AQA GCSE Combined Science - Trilogy | 8464

SPECIFICATION POINT 5.8.1.3

Chromatography

Past-paper questions

Tier	**Foundation**
Question groups	**5**
Available paper years	**2018–2024**

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

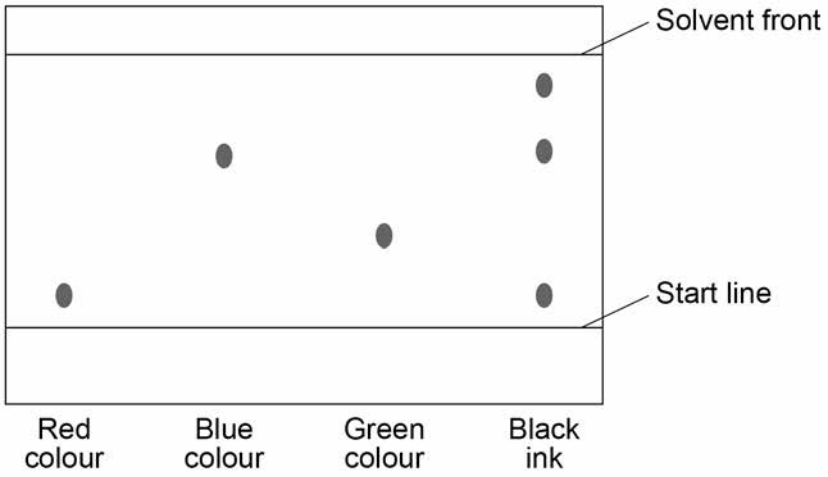
Question 01

June 2018 | 8464/C/2F | Original Q2

0 2 A student used paper chromatography to identify the colours in a black ink.

Figure 5 shows the student's results.

Figure 5



0 2 . 1 What colours are in the black ink?

[2 marks]

0 2 . 2 Suggest which colour is least soluble in the solvent.

Give a reason for your answer.

[2 marks]

Colour _____

Reason _____

5.8.1.3 Chromatography

Question 01 · continued

0 2 . 3 Use **Figure 5** to complete **Table 2**

Table 2

	Distance in mm
Distance moved by green colour	
Distance moved by solvent	

Calculate the R_f value for the green colour.

Use the equation:

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

[4 marks]

R_f value = _____

8

5.8.1.3 Chromatography

Question 02

November 2020 | 8464/C/2F | Original Q5

0 5 This question is about mixtures.

0 5 . 1 Which substance is a mixture?

[1 mark]

Tick (✓) **one** box.

Air ☐ Gold ☐ Methane ☐ Nitrogen ☐

0 5 . 2 Food colourings are often mixtures of dyes.

What name is given to mixtures that are designed as useful products?

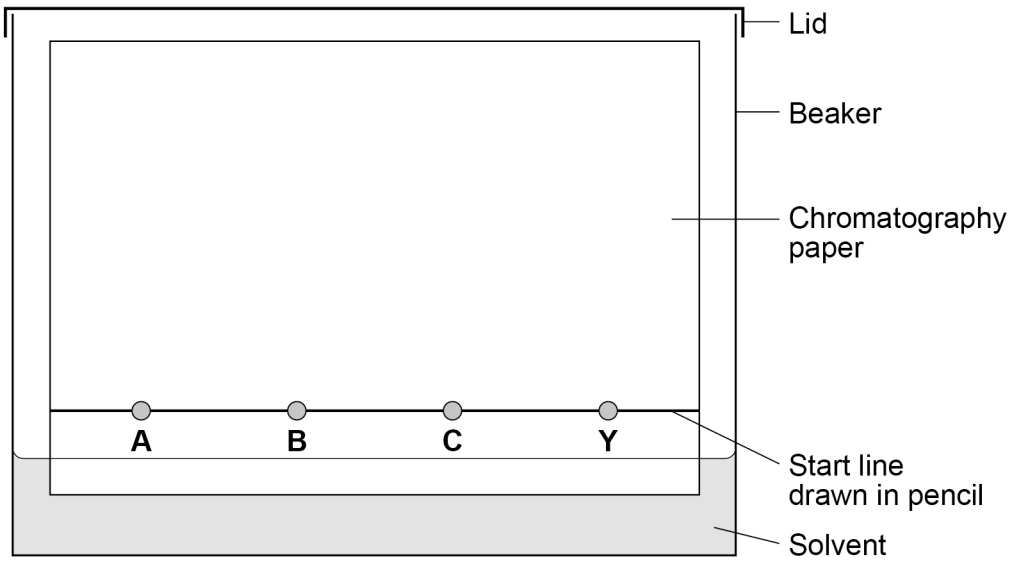
[1 mark]

A student investigated a purple food colouring, **Y**, using chromatography.

The student compares **Y** with dyes **A**, **B** and **C**.

0 5 . 3 **Figure 8** shows the apparatus used.

Figure 8



5.8.1.3 Chromatography

Question 02 · continued

Chromatography involves a stationary phase and a mobile phase.

Draw **one** line from each phase to what is used for that phase.

Use **Figure 8**.

[2 marks]

Phase	What is used
Mobile phase	Chromatography paper
Stationary phase	Pencil line

Beaker

Food colouring

Solvent

Question 5 continues on the next page

5.8.1.3 Chromatography

Question 02 · continued

Figure 9 shows the student's results.

Figure 9



0 5 . 4 What **three** conclusions can you make about the dyes in food colouring **Y**?

[3 marks]

1 _____

_____

2 _____

_____

3 _____

_____

5.8.1.3 Chromatography

Question 02 · continued

0 5 . 5 In a different experiment a student recorded these results:

Distance moved by dye **G** = 60 mm

Distance moved by solvent = 80 mm

Calculate the R_f value of dye **G**.

$$R_f = \frac{\text{distance moved by dye } \mathbf{G}}{\text{distance moved by solvent}}$$

[2 marks]

R_f = _____

9

5.8.1.3 Chromatography

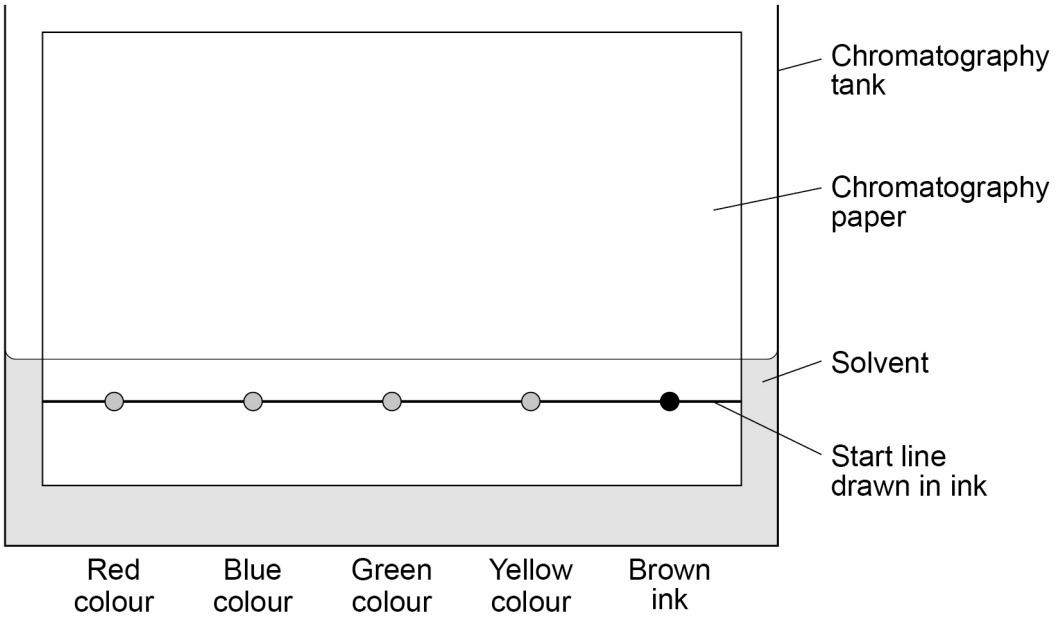
Question 03

June 2022 | 8464/C/2F | Original Q6

0 6 A student investigated the colours in a brown ink using chromatography.

0 6 . 1 **Figure 10** shows the apparatus used.

Figure 10



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

Describe the problem each error would cause.

[4 marks]

Error 1 _____

_____

Problem 1 _____

_____

Error 2 _____

_____

Problem 2 _____

_____

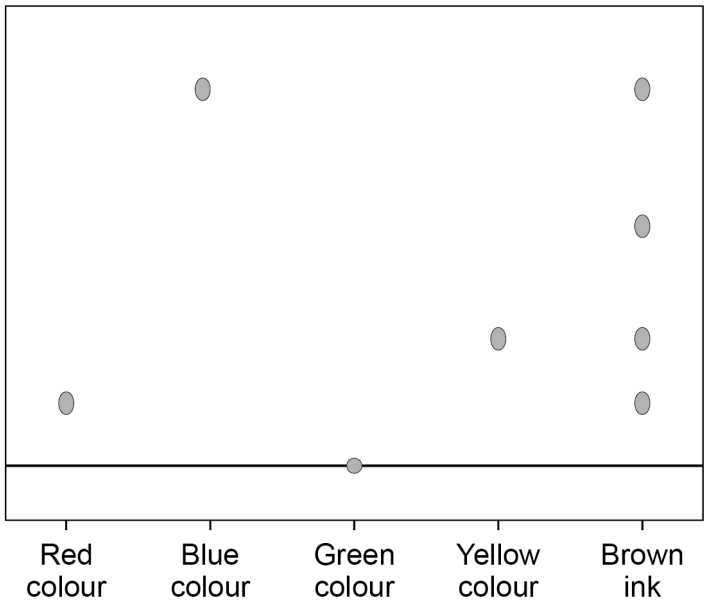
5.8.1.3 Chromatography

Question 03 · continued

A different student set up the apparatus correctly.

Figure 11 shows the results.

Figure 11



0 6 . 2 Give **two** conclusions the student can make from **Figure 11** about the four colours in the brown ink.

[2 marks]

1 _____

_____

2 _____

_____

Question 6 continues on the next page

5.8.1.3 Chromatography

Question 03 · continued

0 6 . 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 6 . 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 04

June 2023 | 8464/C/2F | Original Q6

0 6 Chromatography is used to separate mixtures.

Chromatography involves a mobile phase and one other phase.

0 6 . 1 What is the other phase in chromatography?

[1 mark]

Tick (✓) **one** box.

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

0 6 . 2 Why do the substances in the mixture separate in the mobile phase?

[1 mark]

_____

_____

0 6 . 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 04 · continued

0 6 . 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 6 continues on the next page

5.8.1.3 Chromatography

Question 04 · continued

0 6 . 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 05

June 2024 | 8464/C/2F | Original Q3

0 3 Printer ink is a mixture of chemicals.

0 3 . 1 What is the name given to a mixture that has been designed as a useful product?

[1 mark]

Tick (✓) **one** box.

Formula ☐

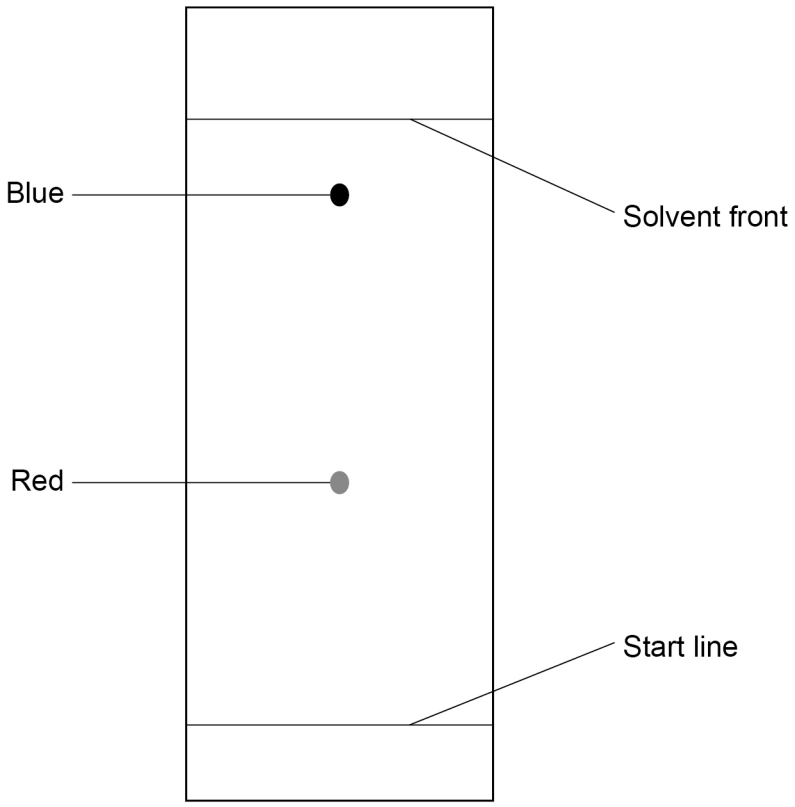
Formulation ☐

Fraction ☐

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

Figure 2 shows the chromatogram.

Figure 2



5.8.1.3 Chromatography

Question 05 · continued

0 3 . 2 The student used a ruler for the start line.

What would the student have used to draw the start line?

Give **one** reason for your answer.

[2 marks]

_____

Reason _____

_____

0 3 . 3 Determine the R_f value of the **red** colour.

Use the equation:

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

[4 marks]

Distance moved by red colour _____

Distance moved by solvent _____

_____

_____

_____

R_f = _____

Question 3 continues on the next page

0 3 . 4 **Table 2** shows the R_f values of four blue colours.

Table 2

Blue colour	R_f
Cerulean	0.40
Cobalt	0.15
Prussian	0.88
Ultramarine	0.68

The student determined that the R_f value of the blue colour in the printer ink was 0.86

Suggest which blue colour was used in the printer ink.

Give **one** reason for your answer.

[2 marks]

Blue colour _____

Reason _____

_____

9