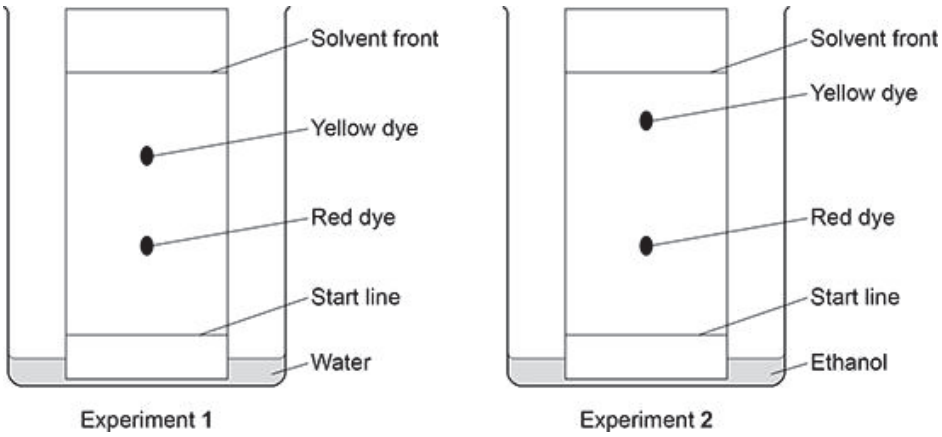
All questions are for both separate science and combined science students

Q1.

A student investigated an orange dye (**A**) using paper chromatography.

Figure 1 shows the results of Experiment **1** and Experiment **2** using orange dye **A**.

Figure 1



(a) Explain why the yellow dye and red dye travel different distances in Experiment **1**.

Refer to forces of attraction between the dyes and the chromatography paper in your answer.

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_____

_____

_____

(2)

(b) The student used the same type of chromatography paper in Experiment **1** and in Experiment **2**.

Explain why the yellow dye is in different positions in Experiment **1** and in Experiment **2**.

Use **Figure 1**.

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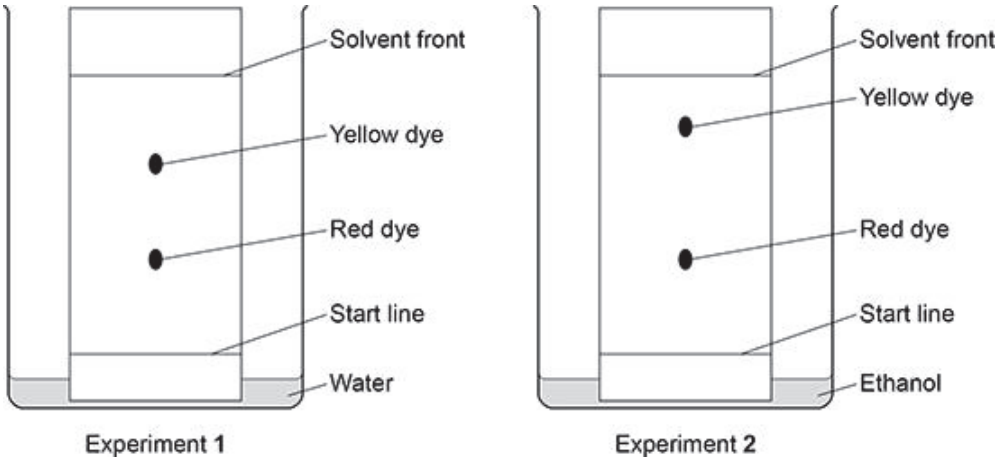
(3)

Figure 1 is repeated below.

Figure 1 shows the results of Experiment **1** and Experiment **2** using orange dye **A**.

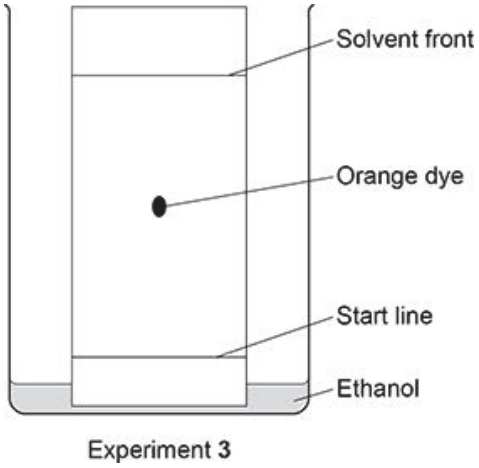
Figure 1



The student investigated a different orange dye (**B**).

Figure 2 shows the results of Experiment **3** using orange dye **B**.

Figure 2



(c) Compare the purity of the orange dyes **A** and **B**.

Give reasons for your answer.

Use **Figure 1** and **Figure 2**.

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_____

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_____

(2)

(d) The student calculated that the R_f value of the orange dye in the experiment shown in **Figure 2** was 0.48

Calculate the distance moved by the solvent front when the orange dye had moved 5.4 cm.

_____

_____

_____

_____

_____

Distance moved by solvent front = _____ cm

(3)

(e) Why is the R_f value of a dye **not** affected by how far the solvent front is allowed to travel?

_____

_____

(1)

(f) Another type of chromatography is called gas chromatography.

Gas chromatography is an instrumental method of chemical analysis.

Scientists tested the orange dyes using gas chromatography.

Suggest **two** advantages of using the instrumental method of gas chromatography rather than paper chromatography.

1 _____

_____

2 _____

_____

(2)

(Total 13 marks)

Q2.

This question is about chromatography.

A student investigated an orange food colouring using two different types of chromatography paper.

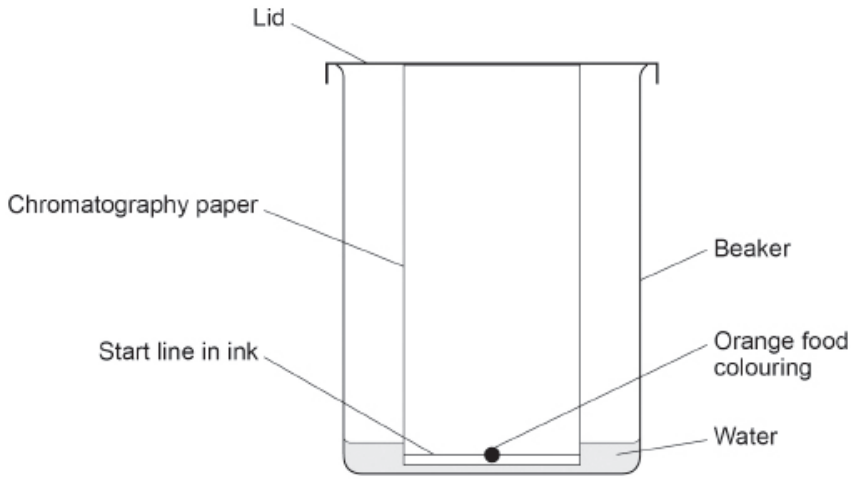
The food colouring:

- contained a mixture of red and yellow dyes
- was soluble in water.

This is the method used.

1. Draw a start line on a piece of type **A** chromatography paper.
2. Put a spot of orange food colouring on the line.
3. Put the paper into a beaker containing water as a solvent.
4. Wait for the water to travel up the paper.
5. Measure the distance above the start line moved by the red and yellow dyes and the water.
6. Repeat steps 1 to 5 using type **B** chromatography paper.

The figure below shows how the student set up the apparatus.



(a) The student made **two** mistakes when setting up the apparatus.

Give **two** mistakes the student made.

1 _____

_____

2 _____

_____

(2)

Another student set up the apparatus correctly.

The table below shows the results.

	Type A chromatography paper		Type B chromatography paper	
	Red dye	**Yellow dye**	**Red dye**	**Yellow dye**
Distance moved by dye in cm	4.8	6.6	5.4	**X**
Distance moved by water in cm	12.0	12.0	12.0	12.0
R_f value	0.40	0.55	0.45	0.60

(b) Determine value **X** in the table above.

_____

_____

_____

_____

_____

X = _____ cm

(3)

Changing the type of chromatography paper resulted in different R_f values for the red dye.

(c) Explain why the R_f values for the red dye are different using the two types of chromatography paper.

Use the table above.

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_____

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_____

_____

(3)

(d) What other change to the investigation could result in a different R_f value for the red dye?

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_____

(1)

(Total 9 marks)