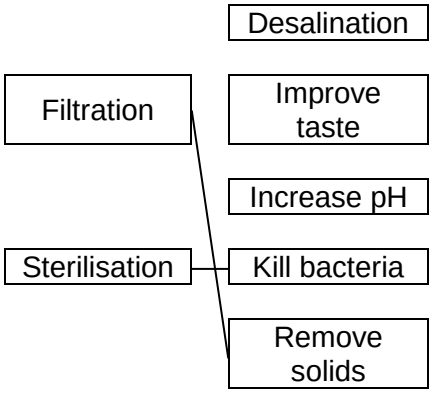
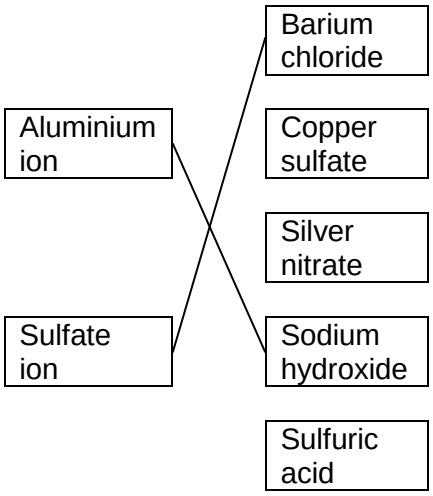
08.6	any **two** from: • flame • (white) solid forms • colour of gas / chlorine disappears / fades	allow burns allow (white) smoke forms	2	AO1 4.1.2.5
Total			**10**	

4.1.2.5 Group 1

Answer 42 · Mark scheme

June 2019 | 8462/2F | Original Q1

Question 1

Question	Answers	Extra information	Mark	AO / Spec. Ref.
01.1		an extra line from a step to a reason for that step negates that mark	1 1	AO1 4.10.1.2
01.2	chlorine ozone		1 1	AO1 4.10.1.2
01.3	evaporate all water from the sample measure the sample's boiling point		1 1	AO2 4.8.1.1 4.10.1.2
01.4		an extra line from an ion to a compound needed negates that mark	1 1	AO1 4.8.3.2 4.8.3.5
01.5	distillation		1	AO1 4.10.1.2
Total			9	

4.1.2.5 Group 1

Answer 43 · Mark scheme

June 2019 | 8462/2F | Original Q9

Question 9

Question	Answers	Mark	AO/ Spec. Ref
09.1	**Level 3**: The design/plan would lead to the production of a valid outcome. All key steps are identified and logically sequenced.	5–6	AO1 4.8.2.3 4.8.3.1 4.8.3.3
	Level 2: The design/plan would not necessarily lead to a valid outcome. Most steps are identified, but the plan is not fully logically sequenced.	3–4	
	Level 1: The design/plan 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 lithium: • crush tablets or dissolve tablet (in water or acid) • clean wire • place on wire • place in (roaring / blue / non-luminous) flame • observe flame colour • crimson flame carbonate: • add hydrochloric acid • effervescence / fizzing • bubble gas through limewater • limewater becomes cloudy		
09.2	formulation(s)	1	AO1 4.8.1.2

4.1.2.5 Group 1

Answer 43 · Mark scheme

09.3	1.20 g = 1200 mg **or** 700 mg = 0.700 g	an answer of 58.3333333 (%) correctly rounded to at least 2 significant figures scores **3** marks	1	AO2 4.8.1.2
	$\frac{700}{1200} \times 100$ **or** $\frac{0.700}{1.20} \times 100$	allow correct use of incorrectly or not converted values from step 1	1	
	= 58.3 (%)	allow 58.3333333 (%) correctly rounded to at least 2 significant figures	1	
Total			**10**	

4.1.2.5 Group 1

Answer 44 · Mark scheme

November 2021 | 8462/1F | Original Q3

Question 3

Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.1	2,8,8,1		1	AO2 4.1.1.7

Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.2	they have the same number of outer shell electrons		1	AO1 4.1.2.1 4.1.2.5

Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.3	metallic		1	AO1 4.2.1.5 1-3

Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.4	any **two** from: • bubbles (very) quickly • melts (into a ball) • floats • moves (very) quickly	allow flame	2	AO1 4.1.2.5 4.4.1.2

Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.5	(reactivity) increases (down the group)		1	AO1 4.1.2.5

4.1.2.5 Group 1

Question 3 continued

Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.6	any **two** from: • increasing speed of movement • increasing rate of bubble production • doesn't melt → melts • no flame → flame **or** flame → explosion		2	AO3 4.1.2.5 4.4.1.2

Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.7	hydrogen		1	AO1 4.1.2.5 4.4.1.2

4.1.2.5 Group 1

Answer 44 · Mark scheme

Question 3 continued

Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.8	sodium ion structure 2,8 fluoride ion structure 2,8 + charge on sodium ion **and** – charge on fluoride ion	allow any combination of circles, dots, crosses or $e^{(-)}$	1 1 1	AO2 4.2.1.2
	an answer of  sodium ion fluoride ion scores **3** marks			

Total		12

4.1.2.5 Group 1

Answer 45 · 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

4.1.2.5 Group 1

Answer 45 · Mark scheme

June 2022 | 8462/1F | Original Q4

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			1 1	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**

4.1.2.5 Group 1

Answer 45 · Mark scheme

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

Total Question 4		**9**

4.1.2.5 Group 1

Answer 46 · Mark scheme

June 2022 | 8462/1F | Original Q9

Question 9

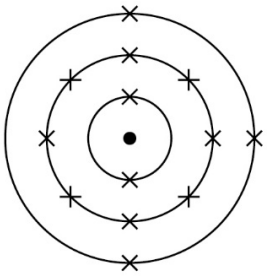
Question	Answers	Extra information	Mark	AO / Spec. Ref.
09.1	D		1	AO3 4.1.2.3

Question	Answers	Extra information	Mark	AO / Spec. Ref.
09.2	B		1	AO3 4.1.3.2

Question	Answers	Extra information	Mark	AO / Spec. Ref.
09.3	any **two** from: (Group 1 elements) • have lower melting / boiling points • have lower densities • are less strong • are softer	allow converse statements for transition elements allow (Group 1 elements are) more malleable / ductile allow (Group 1 elements) are not useful as catalysts ignore transition elements form coloured compounds ignore transition elements form ions with different charges ignore references to chemical properties	2	AO1 4.1.3.1 4.1.3.2

4.1.2.5 Group 1

Answer 46 · Mark scheme

Question	Answers	Extra information	Mark	AO / Spec. Ref.
09.4		allow any combination of x, •, o, $e^{(-)}$ for electrons	1	AO2 4.1.1.7

Question	Answers	Extra information	Mark	AO / Spec. Ref.
09.5	delocalised electrons (the electrons) carry (electrical) charge (the electrons move) through the metal / aluminium / structure	allow free electrons ignore current / electricity for charge ignore throughout for through	1 1 1	AO1 4.2.1.5 4.2.2.8

Question	Answers	Extra information	Mark	AO / Spec. Ref.
09.6	ionic		1	AO1 4.2.1.1

4.1.2.5 Group 1

Answer 46 · Mark scheme

Question	Answers	Extra information	Mark	AO / Spec. Ref.
09.7	magnesium (atom) loses electrons		1	AO2 4.2.1.1 4.2.1.2
	oxygen (atom) gains electrons		1	
	two electrons (are transferred)		1	
	magnesium ions **and** oxide ions are formed	allow Mg^{2+} (ions) **and** O^{2-} (ions) are formed allow magnesium forms positive ions and oxygen forms negative ions allow (both) form a complete outer shell	1	

Total Question 9		**13**

4.1.2.5 Group 1

Answer 47 · Mark scheme

June 2022 | 8462/2F | Original Q1

Question 1

Question	Answers	Extra information	Mark	AO / Spec. Ref.
01.1	100 7	must be in this order	1 1	AO1 4.8.1.1 4.10.1.2 RPA8

Question	Answers	Extra information	Mark	AO / Spec. Ref.
01.2	pH probe / meter **or** universal indicator (paper / solution)	allow wide range indicator (paper / solution)	1	AO1 4.10.1.2 RPA8

Question	Answers	Extra information	Mark	AO / Spec. Ref.
01.3	balance measuring cylinder		1 1	AO1 4.10.1.2 RPA8

Question	Answers	Extra information	Mark	AO / Spec. Ref.
01.4	(mean =) $\frac{1.73 + 1.70 + 1.75 + 1.78}{4}$ = 1.74 (g)		1 1	AO2 4.10.1.2 RPA8

4.1.2.5 Group 1

Answer 47 · Mark scheme

Question	Answers	Extra information	Mark	AO / Spec. Ref.
01.5	(mass =) $\frac{1.5 \times 1000}{50}$ = 30 (g)		1 1	AO2 4.10.1.2 RPA8

Question	Answers	Extra information	Mark	AO / Spec. Ref.
01.6	yellow		1	AO1 4.8.3.1 RPA7

Question	Answers	Extra information	Mark	AO / Spec. Ref.
01.7	white		1	AO1 4.8.3.4 RPA7

Total Question 1		11

4.1.2.5 Group 1

Answer 48 · Mark scheme

June 2023 | 8462/1F | Original Q6

Question 6

Question	Answers	Extra information	Mark	AO / Spec. Ref.
06.1	any one from: • unreactive • appearance • easily shaped	 allow does not react with air / water / skin allow does not tarnish allow aesthetic reasons allow malleable allow easily moulded ignore references to cost ignore references to hardness / strength ignore references to melting / boiling point	1	AO3 4.4.1.2 4.4.1.3

Question	Answers	Extra information	Mark	AO / Spec. Ref.
06.2	any **two** from: • bubbles • moves • floats • melts • disappears	 allow forms a ball allow catches fire	2	AO1 4.1.2.5 4.4.1.2

Question	Answers	Extra information	Mark	AO / Spec. Ref.
06.3	copper is harder copper is less reactive		1 1	AO1 4.1.3.1

4.1.2.5 Group 1

Answer 48 · Mark scheme

June 2023 | 8462/1F | Original Q6

Question	Answers	Mark	AO/ Spec. Ref
06.4	**Level 2:** Some logically linked reasons are given. There may also be a simple judgement.	3–4	AO3 4.2.2.7 4.2.2.8
	Level 1: Relevant points are made. They are not logically linked.	1–2	
	No relevant content	0	
	Indicative content • copper is the better conductor • so heats food more quickly • copper has the higher density • so the pan is heavier • copper costs more per kilogram • so the pan is more expensive to buy • simple judgement		

Total Question 6	**9**

4.1.2.5 Group 1

Answer 49 · Mark scheme

June 2023 | 8462/2F | Original Q10

Question 10

Question	Answers	Mark	AO/ Spec. Ref
10.1	**Level 3:** The method would lead to the production of a valid outcome. The key steps are identified and logically sequenced.	5–6	AO1 4.8.3.1 4.8.3.4 RPA7
	Level 2: The method would not necessarily lead to a valid outcome. Most steps are identified, but the plan 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 (potassium ions) • **place sample on (clean metal) wire** • **introduce into (blue / non-luminous) flame** • using (Bunsen) burner • **observe lilac flame colour** • which shows presence of potassium (ions) (bromide ions) • **dissolve sample** • in (distilled) water • in test tube • add (dilute) nitric acid • **add silver nitrate (solution)** • using (dropping) pipette • **observe cream precipitate (formed after addition of silver nitrate solution)** • which shows presence of bromide (ions)		

Question	Answers	Extra information	Mark	AO / Spec. Ref.
10.2	flame emission spectroscopy		1	AO1 4.8.3.7

4.1.2.5 Group 1

Answer 49 · Mark scheme

Question	Answers	Extra information	Mark	AO / Spec. Ref.
10.3	any **one** from: • (more) accurate • (more) sensitive • fast(er) • determine the concentration of ions present	allow requires a small(er) sample	1	AO1 4.8.3.6

Total Question 10	8

4.1.2.5 Group 1

Answer 50 · 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

4.1.2.5 Group 1

Answer 50 · 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**

4.1.2.5 Group 1

Answer 51 · Mark scheme

June 2025 | 8462/1F | Original Q10

Question 10

Question	Answers	Extra information	Mark	AO / Spec. Ref.
10.1	(substance reduced) SnO_2	allow tin oxide	1	AO2 4.4.1.1 4.4.1.3
	(reason) (SnO_2) loses oxygen	allow (tin oxide) loses oxygen MP2 is dependent upon MP1 being awarded	1	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
10.2	carbon is more reactive than tin	allow tin is less reactive than carbon	1	AO3 4.4.1.2 4.4.1.3

Question	Answers	Extra information	Mark	AO / Spec. Ref.
10.3	(total M_r = 128 + 12 =) 140	allow (total M_r = 112 + 12 + 16 =) 140	1	AO2 4.3.3.2
	(% atom economy =) $\frac{112}{140} \times 100$	allow correct use of an incorrectly determined total M_r	1	
	= 80 (%)		1	

4.1.2.5 Group 1

Answer 51 · Mark scheme

Question	Answers	Extra information	Mark	AO / Spec. Ref.
10.4	any **two** from: tungsten • has a higher melting / boiling point • is denser • is harder • is stronger • is less reactive • has ions with different charges • forms coloured compounds • can be a catalyst	allow the converse for potassium allow the transition metal for tungsten allow the Group 1 metal for potassium ignore references to atomic structure allow is less malleable / ductile allow specific reactions showing difference in reactivity	2	AO1 4.1.2.5 4.1.3.1 4.1.3.2

4.1.2.5 Group 1

Answer 51 · Mark scheme

Question	Answers	Extra information	Mark	AO / Spec. Ref.
10.5	(sum of relative formula masses on left hand side =) 232 + (3 × 2) = 238 (is equal to sum of relative formula masses on right hand side =) 184 + (3 × 18) = 238	allow (sum of relative formula masses on left hand side =) 232 + 6 = 238 allow (is equal to sum of relative formula masses on right hand side =) 184 + 54 = 238 if no other mark awarded, allow **1** mark for 232 + 6 = 184 + 54 **or** allow **1** mark for both sides = 238	1 1	AO2 4.3.1.1 4.3.1.2

Question	Answers	Extra information	Mark	AO / Spec. Ref.
10.6	for sustainable development **or** for economic reasons	allow to minimise use of limited resources allow to minimise use of energy allow to minimise waste ignore references to yield	1	AO1 4.3.3.2

Total Question 10	11

4.1.2.5 Group 1

AQA

GCSE
CHEMISTRY

8462/1F - PAPER 1 FOUNDATION TIER

Mark scheme

8462

June 2018

Version/Stage: 1.0 Final

4.1.2.5 Group 1

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

Copyright © 2018 AQA and its licensors. All rights reserved.
AQA retains the copyright on all its publications. However, registered schools/colleges for AQA are permitted to copy material from this booklet for their own internal use, with the following important exception: AQA cannot give permission to schools/colleges to photocopy any material that is acknowledged to a third party even for internal use within the centre.

PMT

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 <u>not</u> 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.

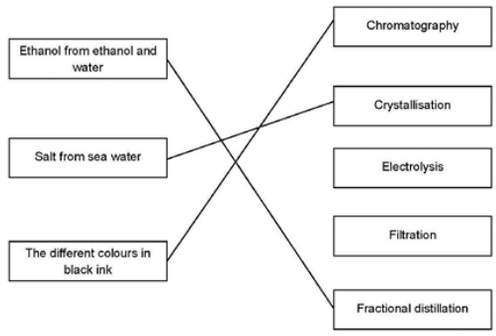
Indicative content in the mark scheme is provided as a guide for examiners. It is not intended to be exhaustive and you must credit other valid points. Students do **not** have to cover all of the points mentioned in the indicative content to reach the highest level of the mark scheme.

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.

4.1.2.5 Group 1

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

4.1.2.5 Group 1

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**	

4.1.2.5 Group 1

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)	allow the reactivity decreases from chlorine to iodine	1	AO1 4.1.2.6
	(because) chlorine displaces bromine and iodine	allow (because) chlorine has two reactions allow (because) neither bromine nor iodine can displace chlorine	1	AO3 4.1.2.6
	(and) bromine displaces iodine **or** iodine does not react	allow (and) bromine has one reaction **or** iodine has no reactions allow (and) iodine cannot displace bromine	1	AO3 4.1.2.6
02.5	80		1	AO2 4.3.1.2

4.1.2.5 Group 1

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**	

4.1.2.5 Group 1

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** $1.2 \times 10^{-10} \times 1 \times 10^{-4}$ = 1.2×10^{-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**	

4.1.2.5 Group 1

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**	

4.1.2.5 Group 1

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

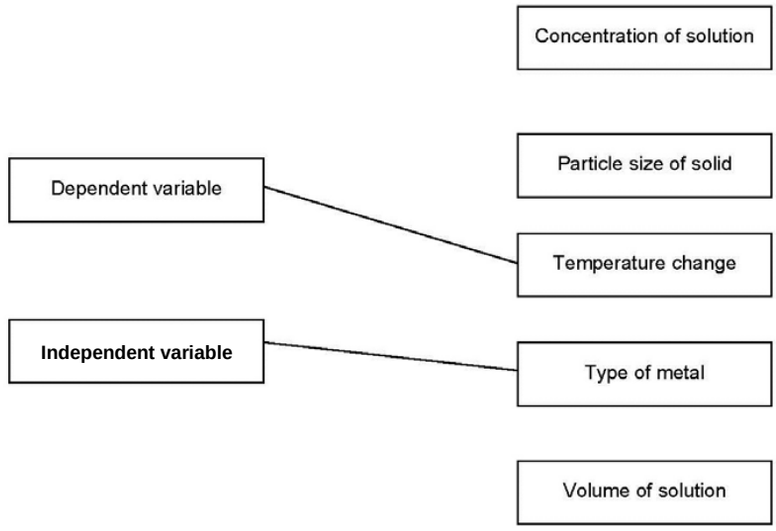
4.1.2.5 Group 1

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 =) $168 \times \frac{\text{answer from question } \mathbf{05.7}}{8.4}$ correctly calculated value (g)	a correctly calculated value from their answer to question **05.7** scores **2** marks allow (mass =) answer from question **05.7** × 20	1 1	AO2 4.3.1.3
Total			**10**	

4.1.2.5 Group 1

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

4.1.2.5 Group 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

4.1.2.5 Group 1

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**	

4.1.2.5 Group 1

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

4.1.2.5 Group 1

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**	

4.1.2.5 Group 1

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

4.1.2.5 Group 1

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**	

4.1.2.5 Group 1

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

4.1.2.5 Group 1

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**	

4.1.2.5 Group 1

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

4.1.2.5 Group 1

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

<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><td></td></tr>
<tr><td>Total</td><td colspan="2"></td><td>11</td></tr>
</table>

4.1.2.5 Group 1

Answer 39 · Examiner comments

June 2018 | 8462/1F | Original Q7

Question 7 (low and standard demand)

07.1 This question was answered well with 80% of students giving the correct name of the product. Some students tried to add in other products such as water or hydrogen.

07.2 85% of students knew this was an oxidation reaction.

07.3 68% of students could relate the colour of the universal indicator to the correct pH. The most common distractor was 'pH 7'.

07.4 73% of students could name sodium hydroxide correctly.

Answer 39 · Examiner comments

June 2018 | 8462/1F | Original Q7

07.5 This question assessed recall directly from the specification. 43% of students could identify the OH^- ion as being present in all alkalis.

More than a 25% thought that the Na^+ ion was responsible, with nearly as many opting for the H^+ ion.

07.6 Students found this calculation very difficult, with 7% achieving full marks. 13% of students made no attempt to answer.

It was necessary to convert either the volume to dm^3 or the concentration to mol/cm^3 to gain partial credit, but most students either failed to attempt a conversion or did not know how many cm^3 are in one dm^3.

07.7 58% of students achieved both marks. It was very common to see the scale on the *x*-axis misread so that the plots for sodium and potassium were incorrect. Some students were using a pen or a very thick pencil so were unable to correct their answer or were compromising accuracy.

07.8 This question was answered very well, with 82% of students answering correctly.

4.1.2.5 Group 1

Answer 40 · Examiner comments

June 2018 | 8462/1F | Original Q9

Question 9 (standard demand)

09.1 Because the question asked for the formula rather than the empirical formula, an answer of Fe_9S_{18} was accepted. Even so, 21% of students were able to answer this correctly.

Many students ignored the necessity for correct capital and lower case letters, with a lower case 'f' being seen quite frequently. Others did not count the atoms correctly, or used a large figure '2' in an inappropriate position.

09.2 This question worked very well. 84% of students managed to achieve at least one mark, with 51% achieving two or more. The most frequent error was in the number of neutrons.

09.3 Whilst 56% of students achieved at least one mark, 34% of these students achieved both.

- Many students repeated information in the stem of the question. And some appeared to ignore it as they declared sodium to be a non-metal.
- Many gave differences in the structure of the atoms instead of differences in properties of the substances.
- Some effectively gave the same difference twice, for example writing that sodium is soft on one line and iron is hard on the other.

09.4 26% of students achieved at least one mark on this question, although some very good answers were seen. As with some other questions, students were sometimes prone to imprecise use of language.

Many students thought that carbon is more reactive than oxygen rather than nickel, or said that carbon is reacting with oxygen (it is not, it is reacting with nickel oxide to remove the oxygen). Those who tried to answer in terms of electron transfer often struggled to gain all the marks.

09.5 Students struggled with this calculation; with 9% of students providing a fully correct answer. This question relies on knowledge of the expression for atom economy. Those who quoted the expression often did not know what was meant by 'reactants'.

It was also common to include the M_r of all the products instead of just the nickel, leading to an answer of 100%, which is clearly incorrect as there is more than one product.

There seemed to be trouble with the interpretation of some calculator displays. Many students lost the final mark because they gave an answer of $67.\dot{8}$. This answer is neither correct (it is not 67.8888888…) nor to three significant figures (it is to an infinite number of significant figures). Some even recognised this latter point and rounded, incorrectly, to 67.9.

4.1.2.5 Group 1

Answer 41 · 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 41 · 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.

4.1.2.5 Group 1

Answer 45 · 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 45 · 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.

4.1.2.5 Group 1

Answer 46 · Examiner comments

June 2022 | 8462/1F | Original Q9

Question 9 (Standard demand)

09.1 Fewer than a quarter of students recognised that element **Q** must be a non-metal because of the lack of conductivity, and therefore in section **D**. **B** and **C** were both seen more often than the correct answer, though responses were fairly evenly spread across all options.

09.2 This was slightly better answered than the previous question. However, again responses were spread across all options.

09.3 Most students described a property of either a Group 1 element or a transition element without reference to the other; this did not gain credit as a comparison was needed. Of those students who did answer in comparative terms, most knew that Group 1 metals are softer than transition metals, but there was confusion about which had lower melting points. Some students thought that one group or the other would not conduct electricity. Very few students were awarded both marks; about a sixth scored one mark.

09.4 Most students could draw the electronic structure correctly. The most common error was to draw only one electron on the outer shell.

09.5 Most students referred to electrons in their answer as required, but fewer than a third described those electrons as delocalised. Some also referred to the electrons carrying charge. However, very few articulated the idea that the electrons themselves move through the metal in a particular direction. Of those who referred to electrons moving, many implied that the movement was random. Some students incorrectly referred to electrons bumping into other atoms or electrons.

Answer 46 · Examiner comments

June 2022 | 8462/1F | Original Q9

09.6 Just over half of students correctly identified the type of bonding. The most common incorrect response was covalent.

09.7 Many students gave good descriptions of the transfer of two electrons from a magnesium atom to an oxygen atom to produce magnesium ions and oxide ions. However, some students subsequently referred to electrons being shared. About 40% of students were awarded at least one mark, with about a sixth gaining all four marks.

4.1.2.5 Group 1

Answer 47 · Examiner comments

June 2022 | 8462/2F | Original Q1

Question 1 (Low demand)

01.1 Around 70% of the students gained 2 marks. The boiling point of pure water was slightly better known than its pH.

01.2 Under half of the students gained this mark, with universal indicator being the most common correct answer and pH scale the most common incorrect response.

01.3 Around 70% of the students gained two marks. Use of a thermometer was the most common incorrect response.

01.4 Very well answered, with nearly 90% of the students gaining both of the marks. the majority both obtaining the correct answer and showing their working.

01.5 This was also very well answered, with more than three-quarters of the students scoring both marks.

01.6 Nearly 50% of the students gained a mark for knowing the flame colour of sodium is yellow.

01.7 Knowing that the halide ion test produces a white precipitate gained a mark for over 50% of the students.

Answer 48 · Examiner comments

June 2023 | 8462/1F | Original Q6

Question 6 (low and standard demand)

06.1 Only a third of students gave a property of platinum which was relevant in its use for jewellery. Many gave properties which are not relevant, such as high density, high melting point or high strength.

06.2 The great majority scored at least one mark. Students were asked for observations which could be seen, so those which could be heard did not gain credit. Bubbling and fizzing are the same observation; many gave both terms and no other observation so scored only one mark. Some incorrectly said that the water changes colour (possibly because they have seen the reaction carried out in the presence of an indicator).

06.3 Most students scored at least one mark, with the vast majority knowing that copper is less reactive than sodium. The differences in physical properties were less well known, with many thinking that copper has a lower melting point.

06.4 Three quarters of students could compare the three properties and therefore achieve a mark in level 1. However, far fewer reached level 2, where there needed to be links to these properties, such as a copper pan cooking food more quickly because of copper's higher thermal conductivity. Many students incorrectly linked density to strength or longevity of the pan. Some students referred incorrectly to electrical conductivity: a property which is not relevant here and for which no data were provided. Many students also provided a simple judgement as to which pan is better overall. Many students simply quoted the values in the table, but did not add any value to the data.

4.1.2.5 Group 1

Answer 49 · Examiner comments

Question 10 (Standard demand)

10.1 This extended response question used the command word ‘plan’.

A simplistic approach to the level descriptors might be:

Level 3 – will produce the expected outcomes.
Level 2 – might produce the expected outcomes with additions or modifications.
Level 1 – will not produce the expected outcomes.

4.1.2.5 Group 1

However, the marking of extended response questions must always be holistic, so a best-fit approach must always be followed.

Key steps were shown in the indicative content in **bold**.

Most students found this question very difficult with only around 6% of students managing at least a mark in Level 2 and only 25% of students gaining at least 1 mark.

The flame test for the potassium ions was seen more often than the test for the bromide ion, with some students identifying the flame colour but not being able to describe how to carry out the test. Many responses failed to include putting the sample of medicine on the wire or making it clear that the Bunsen was lit. A number of students placed the wire under the Bunsen or did not make it clear that the Bunsen was lit. Some students thought that they needed to sterilise an inoculating loop before using in a flame test.

Many students mixed up the tests by carrying out flame tests on all the reagents.

The test for bromide ions was poorly understood with less than 1% of students recognising that silver nitrate should be added to the medicine and being able to state the correct test result.

Around one-fifth of students scored a Level 1 mark by using the medicine or correct test result in their response and including some relevant points in the correct context from the question.

10.2 The instrumental method was known by very few students with only 1% of students being able to correctly identify flame emission spectroscopy. Most students who attempted the question mentioned laboratory or industrial processes such as fractional distillation or electrolysis. More than a third of the students did not attempt this question.

10.3 Over 30% of students correctly identified an advantage for using an instrumental method over a chemical test. The most popular correct responses were rapidity and accuracy. One quarter of the students did not answer this question.

4.1.2.5 Group 1

Mark Ranges and Award of Grades

Grade boundaries and cumulative percentage grades are available on the Results Statistics page of the AQA Website.

4.1.2.5 Group 1

Answer 50 · 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.

© 2024 AQA and its licensors. All rights reserved.

Answer 50 · Examiner comments — June 2024 | 8462/1F | Original Q9

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.

4.1.2.5 Group 1

Answer 51 · Examiner comments

June 2025 | 8462/1F | Original Q10

Question 10 (standard demand)

10.1 Students found this question difficult and fewer than one in ten could give the correct substance. Many gave tin (the result of the reduction) as the answer instead of tin oxide, and many did not appreciate that reduction is loss of oxygen.

10.2 One in six students could give an acceptable answer in terms of reactivity. Students were expected to compare the reactivities of carbon and tin, so both needed to be named. There was some ambiguous use of the word 'it'.

10.3 Whilst a third of students scored one mark, only about one in ten scored all three. Many could not recall the expression for percentage atom economy and therefore did not attempt to find the total M_r of the reactants. A significant minority added the two relative atomic masses provided to give 124 and then divided by 128.

4.1.2.5 Group 1

Answer 51 · Examiner comments June 2025 | 8462/1F | Original Q10

10.4 Nearly a half of students scored at least one mark. Many answers were not comparative so could not gain credit. Some gave two halves of the same comparison as two different differences in properties, e.g. tungsten is hard for one answer and potassium is soft for the other. Answers in terms of atomic structure, rather than properties of the element, did not gain credit.

10.5 Nearly a half of students scored both marks by producing working to show that the total M_r on each side was 238.

10.6 One in five students scored the mark. Common correct responses included minimising waste or making more profit. Common incorrect answers included references to yield, rate or safety.

4.1.2.5 Group 1

Mark Ranges and Award of Grades

Grade boundaries and cumulative percentage grades are available on the Results Statistics page of the AQA Website.