Chromatography Past Paper Questions IGCSE Edexcel

1.

1 Chromatography can be used to separate the substances in a mixture.

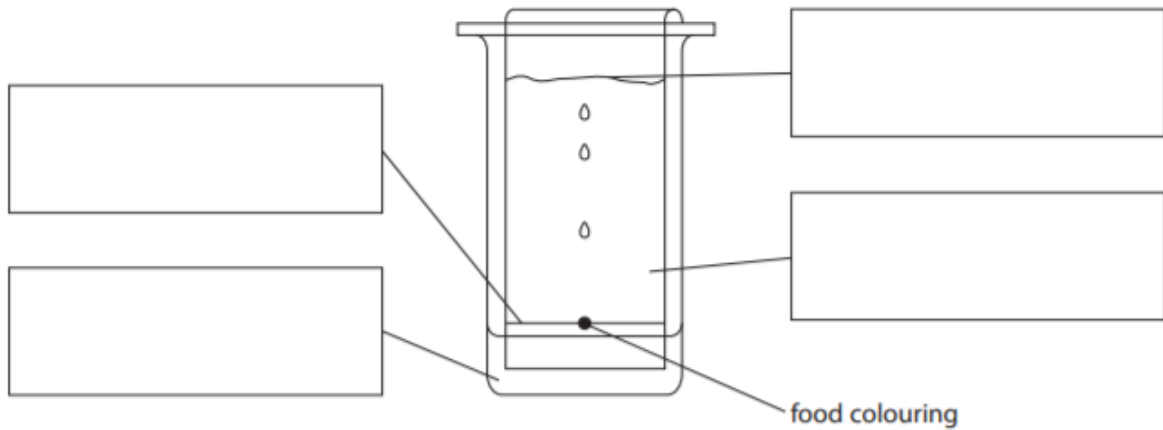(a) Diagram 1 shows the apparatus used to separate the different dyes in a food colouring.

food colouring

Diagram 1

The box lists some terms used in chromatography.

baseline	chromatography paper
solvent	solvent front

Use the terms from the box to label diagram 1.

(3)

(b) Diagram 2 shows a chromatogram produced using four different food colourings,
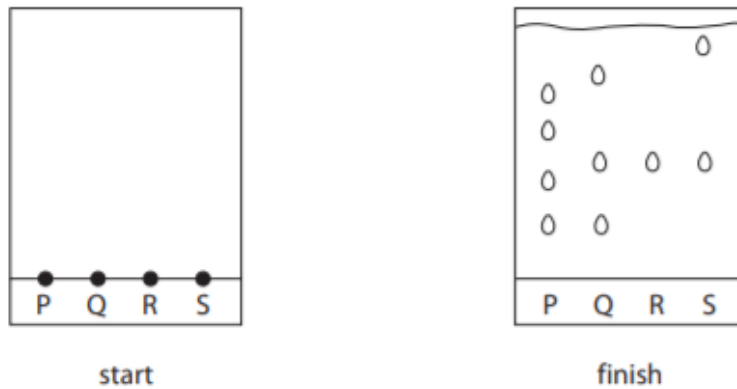P, Q, R and S.

start   finish

Diagram 2

(i) Which food colouring contains only one dye?

(1)

☒ **A** P

☒ **B** Q

☒ **C** R

☒ **D** S

(ii) Which food colourings have one dye in common?

(1)

☒ **A** P, Q and R

☒ **B** P, R and S

☒ **C** Q, R and S
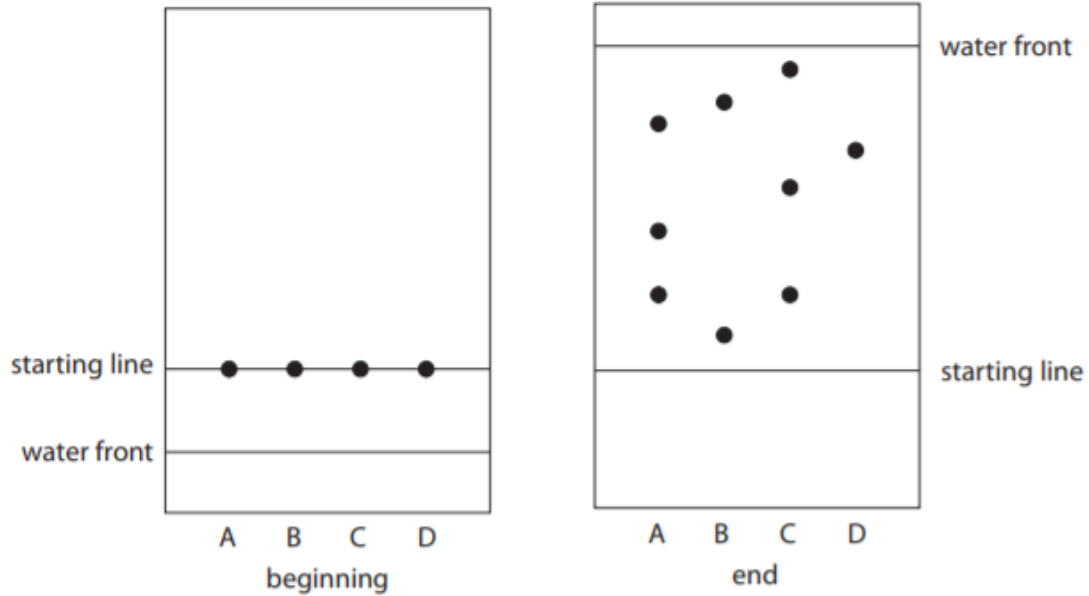
☒ **D** P, Q, R and S

(iii) Explain which food colouring contains the largest number of dyes.

(2)

2.

A student uses chromatography to investigate the colourings found in four different fruit drinks, A, B, C and D.

The diagram shows the chromatography paper at the beginning and at the end of the investigation.

(a) State why the student should draw the starting line in pencil.

(1)

(b) (i) Which drink contains only one colouring?

(1)

☒ **A**

☒ **B**

☒ **C**

☒ **D**

(ii) Explain which drink contains the most soluble colouring.

(2)

....

....

....

....

(iii) Explain which drinks contain the same colouring.

(2)

....

....

....

....

3.

A student wants to find out if the green colouring in grass is a mixture of dyes.

He uses a solvent to dissolve the green colouring from some grass.

He then separates the solution of the green colouring from the remaining grass.

(a) Which of these methods is used to separate the solution of the green colouring from the remaining grass?

(1)

☒ **A** boiling

☒ **B** condensation

☒ **C** evaporation

☒ **D** filtration

(b) The student uses a dropping pipette to place a drop of the green solution onto a piece of chromatography paper and produces a chromatogram.
The diagram shows his results.
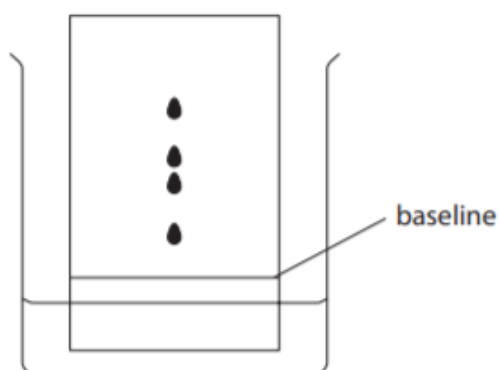
(i) Add three more labels to the diagram to show

- the solvent
- the chromatography paper
- the original position of the spot of the green solution

(3)

(ii) Explain how many different dyes are present in the green colouring.

(1)

4.

A student investigates the pigments found in some vegetables and fruit.

She obtains some coloured vegetable and fruit extracts from carrots, tomatoes and sweet potatoes.

She places a spot of each extract on chromatography paper, along with spots of the three pigments beta-carotene, chlorophyll and lycopene.

Her teacher provides a solvent containing volatile, flammable organic compounds for the experiment. The diagram shows the apparatus at the start of the experiment.
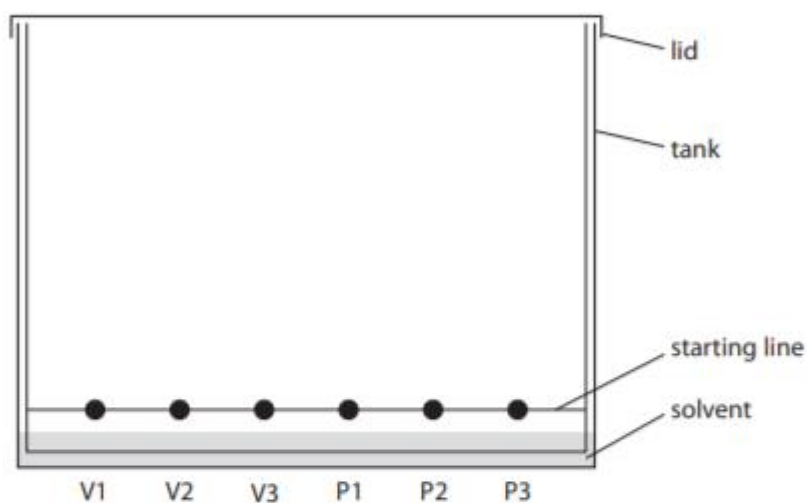
Key to vegetable and fruit extracts and pigments

V1 = carrots   V2 = tomatoes   V3 = sweet potatoes

P1 = beta-carotene   P2 = chlorophyll   P3 = lycopene

(a) (i)   Explain why it is important for the solvent level to be below the spots.

(1)

_____

_____

(ii) State two potential problems that are prevented by fitting the tank with a lid.
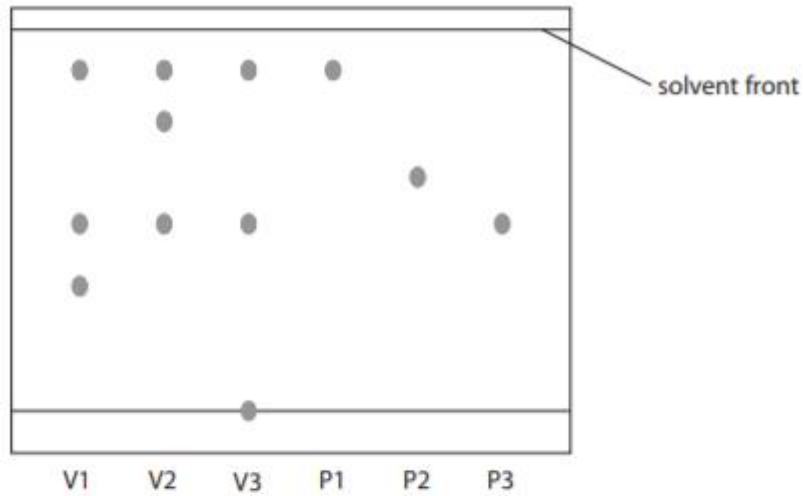
(2)

_____

_____

_____

(b) The diagram shows the chromatogram at the end of the experiment.

Key to vegetable and fruit extracts and pigments

V1 = carrots   V2 = tomatoes   V3 = sweet potatoes
P1 = beta-carotene   P2 = chlorophyll   P3 = lycopene

Which three of the statements A, B, C, D and E are supported by the chromatogram?

Place a cross in three boxes to indicate your choice.

(3)

A   Chlorophyll is **not** present in carrots, sweet potatoes or tomatoes.   ☐

B   Beta-carotene is present in carrots but **not** present in tomatoes.   ☐

C   Both beta-carotene and lycopene are present in sweet potatoes.   ☐

D   Lycopene is present in tomatoes but **not** present in carrots.   ☐

E   Both carrots and tomatoes contain a pigment **other than**
    beta-carotene, chlorophyll and lycopene.   ☐

5.

Illegal drugs are sometimes used to affect the performance of racehorses.
These drugs can be detected in horse urine using chromatography.

- a concentrated sample of urine from each horse is spotted onto the start line of a sheet of chromatography paper

- known illegal drugs are also spotted onto the same paper

- ethanol is used as the solvent

The chromatogram shows urine samples, A, B, C and D, and the two illegal drugs lasix and bute.
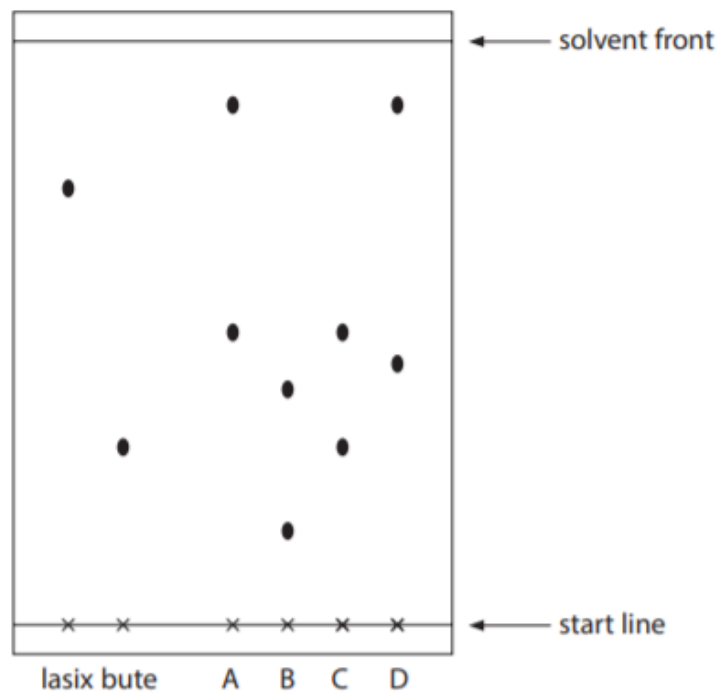
(a) Explain which urine sample contains an illegal drug.

(2)

(b) What is the meaning of the term **solvent**?

(1)

....

....

(c) The results for known drugs are given as R_f values.

$$R_f \text{ value} = \frac{\text{distance travelled by the drug}}{\text{distance travelled by the solvent}}$$

Calculate the R_f value for lasix.

(2)

R_f value for lasix = ...

(d) Suggest how the solubility of the drug in the solvent affects the distance travelled by the substance.

(1)

....
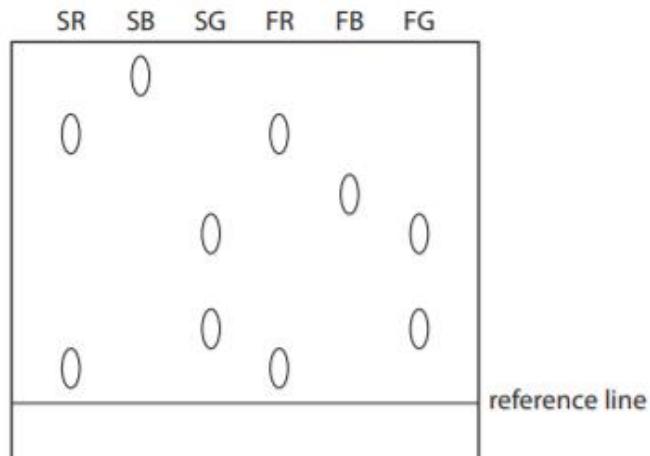
6.

A student investigates some food colourings, each of which is made up of one or more dyes.

She produces a chromatogram using the safe colourings red (SR), blue (SB) and green (SG) and food colourings red (FR), blue (FB) and green (FG).

The diagram shows her chromatogram.

(a) How many dyes are there in SR?

(1)

☐ **A** 1 ☐ **B** 2 ☐ **C** 3 ☐ **D** 4

(b) Complete the table by placing ticks (✓) next to the two food colourings that are definitely safe to use.

Explain your answer.

(2)

Food colouring	Safe to use?
FR	
FB	
FG	

explanation ....

....

7.

A student produces this chromatogram for four dyes, **A**, **B**, **C** and **D**.
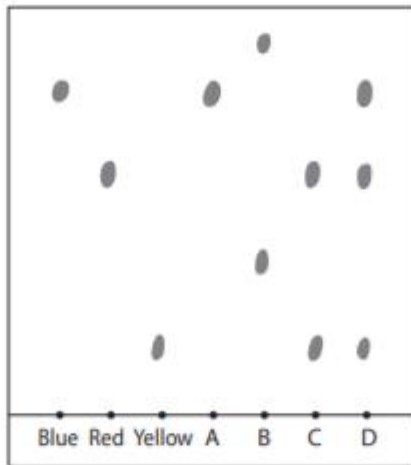
(a) Put a cross (☒) in a box to indicate your answer.

   (i) Which one of the dyes contains three colours?

                                                                     (1)

     ☐ **A**

     ☐ **B**

     ☐ **C**

     ☐ **D**

   (ii) Which one of the dyes contains one colour only?

                                                                     (1)

     ☐ **A**

     ☐ **B**

     ☐ **C**

     ☐ **D**

(b) Each dye is made from one or more of the colours blue, red and yellow.

The student thinks that the result for one dye is incorrect.

Suggest which result is incorrect. Explain your answer.

                                                                     (2)

The incorrect result is ....

because ....