# Paper chromatography

Chemistry required practical | AQA Combined Science 8464 and AQA GCSE Chemistry 8462 | 14 questions, 35 marks

**GCSE science required practicals**

This practical online

**Name:** _____ **Date:** _____ **Score:** _____ **/ 35**

**Aim:** To separate the coloured substances in inks or food colourings by paper chromatography, and to identify them by calculating $R_f$ values.

**Equipment:** chromatography paper; pencil and ruler; capillary tubes or fine glass rods; food colouring samples, known and unknown; beaker (250 $cm^3$); water as the solvent; glass rod or split cork to hang the paper; lid or watch glass to cover the beaker; safety goggles.

## Results

Ella ran a chromatogram of three known food colourings, A, B and C, and an unknown colouring X from a sweet. The solvent moved 8.4 cm from the start line. She measured each spot.

| Sample | Spot | Distance moved by spot in cm | Distance moved by solvent in cm | $R_f$ value |
|---|---|---|---|---|
| A (red) | 1 | 2.1 | 8.4 | 0.25 |
| B (yellow) | 1 | 6.3 | 8.4 | ? |
| C (blue) | 1 | 4.4 | 8.4 | ? |
| X | 1 | 2.1 | 8.4 | ? |
| X | 2 | 4.4 | 8.4 | ? |

## Questions

**1** Explain why the start line is drawn in pencil and not in ink. (2 marks)

**2** Explain why the water level in the beaker must be below the start line. (2 marks)


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**3** Give two variables Ella should keep the same if she wants to compare her $R_f$ values with another class's results. (2 marks)

**4** Another pupil wants to use ethanol as the solvent. Give the hazard and a way to reduce the risk. (2 marks)

**5** Calculate the $R_f$ value of the spot from B. (2 marks)

**6** Calculate the $R_f$ value of the spot from C. Give your answer to 2 significant figures. (2 marks)

**7** Use the results to say which colourings are in X. Explain your answer. (3 marks)

**8** Is food colouring B a pure substance? Explain your answer. (2 marks)


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**9** Ella tests a green colouring in the same way. The solvent moves 8.4 cm again. One of its spots has an $R_f$ value of 0.62. Calculate how far that spot moved from the start line. Give your answer to 2 significant figures. Show your working.

(3 marks)

**10** **Higher tier**

Explain, in terms of the mobile phase and the stationary phase, why colouring B travels further up the paper than colouring A.

(3 marks)

**11** **Higher tier**

A pupil in another school found an $R_f$ of 0.41 for colouring C using ethanol as the solvent. Explain why this does not mean that either result is wrong.

(2 marks)

**12** Ella's spots were large and smeared, which made it hard to measure to the centre. Suggest how she could improve this and explain why it helps.

(2 marks)

**13** Ella took the paper out of the beaker but forgot to mark the solvent front straight away. By the time she marked it, the water had spread a little further up the damp paper, but the spots had not moved. Explain the effect on her $R_f$ values.

(2 marks)


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**14** Plan an investigation, using paper chromatography, to find out whether the black ink in a pen found at a crime scene matches the ink in one of three suspects' pens.

(6 marks)

End of questions | Total 35 marks | The answers sheet has the full method as revision notes.


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