Chromatography

1 (a) What is the correct definition of a pure substance in chemistry?

Circle the correct answer. **(1 mark)**

A. A substance containing two or more types of atom that are not bonded together.

B. A substance that contains one type of element or compound only.

C. A substance that is always naturally produced.

D. A substance that contains two or more different types of element or compound.

(b) Which of these can be used to detect a pure substance?

Circle the correct answer. **(1 mark)**

A. chromatography

B. crystallisation

C. evaporation

D. filtration

(c) Which of the following statements is correct?

Circle the correct answer. **(1 mark)**

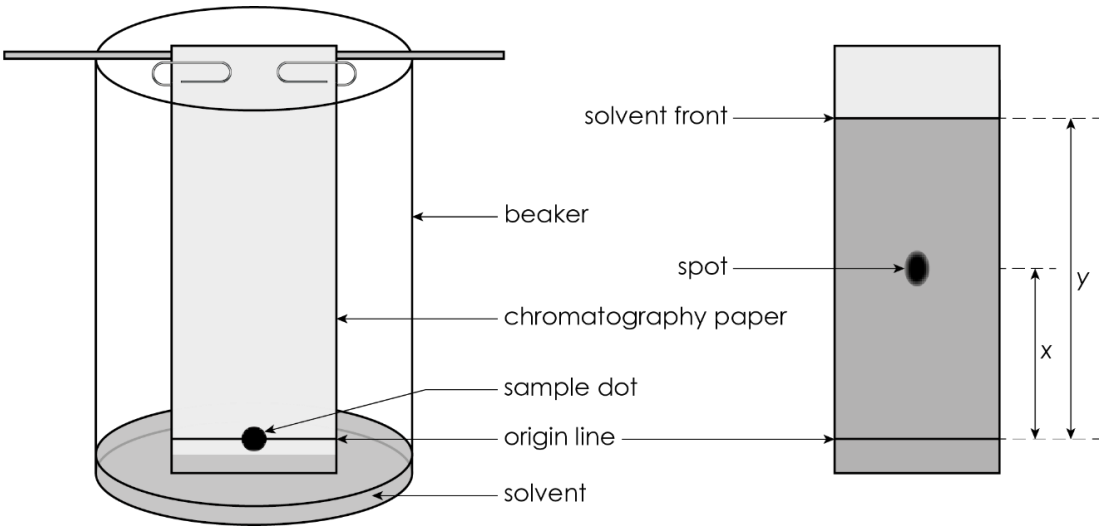
A. Paper chromatography separates mixtures of soluble substances.

B. Paper chromatography separates mixtures of insoluble substances.

C. Paper chromatography separates mixtures of solvents.

D. Paper chromatography separates mixtures with different boiling points.

2 The image shows the setup and results from an experiment used to investigate whether a substance is pure.



(a) Identify the stationary phase.

_____ **(1 mark)**

(b) Identify the mobile phase.

_____ **(1 mark)**

(c) Give one reason why the level of the solvent must be below the sample dot and origin line.

_____

_____

(1 mark)

(d) Look at the number of spots formed on the image.

i. Is the sample a pure substance?

_____ **(1 mark)**

ii. Give a reason for your answer.

_____

_____

(1 mark)

(e) What does the label **x** in the image represent?

Circle the correct answer. (1 mark)

A. the distance moved by the solvent

B. the distance moved by the spot

C. the mobile phase

D. the R_f value

(f) What does the label **y** in the image represent?

Circle the correct answer. (1 mark)

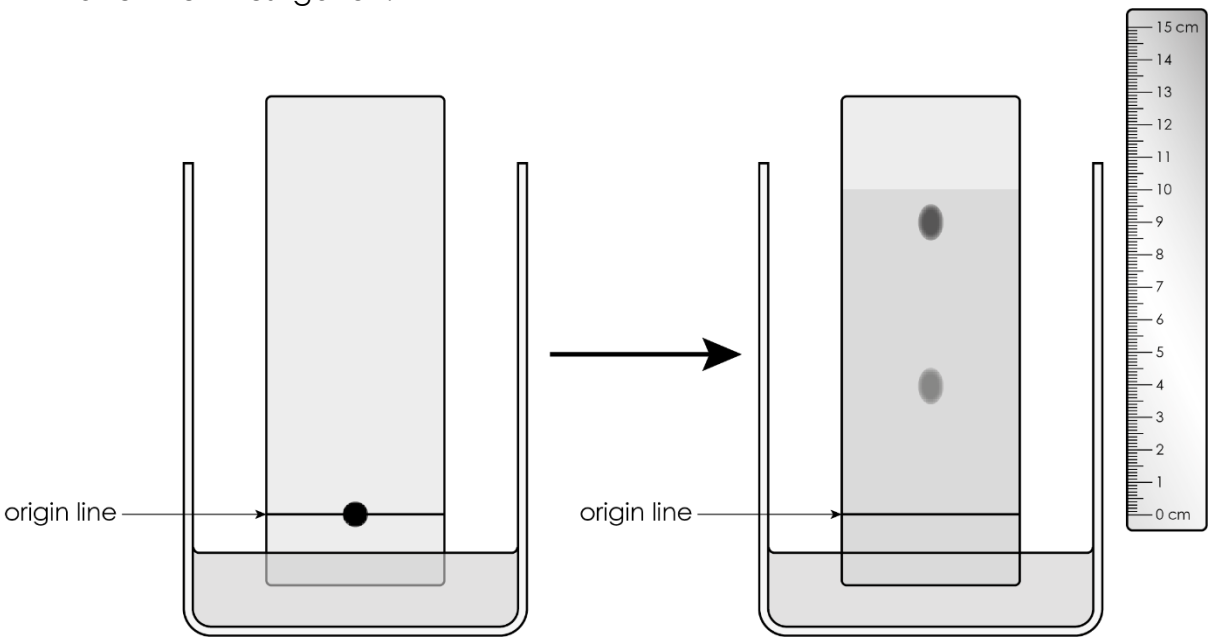
A. the distance travelled by the solvent

B. the distance travelled by the spot

C. the mobile phase

D. the R_f value

3 Students are using chromatography to investigate the coloured substances present in sweets. The image shows the chromatography paper before and after the investigation.



(a) i. How many different substances are present in the sample?

_____ (1 mark)

ii. Give a reason for your answer.

_____

_____ **(1 mark)**

(b) i. Measure the distance travelled by the solvent.

_____ **(1 mark)**

ii. Measure the distance travelled by the higher spot.

_____ **(1 mark)**

iii. This equation is used to calculate the R_f value:

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

Calculate the R_f value for the higher spot.

_____

_____ **(2 marks)**

(c) Calculate the R_f value for the lower spot.

_____

_____ **(2 marks)**

(d) Select words from those provided to complete the sentences. You do not have to use all the words.

solvent	**measure**	**R_f values**
identify	**solute**	**chemical tests**

R_f values can be used to _____ a substance. Each substance will always have the same R_f value in the same _____ .

The R_f values calculated in **question 3(b)** and **(c)** can be compared with known _____ .

(3 marks)

[Total: 21 marks]