AQA GCSE Chemistry | 8462

SPECIFICATION POINT 4.8.3.1

Flame tests

Mark schemes and examiner comments

Tier	**Foundation**
Question groups	**14**
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.

4.8.3.1 Flame tests

Answer 01 · Mark scheme

November 2007 | CHY1A | Original Q3 | Legacy

Three	**A**	carbon	**4**
	B	carbon monoxide	**3**
	C	carbon dioxide	**1**
	D	oxygen	**2**

4.8.3.1 Flame tests

Answer 02 · Mark scheme

Question 2

question	answers	extra information	mark
(a)(i)	get wrong coloured flame/result owtte **or** to get the correct result	allow contaminated	1
(a)(ii)	high melting point unreactive		1 1
(a)(iii)	yellow-orange		1
(b)(i)	bubbles / fizz / effervescence	ignore any named gas	1
(b)(ii)	milky		1
(b)(c)	fast(er) small(er) amount		1 1
total			8

4.8.3.1 Flame tests

Answer 02 · Mark scheme January 2008 | CHY3F | Original Q2 | Legacy

CHY3F

Answer 03 · Mark scheme June 2008 | CHY3F | Original Q3 | Legacy

question	answers	extra information	mark
3(a)(i)	(hydrochloric) acid carbon dioxide limewater		1 1 1
3(a)(ii)	sodium hydroxide ammonia litmus		1 1 1
3(b)	no distinctive colour (flame) owtte	allow: not a metal (ion) accept flame tests only identify single elements	1
Total			**7**

4.8.3.1 Flame tests

Answer 03 · Mark scheme

June 2008 | CHY3F | Original Q3 | Legacy

COMPONENT NUMBER: CHY3F

COMPONENT NAME: Chemistry

STATUS: Final

DATE: June 2008

4.8.3.1 Flame tests

Answer 04 · Mark scheme

Question 4

question	answers	extra information	mark
4(a)(i)	yellow		1
4(a)(ii)	lilac		1
4(a)(iii)	melting point		1
4(b)(i)	barium chloride solid		1 1
4(b)(ii)	white dissolved		1 1
Total			**7**

4.8.3.1 Flame tests

Answer 04 · Mark scheme

January 2010 | CHY3F | Original Q4 | Legacy

CHY3F

4.8.3.1 Flame tests

Answer 05 · Mark scheme

Question 4

question	answers	extra information	mark
4(a)(i)	sodium hydroxide green solid		1 1 1
4(a)(ii)	barium chloride white sulfate ions, SO_4^{2-}		1 1 1
4(b)	some indication of contact between (colourless) flame and the chemical	ignore colour of flame	1
4(c)	any **one** from: • accurate • precise • sensitive • reliable • rapid • only small amount needed	ignore reference to cost / safer	1
Total			**8**

4.8.3.1 Flame tests

Answer 05 · Mark scheme June 2010 | CHY3F | Original Q4 | Legacy

CHY3F

4.8.3.1 Flame tests

Answer 06 · 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**

4.8.3.1 Flame tests

Answer 06 · Mark scheme

January 2011 | CHY3F | Original Q2 | Legacy

CHY3F

4.8.3.1 Flame tests

Answer 07 · Mark scheme

June 2013 | CH3FP | Original Q2 | Legacy

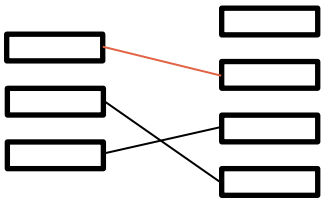
Question 2

question	Answers	extra information	Mark
2(a)(i)	yellow		1
2(a)(ii)	lilac		1
2(b)	(bubble through) limewater cloudy	 allow white / milky	1 1
2(c)(i)	silver nitrate solution		1
2(c)(ii)	white		1
Total			6

4.8.3.1 Flame tests

Answer 08 · Mark scheme

June 2014 | CH3FP | Original Q6 | Legacy

Question	Answers	Extra information	Mark	AO / Spec. Ref.	ID
6(a)(i)	*method of introducing sample into flame* *clean wire or colourless flame*	*e.g. wire/splint/spray* *allow blue / roaring flame*	1 1	1 / 3.4	E
6(a)(ii)			1 1	2 / 3.4.1a	G
6(a)(iii)	(potassium) chloride	allow KCl **or** Cl^-	1	2 / 3.4.1e	E
6(b)(i)	copper	allow Cu^{2+}	1	2 / 3.4.1c	E
6(b)(ii)	sulfate		1	2 / 3.4.1f	A
Total			**7**		

4.8.3.1 Flame tests

Answer 08 · Mark scheme

June 2014 | CH3FP | Original Q6 | Legacy



4.8.3.1 Flame tests

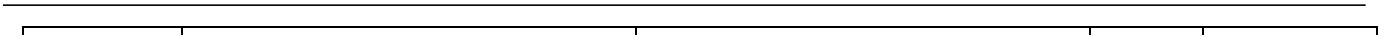
Answer 09 · Mark scheme June 2015 | CH3FP | Original Q6 | Legacy

Question	Answers	Extra information	Mark	AO / Spec. Ref.
6(a)	copper (II) → blue iron (III) → brown	more than one line from any box negates the mark	1 1	**AO1** 3.4.1.c
6(b)	aluminium	allow correct answer shown in box if answer line blank	1	**AO1** 3.4.1.b
6(c)(i)	yellow	allow orange	1	**AO1** 3.4.1.a
6(c)(ii)	lilac	allow purple	1	**AO1** 3.4.1.a
6(c)(iii)	one colour masks the other	allow colours mixed	1	**AO2** 3.4.1.a
Total			**6**	

4.8.3.1 Flame tests

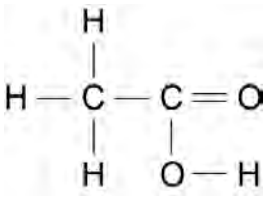
Answer 09 · Mark scheme

June 2015 | CH3FP | Original Q6 | Legacy



4.8.3.1 Flame tests

Answer 10 · 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**	

4.8.3.1 Flame tests

Answer 10 · Mark scheme

June 2016 | CH3FP | Original Q5 | Legacy

Question	Answers	Extra information	Mark	AO / SpecRef
6			6	2AO1 / 3AO2 / 1AO3 3.4.1g

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.

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 using some of the apparatus.	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.	There is a description of titrations that would allow a comparison to be made between the two solutions of hydrochloric acid.

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

Total		6

4.8.3.1 Flame tests

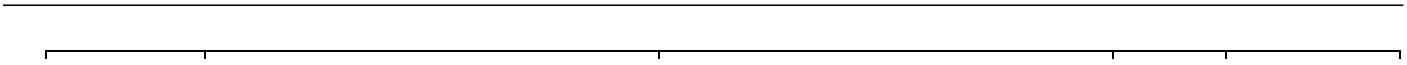
Answer 11 · Mark scheme June 2018 | 8462/2F | Original Q8

Question	Answers	Extra information	Mark	AO / Spec. Ref.
08.1	yellow	allow orange allow orange-yellow	1	AO1 4.8.3.1
08.2	copper (ion)	allow Cu^{2+} allow copper (II) allow barium (ion) allow Ba^{2+}	1	AO1 4.8.3.1
08.3	(flame) colours are masked	allow (flame) colours mix / blend allow only see one colour allow cannot see two colours at once ignore hard to distinguish	1	AO1 4.8.3.1
08.4	Li^+ Na^+		1 1	AO2 4.8.3.7
08.5	bromide (ion)	allow Br^- ignore bromine	1	AO1 4.8.3.4
08.6	add barium chloride (solution) add hydrochloric acid white precipitate produced	allow barium nitrate (solution) allow nitric acid allow acidified do **not** accept sulfuric acid dependent on use of a barium compound	1 1 1	AO1 4.8.3.5
Total			**9**	

4.8.3.1 Flame tests

Answer 11 · Mark scheme

June 2018 | 8462/2F | Original Q8



4.8.3.1 Flame tests

Answer 12 · Mark scheme

November 2020 | 8462/2F | Original Q8

Question 8

Question	Answers	Extra information	Mark	AO / Spec. Ref.
08.1	green	allow blue-green	1	AO1 4.8.3.1 RPA 7
08.2	did not clean the metal wire (between tests) **or** copper sulfate (solution) is still present (so) colours are mixed / blended / masked		1 1	AO3 4.8.3.1 RPA 7
08.3	(copper sulfate solution) blue precipitate (calcium iodide solution) white precipitate	allow blue solid allow white solid	1 1	AO1 4.8.3.2 RPA 7
08.4	barium chloride (solution)	allow barium nitrate (solution)	1	AO1 4.8.3.5 RPA 7
08.5	silver nitrate (solution) yellow precipitate	 allow yellow solid allow pale yellow precipitate / solid	1 1	AO1 4.8.3.4 RPA 7
Total			**8**	

4.8.3.1 Flame tests

Answer 13 · 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

4.8.3.1 Flame tests

Answer 13 · Mark scheme

June 2022 | 8462/2F | Original Q1

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

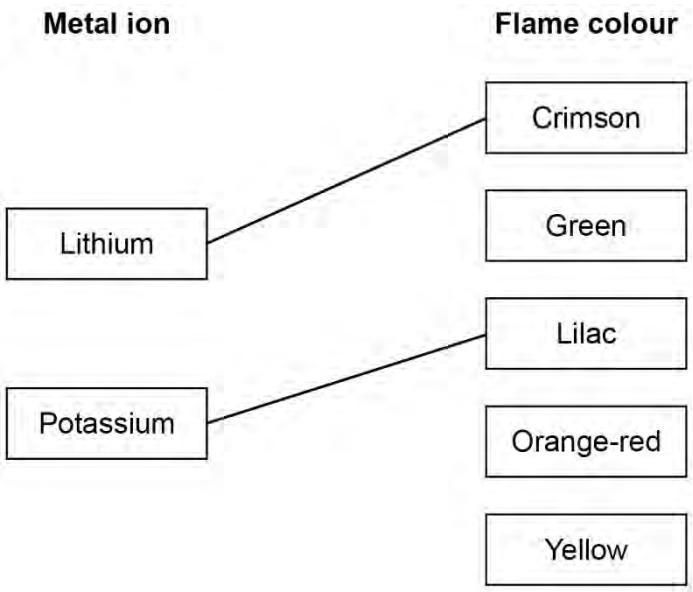
4.8.3.1 Flame tests

Answer 14 · Mark scheme

June 2025 | 8462/2F | Original Q1

Question 1

Question	Answers	Extra information	Mark	AO / Spec. Ref.
01.1	put sample on (metal) wire hold wire in (blue / non-luminous) flame	ignore references to cleaning	1 1	AO1 4.8.3.1 RPA7

Question	Answers	Mark	AO / Spec. Ref.
01.2	 do **not** accept more than one line from a box on the left	1 1	AO1 4.8.3.1 RPA7

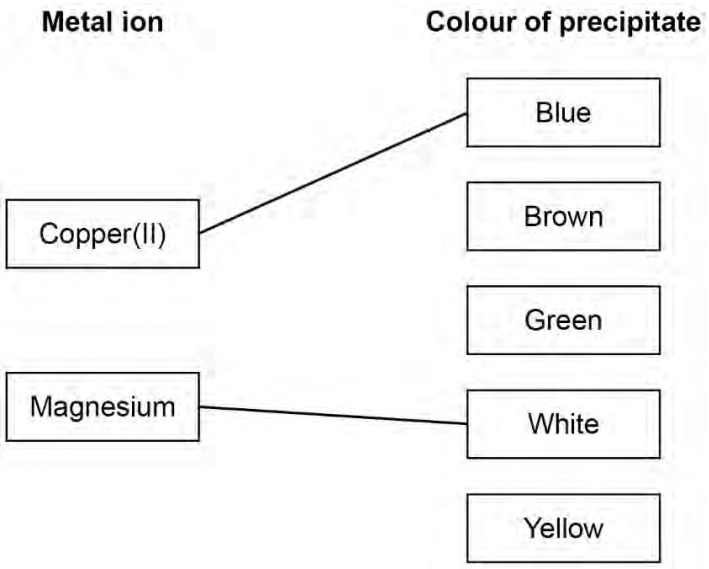
Question	Answers	Extra information	Mark	AO / Spec. Ref.
01.3	carbon dioxide		1	AO1 4.8.3.3

4.8.3.1 Flame tests

Answer 14 · Mark scheme

Question	Answers	Extra information	Mark	AO / Spec. Ref.
01.4	barium chloride solution		1	AO1 4.8.3.5 RPA7

Question	Answers	Extra information	Mark	AO / Spec. Ref.
01.5	solid		1	AO1 4.2.2.1 4.8.3.5

Question	Answers	Mark	AO / Spec. Ref.
01.6	 do **not** accept more than one line from a box on the left	1 1	AO1 4.8.3.2 RPA7

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

Total Question 1	10

4.8.3.1 Flame tests

Answer 11 · Examiner comments

June 2018 | 8462/2F | Original Q8

Question 8 (standard demand)

08.1 38% of students gave yellow or orange. There was a lot of variety in the wrong answers with all the colours of the spectrum represented.

08.2 Copper was the most common answer given although a few gave barium

08.3 A lot of students lost this mark as it was unclear if they were talking about the mixture of flame colours or the mixture of metal ions. 29% of students answered correctly.

08.4 57% of students correctly identified both of the ions in the flame emission spectrum.

08.5 3% of students identified the correct answer as bromide. A few put bromine but most seemed to guess.

08.6 The test for sulfate ions was not well known: 10% achieved the mark while 42% of students left it blank.

4.8.3.1 Flame tests

Answer 13 · 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.

4.8.3.1 Flame tests

Answer 14 · Examiner comments June 2025 | 8462/2F | Original Q1

Question 1

01.1 Three quarters of students scored at least one mark on this item. The most common mark was for putting the wire into the flame. Students should be encouraged to state that the wire is placed in a blue flame when describing a flame test. Many students described the metal wire as being placed under, over or on a Bunsen with no mention of a flame.

01.2 There were nearly two thirds of students who scored at least one mark for this question. Students knew the flame colour for potassium more frequently than that for lithium.

01.3 Carbon dioxide was identified by two thirds of students.

01.4 Only a quarter of students correctly identified barium chloride solution. Sodium chloride solution was the most common distractor.

01.5 Fewer than 1 in 5 students correctly identified a precipitate as a solid. Most students gave a liquid as the answer.

01.6 Fewer than 20% of students correctly identified both precipitate colours. The most common error was identifying the copper precipitate as green. The magnesium precipitate was given the full range of colours available.

01.7 2 in 5 students correctly identified the iodide precipitate as yellow. The other options were both frequently seen.