

GCSE Chemistry

Worksheet: Flame tests

TIME 30 min	TOTAL 30 marks	CALCULATOR Allowed	DIFFICULTY Easy, Medium
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Topics: Flame tests

NAME	CLASS	DATE
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- Use black ink or black ball-point pen. Pencil should only be used for drawing.
- Answer all questions in the spaces provided.
- In all calculations, show clearly how you work out your answer.
- The marks for questions are shown in brackets.

0 1

The wire loop used in a flame test is usually made of nichrome or platinum.

0 1 . 1

Suggest why a copper wire would **not** be suitable.

[1 mark]

0 1 . 2

Suggest why the wire loop is dipped in acid and heated in the flame before each test.

[1 mark]

0 2

0 2 . 1

Which metal ion gives a lilac flame?

Tick (✓) **one** box.

Copper(II)

☐

Lithium

☐

Potassium

☐

Sodium

☐

[1 mark]

0 2 . 2

A different compound gives no colour change to a Bunsen flame at all when tested.

Suggest what this indicates.

.....

.....

[1 mark]

0 3

Flame tests can be used to identify some metal ions.

0 3 . 1

What colour flame is produced by potassium compounds?

.....

.....

.....

[1 mark]

0 3 . 2

Which metal ion gives a crimson flame?

Tick (✓) **one** box.

Calcium

☐

Copper

☐

Lithium

☐

Sodium

☐

[1 mark]

0 3 . 3

A compound gives a green flame.
Name the metal ion in the compound.

.....

.....

.....

.....

[1 mark]

0 3 . 4

What colour flame is produced by calcium compounds?

.....

.....

[1 mark]

0 4

A firework manufacturer wants a firework star that burns with a lilac flame.

0 4 . 1

Which metal compound should be added to the firework mixture?

.....

.....

[1 mark]

0 4 . 2

Suggest why firework manufacturers need to know the flame colours produced by different metal ions.

.....

.....

[1 mark]

0 5

Table 1 shows the results of flame tests on five compounds, A to E.

Table 1

Compound	Flame colour
A	crimson
B	orange-red
C	no change to the flame colour
D	green
E	yellow

0 5 . 1

Identify the metal ion in compound A and the metal ion in compound D.

.....

.....

.....

.....

[2 marks]

0 5 . 2

Compound B is a chloride.
Name compound B.

.....

.....

.....

.....
[1 mark]

0 5 . 3

A student concluded that compound C does not contain a metal ion.
Explain why the student's conclusion may not be correct.

.....

.....

[1 mark]

0 5 . 4

Compound E contains sodium ions.

Suggest why it would be difficult to use a flame test to identify another metal ion in a mixture that also contains compound E.

[1 mark]

0 6

Lithium, sodium and potassium are all in Group 1 of the periodic table.

0 6 . 1

Explain why compounds of these three elements can all be identified by a flame test, but a flame test cannot easily identify magnesium compounds.

[2 marks]

0 6 . 2

A student carries out a flame test on lithium chloride and sees a crimson flame. Predict the flame colour for lithium carbonate. Explain your answer.

[2 marks]

0 7

0 7 . 1

Which **two** of these metal ions produce the most similar flame colours, and so could most easily be confused with each other?

Tick (✓) **two** boxes.

Lithium

☐

Calcium

☐

Potassium

☐

Sodium

☐

[2 marks]

0 7 . 2

Suggest how a student could distinguish between these two metal ions if unsure from the flame colour alone.

.....

.....

[1 mark]

0 8

Two students carry out flame tests on the same five unlabelled compounds. For compound Z, student 1 records the colour as 'orange-red' and student 2 records it as 'red'.

0 8 . 1

Suggest **two** reasons why the two students might disagree about the flame colour of compound Z.

.....

.....

.....

.....

[2 marks]

0 8 . 2

Suggest how the students could improve the reliability of their observations.

.....

.....

[1 mark]

0 9

A student carried out flame tests on four solid compounds using a wire loop and a Bunsen burner.

0 9 . 1

Describe how the student should carry out a flame test on one of the solid compounds.

.....

.....

.....

.....

.....

.....

[3 marks]

0 9 . 2

Explain why the wire loop must be cleaned before each test.

.....

.....

[1 mark]

0 9 . 3

One compound produced a lilac flame.
Name the metal ion in this compound.

.....

.....

.....

.....
[1 mark]

END OF QUESTIONS

Original practice questions written to match the specification. Not produced by, affiliated with or endorsed by AQA.

Mark scheme

GCSE Chemistry · Worksheet: Flame tests · 30 marks

Question 1 (2 marks)

01.1 [1 mark]

- copper itself produces a (green) flame colour, which would interfere with / mask the colour of the compound being tested (1)
-

01.2 [1 mark]

- to clean the loop / remove any previous compound, so it does not contaminate / affect the next flame colour observed (1)
-

Question 2 (2 marks)

02.1 [1 mark]

Correct: Potassium

02.2 [1 mark]

- it could still contain a metal ion, just not one of the ions (e.g. magnesium, zinc or aluminium) that produces a characteristic flame colour (1)

Notes: Allow: it does not contain lithium, sodium, potassium, calcium or copper ions.

Question 3 (4 marks)

03.1 [1 mark]

Answer: lilac

- lilac (1)
-

03.2 [1 mark]

Correct: Lithium

03.3 [1 mark]

Answer: copper(II)

- copper(II) / copper / Cu^{2+} (1)
-

03.4 [1 mark]

Answer: orange-red

- orange-red (1)

Notes: Allow 'brick red'. Do not accept 'red' or 'orange' alone.

Question 4 (2 marks)

04.1 [1 mark]

Answer: a potassium compound

- a potassium compound / potassium salt (1)
-

04.2 [1 mark]

- so they can choose the correct metal compounds to produce fireworks with the colours they want (1)
-

Question 5 (5 marks)

05.1 [2 marks]

Answer: A: lithium; D: copper(II)

- A: lithium / Li^+ (1)
- D: copper(II) / copper / Cu^{2+} (1)

05.2 [1 mark]

Answer: calcium chloride

- calcium chloride (1)

05.3 [1 mark]

- some metal ions do not give a (distinctive) flame colour (e.g. magnesium) (1)

05.4 [1 mark]

- the yellow (sodium) flame would mask the colour of the other metal ion (1)
-

Question 6 (4 marks)

06.1 [2 marks]

- lithium, sodium and potassium ions each produce a distinctive, different flame colour (1)
- magnesium ions do not produce a flame colour, so the test gives no useful (positive) result for magnesium (1)

06.2 [2 marks]

Answer: crimson

- crimson (1)
 - the flame colour is caused by the metal ion (lithium); the other ion (chloride or carbonate) does not change the colour (1)
-

Question 7 (3 marks)

07.1 [2 marks]

Correct: Lithium; Calcium

07.2 [1 mark]

- do a confirmatory test, e.g. add sodium hydroxide solution: calcium ions form a white precipitate, but lithium ions (a Group 1 ion) do not form a precipitate with sodium hydroxide solution (1)
-

Question 8 (3 marks)

08.1 [2 marks]

- flame colours can be judged slightly differently by different observers, and 'orange-red' can look similar to plain 'red' (1)
- a small amount of another metal ion, present as an impurity, could have slightly altered the colour seen (1)

Notes: For the second mark, allow: the loop was not cleaned properly, so traces of a previously tested compound were present.

08.2 [1 mark]

- repeat the test (several times) and/or compare the flame with a known reference sample, and agree on a description together (1)

Notes: Allow: use an instrumental method such as flame emission spectroscopy.

Question 9 (5 marks)

09.1 [3 marks]

- clean the wire loop by dipping it in (hydrochloric) acid and holding it in the flame (until there is no colour) (1)
- dip the loop into the solid (moistened with acid) (1)
- hold the loop in the (edge of a) blue / roaring Bunsen burner flame and record the colour (1)

09.2 [1 mark]

- to remove traces of the previous compound, which would affect the flame colour (1)

09.3 [1 mark]

Answer: potassium

- potassium / K^+ (1)
-