AQA GCSE Chemistry | 8462

SPECIFICATION POINT 4.8.3.7

Flame emission spectroscopy

Past-paper questions

Tier	**Higher**
Question groups	**4**
Available paper years	**2008–2018**

Using this booklet

1. Answer the questions in order and show your working.
2. Original question numbers and marks are retained.
3. Print at actual size (100%) for measuring questions.
4. Use the companion answer booklet to check your work.

Name: _____ **Date:** _____

Whole questions are retained for context, so some parts assess other specification points. Current and legacy sources are labelled. Continue on extra paper if needed.

4.8.3.7 Flame emission spectroscopy

Question 01

6 (a) Four bottles of chemicals made in the 1880s were found recently in a cupboard during a Health and Safety inspection at Lovell Laboratories.



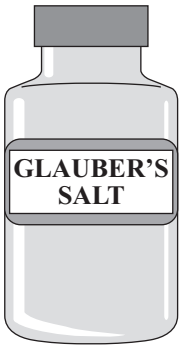
Sodium carbonate



Sodium chloride



Sodium nitrate



Sodium sulfate

The chemicals are correctly named.

You are provided with the following reagents:

- aluminium powder
- barium chloride solution acidified with dilute hydrochloric acid
- dilute hydrochloric acid
- silver nitrate solution acidified with dilute nitric acid
- sodium hydroxide solution.

4.8.3.7 Flame emission spectroscopy

Question 01 · continued

BLANK

(i) Describe tests to show that these chemicals are correctly named.

In each case give the reagent(s) you would use and state what you would see.

Test and result for carbonate ions:

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Test and result for chloride ions:

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Test and result for nitrate ions:

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Test and result for sulfate ions:

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.....

(5 marks)

(ii) Suggest why a flame test would **not** distinguish between these four chemicals.

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(1 mark)

(b) Instrumental methods of analysis linked to computers can be used to identify chemicals.

Describe **two** advantages of using instrumental methods of analysis.

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(2 marks)

8

4.8.3.7 Flame emission spectroscopy

Question 02

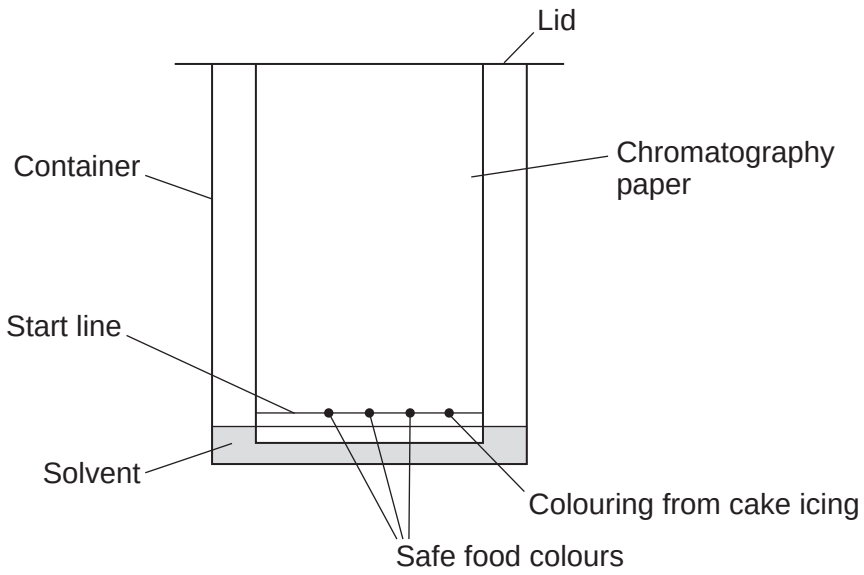
June 2012 | CH2HP | Original Q1 | Legacy

1 Icing on cakes is tested to check that safe colours were used when they were made.



Paper chromatography is one method of testing which colours are in cake icing.

1 (a) The diagram shows an experiment a student did.



1 (a) (i) Suggest why there is a lid on the container.

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(1 mark)

1 (a) (ii) The start line should be drawn in pencil **not** in ink.
Suggest why.

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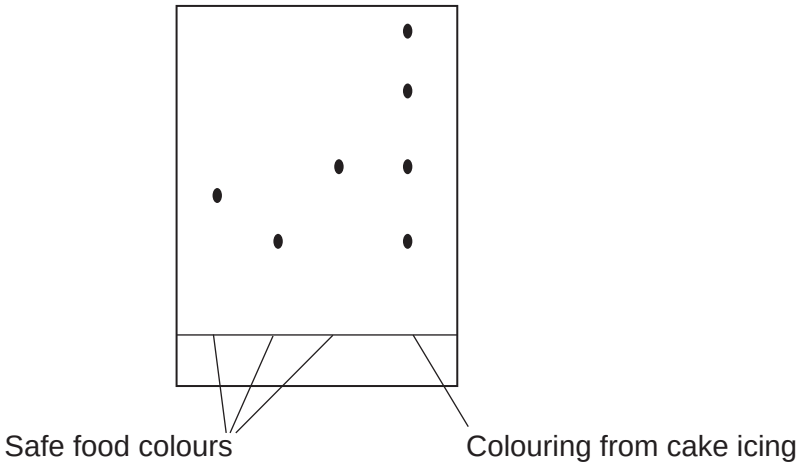
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(1 mark)

4.8.3.7 Flame emission spectroscopy

Question 02 · continued

1 (b) The diagram shows the results of the paper chromatography experiment.



1 (b) (i) How many different food colours were used in the colouring from the cake icing?

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(1 mark)

1 (b) (ii) Is the cake icing safe to eat?

Give a reason for your answer.

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(1 mark)

Question 1 continues on the next page

4.8.3.7 Flame emission spectroscopy

Question 02 · continued

1 (c) Gas chromatography linked to mass spectroscopy is an example of an instrumental method. This method was used on a mixture of solvents.

1 (c) (i) Give **two** advantages of gas chromatography compared with paper chromatography.

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(2 marks)

1 (c) (ii) What does gas chromatography do to the mixture of solvents?

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(1 mark)

1 (c) (iii) What information does mass spectroscopy give?

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(1 mark)

8

4.8.3.7 Flame emission spectroscopy

Question 03

January 2013 | CH2HP | Original Q4 | Legacy

4 Thermosoftening polymers can be used to make plastic bottles and food packaging.

4 (a) The reaction to produce polymers uses a catalyst.

Why does the catalyst work for a long time before it needs replacing?

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(1 mark)

4 (b) Thermosoftening polymers would **not** be suitable for packaging very hot food.

Explain why in terms of their properties and structure.

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(2 marks)

4.8.3.7 Flame emission spectroscopy

Question 03 · continued

4 (c) Compounds from food packaging must not contaminate the food.

Food can be tested for contamination using gas chromatography linked to mass spectroscopy (GC-MS).

4 (c) (i) Gas chromatography can separate substances in a mixture of compounds.

Describe how, as fully as you can.

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(3 marks)

4 (c) (ii) What information does the molecular ion peak give about the molecule?

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(1 mark)

7

4.8.3.7 Flame emission spectroscopy

Question 04

June 2018 | 8462/2H | Original Q1

0 1 This question is about chemicals in fireworks.

Coloured flames are produced because of the metal ions present in fireworks.

0 1 . 1 What colour flame would sodium ions produce?

[1 mark]

0 1 . 2 Name a metal ion that would produce a green flame.

[1 mark]

0 1 . 3 Some fireworks contain a mixture of metal ions.

Why is it difficult to identify the metal ions from the colour of the flame?

[1 mark]

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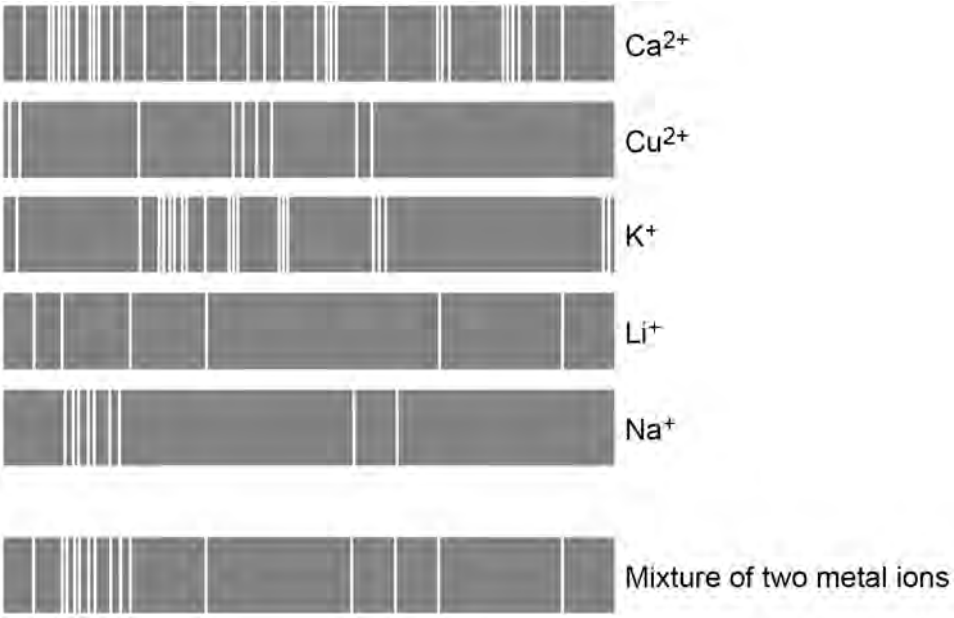
Question 04 · continued

0 1 . 4 Flame emission spectroscopy is used to identify metal ions in a firework.

Figure 1 shows:

- the flame emission spectra of five individual metal ions
- a flame emission spectrum for a mixture of two metal ions.

Figure 1



Which **two** metal ions are in the mixture?

[2 marks]

Tick **two** boxes.

- Ca^{2+} ☐
- Cu^{2+} ☐
- K^+ ☐
- Li^+ ☐
- Na^+ ☐

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Question 04 · continued

The compounds in fireworks also contain non-metal ions.

A scientist tests a solution of the chemicals used in a firework.

0 1 . 5 Silver nitrate solution and dilute nitric acid are added to the solution.

A cream precipitate forms.

Which ion is shown to be present by the cream precipitate?

[1 mark]

0 1 . 6 Describe a test to show the presence of sulfate ions in the solution.

Give the result of the test if there are sulfate ions in the solution.

[3 marks]

Test

Result

9