AQA GCSE Chemistry | 8462

SPECIFICATION POINT 4.1.2.4

Group 0

Mark schemes and examiner comments

Tier	**Foundation**
Question groups	**41**
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.

4.1.2.4 Group 0

Answer 01 · Mark scheme

Question 3

	answers	extra information	mark
(a)	tungsten		1
	has the high(est) melting point	accept that metals other than tungsten are likely to melt	1
(b)	argon		1
	is an unreactive gas	accept that gases other than argon are reactive accept that argon is a noble gas or in Group 0	1
total			4

4.1.2.4 Group 0

Answer 02 · Mark scheme March 2007 | CHY1B | Original Q2 | Legacy

Two	**A**	carbon dioxide	**1**
	B	nitrogen	**3**
	C	noble gases	**4**
	D	oxygen	**2**

Answer 03 · Mark scheme March 2007 | CHY1B | Original Q3 | Legacy

Three	**A**	ethanol	**2**
	B	ethene	**4**
	C	helium	**1**
	D	poly(propene)	**3**

Answer 04 · Mark scheme June 2007 | CHY1B | Original Q4 | Legacy

Four	**A**	boiling point	**4**
	B	colour	**2**
	C	density	**3**
	D	reactivity	**1**

Answer 05 · Mark scheme June 2007 | CHY1F | Original Q1 | Legacy

The full source mark scheme begins on page 44. Follow original question 1 in that document.

Answer 06 · Mark scheme June 2007 | CHY1F | Original Q5 | Legacy

The full source mark scheme begins on page 44. Follow original question 5 in that document.

4.1.2.4 Group 0

Answer 07 · Mark scheme

Four	**A**	ammonia	**3**
	B	helium	**2**
	C	methane	**1**
	D	oxygen	**4**

4.1.2.4 Group 0

Answer 08 · Mark scheme

Question 1

question	answers	extra information	mark
(a)(i)	made up of one sort of atom	accept it is in the periodic table **or** has its own symbol	1
(a)(ii)	nitrogen / N / N_2 **or** oxygen / O / O_2	do **not** accept argon **or** helium do **not** accept oxide	1
(b)(i)	compound carbon		1 1
(b)(ii)	bond		1
total			5

4.1.2.4 Group 0

Answer 08 · Mark scheme January 2008 | CHY1F | Original Q1 | Legacy

CHY1F

Answer 09 · Mark scheme March 2008 | CHY1BP | Original Q1 | Legacy

One	**A**	argon (noble gas)	**2**
	B	carbon dioxide	**3**
	C	nitrogen	**1**
	D	oxygen	**4**

Answer 10 · Mark scheme November 2008 | CHY1BP | Original Q3 | Legacy

Three	**A**	argon	**1**
	B	bromine	**3**
	C	ethanol	**2**
	D	nickel	**4**

Answer 11 · Mark scheme November 2008 | CHY1BP | Original Q5 | Legacy

Five	**A**	carbon dioxide	**3**
	B	helium	**1**
	C	nitrogen	**2**
	D	oxygen	**4**

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

Answer 12 · Mark scheme March 2009 | CHY1BP | Original Q1 | Legacy

One	**A**	oxygen	**3**
	B	noble gas	**4**
	C	air	**2**
	D	water vapour	**1**

Answer 13 · Mark scheme June 2009 | CHY1BP | Original Q3 | Legacy

Three	**A**	It is the gas that is a compound	**2**
	B	It is the most abundant of the noble gases.	**1**
	C	It is the noble gas with the lowest boiling point	**4**
	D	There are 18 cm^3 of this gas in 100 litres of air	**3**

4.1.2.4 Group 0

Answer 14 · Mark scheme

Question 1

question	answers	extra information	mark
1(a)	conducts (electricity) **or** allows electrons / current to flow	accept flexible ignore conducts heat	1
1(b)	electron		1
1(c)(i)	lithium>copper>tungsten **or** Li>Cu>W	all correct allow **1** mark for one metal in the correct position	2
1(c)(ii)	has high / highest melting point **or** can withstand the highest temperature	accept has high / highest boiling point	1
1(d)	unreactive		1
Total			**6**

4.1.2.4 Group 0

Answer 14 · Mark scheme

June 2009 | CHY1F | Original Q1 | Legacy

CHY1F

4.1.2.4 Group 0

Answer 15 · Mark scheme

June 2009 | CHY1F | Original Q4 | Legacy

Question 4

question	answers	extra information	mark
4(a)(i)	nitrogen / N_2		1
4(a)(ii)	carbon dioxide / CO_2		1
4(b)(i)	humans / scientists had not evolved	accept it was billions / millions of years ago allow too long ago	1
4(b)(ii)	temperature is above 100°C **or** any water would evaporate / boil	accept Venus is too hot	1
4(c)	any **three** from: • used by plants • used for photosynthesis • dissolves in oceans / seas • used to form the shells / skeletons of marine organisms • locked up as limestone / carbonates • locked up as fossil fuels / oil / coal	accept plants take in carbon dioxide and give out oxygen for the first two bullet points ie **2** marks allow absorbs into oceans / seas	3
Total			**7**

4.1.2.4 Group 0

Answer 15 · Mark scheme June 2009 | CHY1F | Original Q4 | Legacy

CHY1F

Answer 16 · Mark scheme November 2009 | CHY1BP | Original Q2 | Legacy

No matching mark scheme was available in the supplied archive for this question.

Answer 17 · Mark scheme March 2010 | CHY1BP | Original Q1 | Legacy

Question	Key		
One	**A**	oxygen	**1**
	B	nitrogen	**4**
	C	carbon dioxide	**2**
	D	helium	**3**

Answer 18 · Mark scheme June 2010 | CHY1BP | Original Q1 | Legacy

Question	Key		
One	**A**	Nitrogen	**2**
	B	Oxygen	**3**
	C	Carbon dioxide	**1**
	D	Argon	**4**

Answer 19 · Mark scheme November 2010 | CHY1BP | Original Q2 | Legacy

Two	**A**	Argon	**2**
	B	Helium	**4**
	C	Neon	**3**
	D	Xenon	**1**

Answer 20 · Mark scheme November 2010 | CHY1BP | Original Q4 | Legacy

Four	**A**	Venus	**1**
	B	Earth	**2**
	C	Mars	**4**
	D	Jupiter	**3**

4.1.2.4 Group 0

Answer 21 · Mark scheme

Question 1

question	answers	extra information	mark
1(a)	less dense than air		1
1(b)(i)	water	accept hydrogen oxide do **not** accept hydrogen dioxide / hydro oxide	1
1(b)(ii)	unreactive		1
1(c)	atoms		1
1(d)	electron(s) nucleus		1 1
Total			**6**

4.1.2.4 Group 0

Answer 21 · Mark scheme

January 2011 | CHY1F | Original Q1 | Legacy

CHY1F

Answer 22 · Mark scheme

March 2011 | CHY1BP | Original Q1 | Legacy

Question	Key		
One	**A**	Oxygen	**4**
	B	Argon	**2**
	C	Carbon dioxide	**1**
	D	Neon	**3**

Answer 23 · Mark scheme

June 2011 | CHY1BP | Original Q8 | Legacy

Eight	**3**	**3**	**3**	**2**

4.1.2.4 Group 0

Answer 24 · Mark scheme

June 2011 | CHY1F | Original Q1 | Legacy

Question 1

question	answers	extra information	mark
1(a)	layer 1 – crust layer 2 – mantle layer 3 – core	extra line from a layer cancels the mark	1 1 1
1(b)(i)	0.97	extra ring drawn cancels the mark	1
1(b)(ii)	carbon dioxide / CO_2		1
Total			**5**

4.1.2.4 Group 0

Answer 24 · Mark scheme June 2011 | CHY1F | Original Q1 | Legacy

CHY1F

Answer 25 · Mark scheme November 2011 | CHY1BP | Original Q5 | Legacy

Five	**A** abundance			**4**
	B colour			**2**
	C density			**3**
	D reactivity			**1**
	A	**B**	**C**	**D**

4.1.2.4 Group 0

Answer 26 · Mark scheme

June 2012 | CH1FP | Original Q3 | Legacy

Question 3

question	answers	extra information	mark
3(a)	Aluminium has a low density Aluminium is resistant to corrosion		1 1
3(b)(i)	(an alloy) is a mixture of metals	accept (an alloy) can be a metal mixed with another metal **or** iron mixed with carbon / a non-metal	1
3(b)(ii)	pure metals are soft **or** alloys are hard	allow weak allow strong / keep their shape ignore rust / corrosion	1
3(c)(i)	crude oil		1
3(c)(ii)	hydrocarbons		1
3(c)(iii)	oxygen		1
3(d)(i)	hydrogen	allow H_2 or H	1
3(d)(ii)	only water is produced (from the fuel) **or** no carbon dioxide is produced (from the fuel)	 allow less carbon dioxide produced **or** less global warming allow carbon dioxide causes global warming	1
Total			**9**

4.1.2.4 Group 0

Answer 26 · Mark scheme

June 2012 | CH1FP | Original Q3 | Legacy

CH1FP

4.1.2.4 Group 0

Answer 27 · Mark scheme

June 2012 | CH1FP | Original Q7 | Legacy

Question 7

question	answers	extra information	mark
7(a)	any **one** from: • there are many stages needed (to extract titanium) • more energy / materials are needed (to extract titanium) • titanium cannot be extracted by using carbon	ignore references to cost / mining / availability allow longer / slower / more complicated process / batch process ignore higher temperature ignore reference to electrolysis do **not** accept titanium extracted by electrolysis	1
7(b)	carbon dioxide	allow CO_2	1
7(c)	magnesium chloride is electrolysed / used / decomposed magnesium and / or chlorine are recycled / reused	 allow the products of electrolysis are recycled word / symbol equation = **1** mark	1 1
7(d)	 because oxygen / nitrogen (in air) would react with the magnesium **or** would produce magnesium oxide / nitride whereas argon is inert / unreactive **or** argon does not react with magnesium	accept titanium for magnesium ignore argon is in Group 0 / noble gas	 1 1
7(e)	240		1
7(f)	250	allow range 245 to 250	1
Total			8

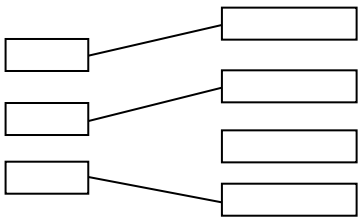
4.1.2.4 Group 0

Answer 27 · Mark scheme June 2012 | CH1FP | Original Q7 | Legacy

CH1FP

4.1.2.4 Group 0

Answer 28 · Mark scheme

question	answers	extra information	mark
1(a)(i)	nucleus		1
1(a)(ii)	an energy level (shell)		1
1(b)			1 1 1
1(c)	2/two(%)		1
1(d)(i)	10/ten		1
1(d)(ii)	(group) 0	accept noble gases ignore (group) 8	1
Total			8

4.1.2.4 Group 0

Answer 28 · Mark scheme

January 2013 | CH1FP | Original Q1 | Legacy

CH1FP

4.1.2.4 Group 0

Answer 29 · Mark scheme

June 2013 | CH3FP | Original Q3 | Legacy

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**

4.1.2.4 Group 0

Answer 30 · 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**		

4.1.2.4 Group 0

Answer 30 · Mark scheme

June 2014 | CH1FP | Original Q2 | Legacy



4.1.2.4 Group 0

Answer 31 · 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**		

4.1.2.4 Group 0

Answer 31 · Mark scheme

June 2014 | CH3FP | Original Q1 | Legacy



4.1.2.4 Group 0

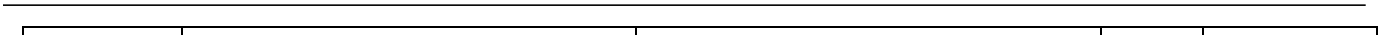
Answer 32 · Mark scheme

Question	Answers	Extra information	Mark	AO / Spec. Ref.
1(a)	1 very small	must be in this order accept negligible, 1/2000 allow zero	1 1	AO1 2.3.1b
1(b)	The mass number		1	AO1 2.3.1c
1(c)	C		1	AO2 2.3.1a
1(d)(i)	2		1	AO2 2.1.1a
1(d)(ii)	3		1	AO2 2.1.1a
1(e)(i)	28		1	AO2 2.3.1f
1(e)(ii)	42.9	accept ecf from (e)(i) accept 42 - 43	1	AO2 2.3.3a
1(f)(i)	0.9		1	AO2 2.3
1(f)(ii)	any **one** from: • accurate • sensitive • rapid • small sample		1	AO1 2.3.2a
Total			**10**	

4.1.2.4 Group 0

Answer 32 · Mark scheme

June 2015 | CH2FP | Original Q1 | Legacy



4.1.2.4 Group 0

Answer 33 · 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**	

4.1.2.4 Group 0

Answer 34 · Mark scheme

June 2016 | CH1FP | Original Q2 | Legacy

Question 2

Question	Answers	Extra information	Mark	AO / Spec. Ref.
2(a)(i)	the Earth's (surface) temperature was high **or** at/above 100 °C	allow the Earth's (surface) temperature was too/very hot **or** water evaporated/ boiled **or** turned to steam/gas allow because of heat from volcanoes ignore the Earth's (surface) was covered by volcanoes ignore water turned to water vapour	1	AO3 1.7.2b
2(a)(ii)	plates	allow plate	1	AO1 1.7.1d
2(b)(i)	air ——— mixture carbon dioxide ——— compound argon ——— element	allow only one line from each substance	1 1 1	AO1 1.1.1a; 1.1.3a; 1.7.2a
2(b)(ii)	oxygen		1	AO1 1.4.3b
2(b)(iii)	about 80 %		1	AO1 1.7.2a
2(c)(i)	0.03(0) (%)		1	AO2 1.7.2 c
2(c)(ii)	increased slowly then rapidly	allow figures from graph to indicate increase	1 1	AO2 1.7.2i
2(c)(iii)	any **two** from: • use of fossil fuels • deforestation • cars/transport • industry/factories	ignore more people allow less trees / plants	2	AO3 1.7.2i
Total			**12**	

4.1.2.4 Group 0

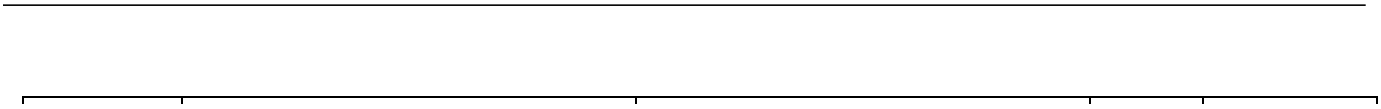
Answer 35 · Mark scheme June 2017 | CH1FP | Original Q1 | Legacy

Question	Answers	Extra information	Mark	AO / Spec. Ref.
1(a)(i)	dissolved locked up		1 1	AO1 1.7.2g;h
1(a)(ii)	photosynthesis		1	AO1 1.7.2f
1(b)(i)	argon - 1 nitrogen - 80 oxygen - 20	each mark is awarded for one line from each gas to the correct percentage	1 1 1	AO1 AO3 1.7.2a
1(b)(ii)	(burning) fossil fuels	allow deforestation **or** a description allow (increase in) transport / factories ignore more people **or** population (increase)	1	AO1 1.7.2i
Total			**7**	

4.1.2.4 Group 0

Answer 35 · Mark scheme

June 2017 | CH1FP | Original Q1 | Legacy



4.1.2.4 Group 0

Answer 36 · Mark scheme

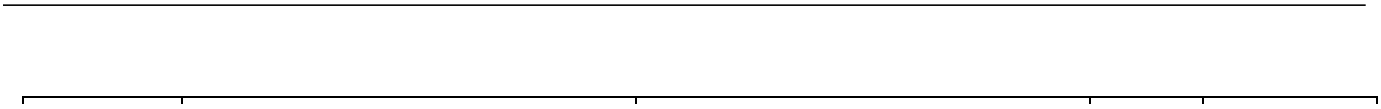
June 2017 | CH1FP | Original Q2 | Legacy

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	

4.1.2.4 Group 0

Answer 36 · Mark scheme

June 2017 | CH1FP | Original Q2 | Legacy



4.1.2.4 Group 0

Answer 37 · Mark scheme

June 2019 | 8462/1F | Original Q1

Question 1

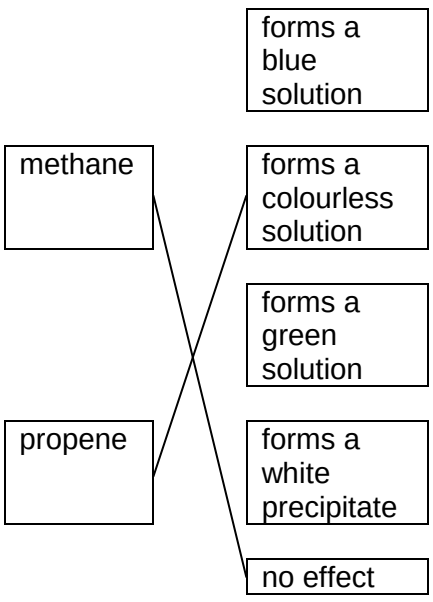
Question	Answers	Extra information	Mark	AO / Spec. Ref.
01.1	**A** nucleus **B** electron		1 1	AO1 4.1.1.4 4.1.1.7
01.2	electron		1	AO1 4.1.1.5
01.3	3 / three		1	AO2 4.1.2.1
01.4	(atomic number) 5 (mass number) 11		1 1	AO2 4.1.1.5
01.5	isotope		1	AO1 4.1.1.5
01.6	there are the same number of $^{79}_{35}Br$ atoms and $^{81}_{35}Br$ atoms		1	AO2 4.1.1.6
Total			**8**	

4.1.2.4 Group 0

Answer 38 · Mark scheme

June 2019 | 8462/2F | Original Q4

Question 4

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.1	nitrogen **and** methane	in either order, both required for mark allow phonetic spellings allow N_2 for nitrogen allow CH_4 for methane	1	AO2 4.9.1.1
04.2	nitrogen bar to 78% oxygen bar to 21%	ignore width of bars ignore additional bars	1 1	AO2 4.9.2.2
04.3	Titan's atmosphere contains too little carbon dioxide.		1	AO3 4.9.1.3
04.4	long wavelength radiation is reflected back to the surface of Titan.		1	AO1 4.9.2.1
04.5		an extra line from a gas to an effect on bromine water negates that mark	1 1	AO1 4.7.1.4

4.1.2.4 Group 0

Answer 38 · Mark scheme

June 2019 | 8462/2F | Original Q4

04.6	$\frac{7 \times 21}{3}$ = 49 (g)	an answer of 49 (g) scores **2** marks.	1 1	AO2 4.7.2.2
Total			**9**	

4.1.2.4 Group 0

Answer 39 · Mark scheme

November 2021 | 8462/1F | Original Q1

Question 1

Question	Answers	Extra information	Mark	AO / Spec. Ref.
01.1	non-metallic element		1	AO3 4.1.1.1 4.1.2.3

Question	Answers	Extra information	Mark	AO / Spec. Ref.
01.2	compound		1	AO1 4.1.1.1

Question	Answers	Extra information	Mark	AO / Spec. Ref.
01.3	noble gases		1	AO1 4.1.2.4

Question	Answers	Extra information	Mark	AO / Spec. Ref.
01.4	the boiling points increase down the group		1	AO1 4.1.2.4

Question	Answers	Extra information	Mark	AO / Spec. Ref.
01.5	atoms		1	AO1 4.1.2.4

Question	Answers	Extra information	Mark	AO / Spec. Ref.
01.6	XO_2		1	AO2 4.2.1.3

4.1.2.4 Group 0

Question 1 continued

Question	Answers	Extra information	Mark	AO / Spec. Ref.
01.7	$(2.8)^2 \times 6$ $= 47.04$ $= 47$ (nm^2)	 allow an answer correct to 2 significant figures resulting from an incorrect attempt at the calculation	1 1 1	AO2 4.2.4.1

Question	Answers	Extra information	Mark	AO / Spec. Ref.
01.8	the surface area to volume ratio of the fine particle is 10 times greater		1	AO1 4.2.4.1

Total			10

4.1.2.4 Group 0

Answer 40 · 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

4.1.2.4 Group 0

Answer 40 · 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**

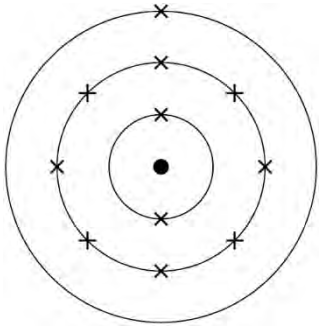
4.1.2.4 Group 0

Answer 41 · Mark scheme

Question 8

Question	Answers	Extra information	Mark	AO / Spec. Ref.
08.1	towards the right **and** the top	allow a description of the position in the periodic table allow in Groups (3) 4 to 0	1	AO1 4.1.2.3

Question	Answers	Extra information	Mark	AO / Spec. Ref.
08.2	a melting point below 100 °C		1	AO3 4.1.2.3 4.2.2.7 4.2.2.8

Question	Answers	Extra information	Mark	AO / Spec. Ref.
08.3		allow any combination of ×, ●, o, $e^{(-)}$ for electrons	1	AO1 4.1.1.7

4.1.2.4 Group 0

Answer 41 · Mark scheme

Question	Answers	Extra information	Mark	AO / Spec. Ref.
08.4	any **one** from: • so elements / tellurium / iodine were in groups with similar properties • iodine has similar properties to Group 7 elements • iodine has different properties to Group 6 elements	ignore reference to atomic structure allow named elements for Group 6 / 7 elements allow converse arguments in terms of tellurium	1	AO1 4.1.2.2

Question	Answers	Extra information	Mark	AO / Spec. Ref.
08.5	argon has a full outer shell (of electrons)	allow energy level for shell allow argon has eight outer shell electrons ignore argon has no outer shell electrons	1	AO1 4.1.2.4
	(so argon) has a stable arrangement of electrons **or** (so argon) has a stable electronic structure	allow (so argon) does not gain / lose / share electrons	1	

4.1.2.4 Group 0

Answer 41 · Mark scheme

Question	Answers	Extra information	Mark	AO / Spec. Ref.
08.6	atoms with the same number of protons (but with) different numbers of neutrons	allow atoms of the same element allow atoms with the same atomic number ignore atoms with the same number of electrons	1 1	AO1 4.1.1.5

Question	Answers	Extra information	Mark	AO / Spec. Ref.
08.7	~115		1	AO2 4.1.1.6

Total Question 8	9

4.1.2.4 Group 0

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ASSESSMENT and QUALIFICATIONS ALLIANCE

General Certificate of Secondary Education

Science B 4462 / Chemistry 4421

CHY1F Unit Chemistry 1

Mark Scheme

2007 examination - June series

4.1.2.4 Group 0

Mark schemes are prepared by the Principal Examiner and considered, together with the relevant questions, by a panel of subject teachers. This mark scheme includes any amendments made at the standardisation meeting attended by all examiners and is the scheme which was used by them in this examination. The standardisation meeting ensures that the mark scheme covers the candidates' responses to questions and that every examiner understands and applies it in the same correct way. As preparation for the standardisation meeting each examiner analyses a number of candidates' scripts: alternative answers not already covered by the mark scheme are discussed at the meeting and legislated for. If, after this meeting, examiners encounter unusual answers which have not been discussed at the meeting they are required to refer these to the Principal Examiner.

It must be stressed that a mark scheme is a working document, in many cases further developed and expanded on the basis of candidates' 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.

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Dr Michael Cresswell, Director General.

4.1.2.4 Group 0

MARK SCHEME

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 and help to delineate what is acceptable or not worthy of credit or, in discursive answers, to give an overview of the area in which a mark or marks may be awarded.

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

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 lines 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.)

3. Marking points

3.1 Marking of lists

This applies to questions requiring a set number of responses, but for which candidates 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.

4.1.2.4 Group 0

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

Candidate	Response	Marks awarded
1	4,8	0
2	green, 5	0
3	red*, 5	1
4	red*, 8	0

Example 2: Name two planets in the solar system. (2 marks)

Candidate	Response	Marks awarded
1	Pluto, Mars, Moon	1
2	Pluto, Sun, Mars, Moon	0

3.2 Use of chemical symbols / formulae

If a candidate 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

Full marks can be given for a correct numerical answer, as shown in the column 'answers', without any working shown.

However if the answer is incorrect, mark(s) can be gained by correct substitution / working and this is shown in the 'extra information' column;

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 are 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 e.c.f. 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 Unexpected Correct Answers not in the Mark Scheme

The Examiner should use professional judgement to award credit where a candidate has given an unexpected correct answer which is not covered by the mark scheme. The Examiner should consult with the Team Leader to confirm the judgement. The Team Leader should pass this answer on to the Principal Examiner with a view to informing all examiners.

4.1.2.4 Group 0

CHY1F Question 1

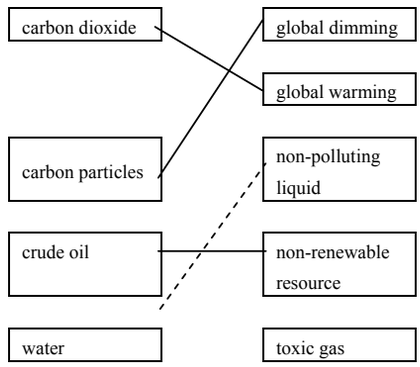
	answers	extra information	mark
(a)	low density unreactive		1 1
(b)	a polymer		1
(c)	any **one** from: • not broken down by (microorganisms) • does not decay (naturally)	ignore cannot recycle / degrade / disintegrate	1
total			4

CHY1F Question 2

	answers	extra information	mark
(a)(i)	additive		1
(b)	any **three** from: • colour 1 is made up of only one colour / dye • colour 2 is made up of only one colour / dye • colour 3 is made up of two colours / dyes **or** more colours (than colours 1 and 2) • colours 1, 2 and 3 are all different • colour 1 is less dark than colour 2	accept colour 3 is a mixture of colours 1 and 2 for **3** marks accept E-number or additive instead of colour ignore comments about height / level	3
total			4

4.1.2.4 Group 0

CHY1F Question 3

	answers	extra information	mark
(a)	hydrogen	ignore formulae	1
(b)	any **two** from: • different sized molecules / more or less (carbon) atoms (in molecules) • fuels have <u>different</u> boiling points • fuels condense at <u>different</u> temperatures	ignore different densities	2
(c)		all three correct = **3** marks two correct = **2** marks one correct = **1** mark	3
total			6

4.1.2.4 Group 0

CHY1F Question 4

	answers	extra information	mark
(a)(i)	any **one** from: • iron ore is a limited resource / non-renewable • iron is in high demand • provide jobs • economic advantage		1
(ii)	any **two** from: • would damage (wildlife) habitats / countryside / greenfield sites • extra traffic • visual (pollution) / eyesore • noise (pollution) / sound (pollution) • dust (pollution) • river (pollution) • carbon dioxide (from traffic) / adds to greenhouse effect / global warming • damage roads / buildings by <u>vibrations</u> / <u>shockwaves</u>		2
(b)(i)	carbon monoxide / carbon	accept formulae CO / C	1
(ii)	atoms are all the same (size) / type	accept (particles) are all the same (size) / type for one mark	1 1

Continued on next page

4.1.2.4 Group 0

Question 4 continued

	answers	extra information	mark
(iii)	any **two** from: • impurities / carbon / different (sized) atoms **or** elements **or** metals • changes the structure / disrupts the pattern or layers • prevents layers sliding over each other • it is an alloy		2
total			8

4.1.2.4 Group 0

CHY1F Question 5

	answers	extra information	mark
(a)	core	ignore outer or inner	1
	mantle		1
(b)(i)	carbon dioxide	accept formula CO_2	1
	oxygen	accept formulae O_2 / O	1
(ii)	4%		1
(iii)	carbon dioxide has <u>decreased</u> / from 95% to 0%		1
	oxygen has <u>increased</u> / from 0% to 21%		1
	any **one** from: (carbon dioxide decrease) • carbon dioxide used during photosynthesis / by plants • carbon dioxide dissolves in oceans • carbon dioxide is locked up in rocks / carbonates / fossil fuels (oxygen increase) • oxygen released during photosynthesis / by plants		1
total			8

4.1.2.4 Group 0

CHY1F Question 6

	answers	extra information	mark
(a)	any **two** from: • nitrogen • carbon dioxide • water (vapour) / steam	 accept formulae N / N_2 accept formula CO_2 ignore CO accept formula H_2O	2
(b)	any **three** from: <u>limestone</u> • abundant / local • natural material **or** no 'processing' needed • relatively easy to cut • appearance better <u>concrete</u> • <u>raw materials</u> are abundant • can be reinforced (by steel rods) / strong(er) / supported (by steel rods) • concrete mixture can be poured / moulded / constructed on site • less reactive with acid rain / weathering / erosion	no mark for 'limestone' or 'concrete' on first line – mark advantages only ignore ideas of speed of production or easier to use accept 'can build higher' ignore density / extraction / quarrying / pollution / cost	3
total			5

4.1.2.4 Group 0

CHY1F Question 7

	answers	extra information	mark
(a)(i)	$Cu_2S + 2O_2 \rightarrow 2CuO + SO_2$	accept fractions and multiples	1
(ii)	any **two** from: • sulfur dioxide • causes acid rain • consequence of acid rain eg kills fish / plants	 accept sulphur dioxide / sulphur oxide / SO_2 ignore other comments eg global warming / ozone / global dimming / greenhouse effect	2
(b)	any **two** from: • heat (copper oxide with carbon) • oxygen is removed by carbon **or** carbon monoxide / carbon dioxide is produced **or** carbon displaces copper • because carbon is more reactive than copper	 accept copper (oxide) loses oxygen **or** carbon gains oxygen accept carbon oxide accept a correct word or balanced symbol equation allow a correct comparison of reactivity	2
(c)(i)	electrolysis	accept electroplating	1
(ii)	(electrical) wiring / appliances / coins / pipes / cladding for buildings / jewellery / making alloys **or** named alloys		1

Continued on next page

4.1.2.4 Group 0

Question 7 continued

	answers	extra information	mark
(d)	any **three** explanations from: <u>for recycling</u> • less acid rain (pollution) • copper reserves last longer / conserved **or** do not run out • energy for extraction (saved) **or** less energy required • less mining / quarrying • less waste (copper) / electrical appliances dumped **or** less landfill <u>against recycling</u> • collection problems • transport problems • difficult to separate copper from appliances • energy used to melt the collected copper	ignore electrolysis / pollution ignore ideas about less machinery / plant ignore idea of cost	3
total			10

4.1.2.4 Group 0

Answer 37 · Examiner comments

June 2019 | 8462/1F | Original Q1

Question 1 (low demand)

01.1 Approximately 80% of students identified both the nucleus and the electron in the diagram of an atom.

01.2 Approximately 60% of students identified the electron as having the lowest mass.

01.3 Approximately three-quarters of students correctly applied their knowledge and understanding of the link between electronic structure and group number.

01.4 Almost 60% of students scored both marks. Here, they applied their knowledge and understanding of the links between atomic structure and both atomic number and mass number.

01.5 Approximately 70% of students knew the term ‘isotope’ for the type of atom described.

01.6 Students found this multiple choice question about the link between isotope ratios and relative atomic mass difficult.

The first incorrect option was chosen more often than the correct one. This suggests that, in many cases, students did not understand how the relative atomic mass is determined from the average mass of all isotope atoms and were perhaps drawn towards the word ‘fewer’ alongside the smaller number ‘79’.

4.1.2.4 Group 0

Answer 40 · 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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Answer 40 · 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.

4.1.2.4 Group 0

Answer 41 · Examiner comments

June 2025 | 8462/1F | Original Q8

Question 8 (standard demand)

08.1 Only one student in six could give a correct description of where the non-metals are found, despite there being a clear statement in the specification. Many referred to the right of the table, but few referred to the top. Those who referred to specific groups were often correct but some omitted Group 0. Some referred to a 'staircase' but did not specify what it means; it should be noted that the periodic table provided does not show a staircase.

08.2 About half correctly chose the low melting point, with the three distractors all being popular. Several ticked more than one box, which automatically scores zero when the instruction is to tick **one** box.

08.3 Three fifths of students drew the structure correctly. A few tried to put in 23 electrons and a few 12. One in seven students did not attempt to answer; this is a common occurrence when a question is not accompanied by answer lines. Students do need to read all the words, so they are aware there is a task to do.

08.4 This was answered less successfully. Many stated that Mendeleev left spaces for other elements to be discovered which, while true, does not answer the question. Others answered in terms of atomic number, which was not known in Mendeleev's time. Even those who tried to answer in terms of placing elements in the 'correct' group rarely mentioned properties.

08.5 Whilst about two fifths knew that argon has a full outer shell, not many were able to go on to say that this is a stable electronic structure, or that electrons are not transferred or shared. Many simply repeated information in the question with different words, such as 'argon is a noble gas' or 'argon is stable'.

08.6 Whilst about a quarter of students knew that a different number of neutrons was involved, few stated that isotopes are <u>atoms</u> with the same number of protons or <u>atoms</u> of the same element. Some referred to 'elements' implying more than one element, which contradicts the idea of atoms of the same element. Some students implied incorrectly that an isotope is a single atom in which the number of neutrons is different to the number of protons and electrons.

08.7 Fewer than half of students could correctly estimate that the A_r must be closest to 115 as there was such a high proportion of the 115 isotopes. The most popular answer was ~114, taking a simple mean rather than a weighted mean of the mass numbers.