AQA GCSE Combined Science - Trilogy | 8464

SPECIFICATION POINT 5.8.1.3

Chromatography

Past-paper questions

Tier	**Higher**
Question groups	**4**
Available paper years	**2019–2024**

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.

5.8.1.3 Chromatography

Question 01

June 2019 | 8464/C/2H | Original Q3

0 3 This question is about chromatography of food colouring.

0 3 . 1 Food colouring is a formulation.

What is a formulation?

[1 mark]

0 3 . 2 Explain how paper chromatography separates the dyes in a food colouring.

Do **not** give details of how to do the experiment.

[2 marks]

0 3 . 3 Explain how the student could tell from the chromatogram that the food colouring contained more than one dye.

[2 marks]

Question 3 continues on the next page

5.8.1.3 Chromatography

Question 01 · continued

0 3 . 4 Explain how the student could use chromatography to identify unknown dyes in the food colouring.

[3 marks]

8

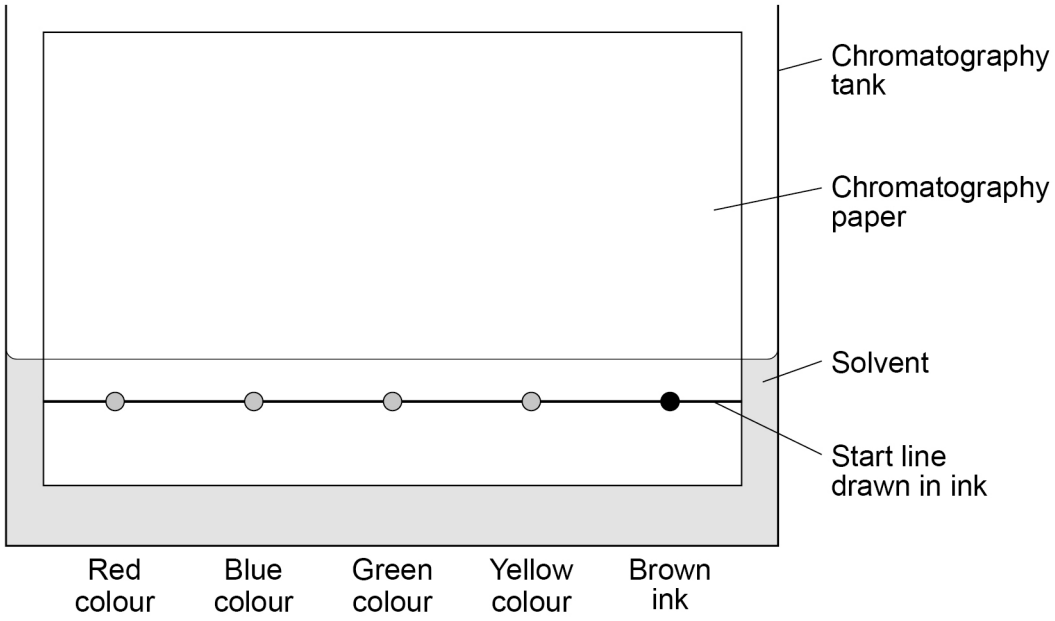
5.8.1.3 Chromatography

Question 02

0 1 A student investigated the colours in a brown ink using chromatography.

0 1 . 1 **Figure 1** shows the apparatus used.

Figure 1



Give **two** errors made by the student.

Describe the problem each error would cause.

[4 marks]

Error 1 _____

_____

Problem 1 _____

_____

Error 2 _____

_____

Problem 2 _____

_____

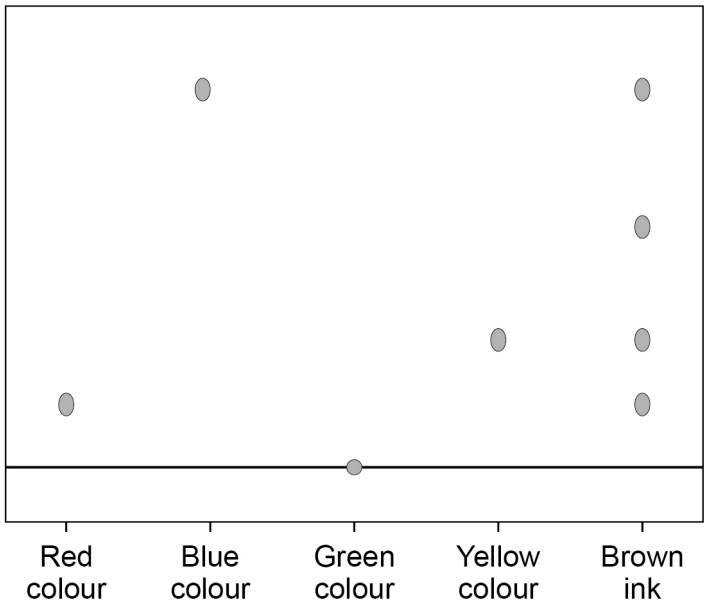
5.8.1.3 Chromatography

Question 02 · continued

A different student set up the apparatus correctly.

Figure 2 shows the results.

Figure 2



0 1 . 2 Give **two** conclusions the student can make from **Figure 2** about the four colours in the brown ink.

[2 marks]

1 _____

_____

2 _____

_____

Question 1 continues on the next page

Question 02 · continued

0 1 . 3 Why was the green colour still on the start line at the end of the experiment?

[1 mark]

Tick (✓) **one** box.

- The experiment was left for too long. ☐
- The green colour was insoluble in the solvent. ☐
- The green spot contained too many colours. ☐
- The green spot was too small. ☐

0 1 . 4 A student calculated the R_f value of a colour to be 0.24

The colour moved 1.8 cm from the start line.

Calculate the distance the solvent moved.

Use the equation:

$$R_f = \frac{\text{distance moved by colour}}{\text{distance moved by solvent}}$$

[3 marks]

Distance moved by solvent = _____ cm

10

5.8.1.3 Chromatography

Question 03

0 2 Chromatography is used to separate mixtures.

Chromatography involves a mobile phase and one other phase.

0 2 . 1 What is the other phase in chromatography?

[1 mark]

Tick (✓) **one** box.

- Moving phase ☐
- Recycled phase ☐
- Stationary phase ☐
- Viscous phase ☐

0 2 . 2 Why do the substances in the mixture separate in the mobile phase?

[1 mark]

_____

_____

0 2 . 3 How many spots will be produced on the chromatogram of a pure compound?

[1 mark]

Number of spots = _____

5.8.1.3 Chromatography

Question 03 · continued

0 2 . 4 In a chromatography experiment, a blue colour moved 4.77 cm.

The solvent moved 5.30 cm.

Calculate the R_f value for the blue colour.

[2 marks]

R_f value = _____

Question 2 continues on the next page

5.8.1.3 Chromatography

Question 03 · continued

0 2 . 5 Black ink is a mixture of several colours.

Plan an experiment using paper chromatography to:

- separate the colours in black ink
- identify the colours from their R_f values.

[6 marks]

11

5.8.1.3 Chromatography

Question 04

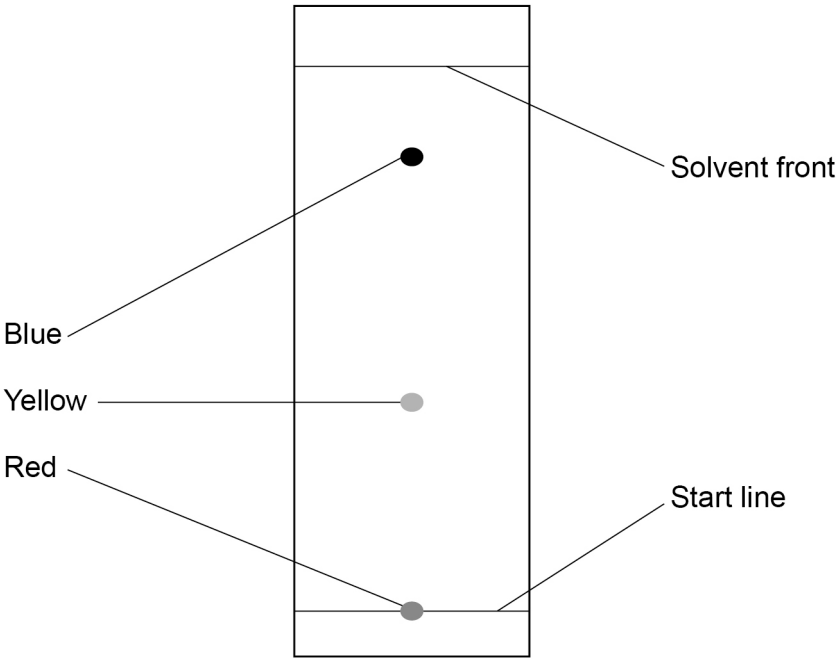
0 4 Printer ink is a mixture of chemicals.

A student used chromatography to investigate the colours in a printer ink.

The student put a spot of the printer ink on the start line.

Figure 4 shows the results.

Figure 4



Not to scale

0 4 . 1 Explain why the red colour did **not** move from the start line.

[2 marks]

Question 4 continues on the next page

5.8.1.3 Chromatography

Question 04 · continued

0 4 . 2 The blue colour moved 6.4 cm up the chromatogram.

The R_f value of the blue colour is 0.87

Calculate the distance moved by the solvent.

Give your answer to 2 significant figures.

[4 marks]

Distance moved by the solvent (2 significant figures) = _____ cm

5.8.1.3 Chromatography

Question 04 · continued

There were four colours in the printer ink.

0 4 . 3 Suggest **one** reason why only three colours were visible on the chromatogram.

[1 mark]

0 4 . 4 Suggest how the student could use chromatography to show there were four colours in the printer ink.

[1 mark]

8