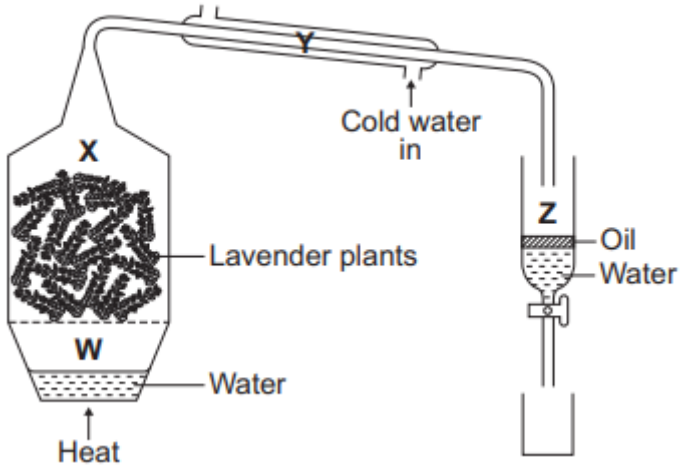
SEPARATION TECHNIQUES 4

Q1. Steam distillation is used to separate oils from plants. The diagram shows some apparatus that can be used to separate oil from lavender plants. Four parts of the apparatus are labelled W, X, Y and Z.



In which part, W, X, Y or Z, of the apparatus:

is steam produced _____

are steam and oil condensed? _____

(2 marks)

Q2. This question is about oil reserves.

Diesel is separated from crude oil by fractional distillation.

Describe the steps involved in the fractional distillation of crude oil.

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(3 marks)

Q3. The diagram shows how a solution of ethanol is made from sugar dissolved in water.

The boiling point of ethanol is 78°C and the boiling point of water is 100°C.

What are the main steps needed to obtain pure ethanol from the mixture produced after three days?

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_____

_____

_____

(2 marks)

Q4. Read the article.

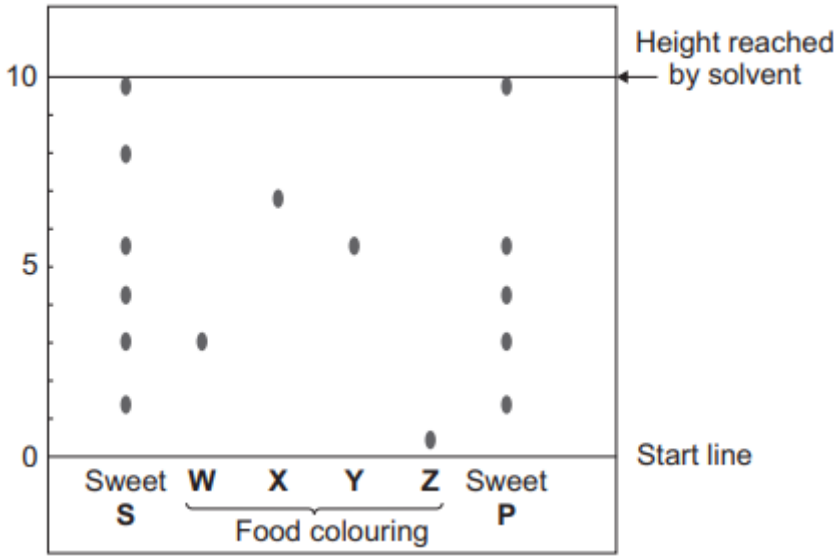
Problem food colourings

Scientists say they have evidence that some food colourings cause hyperactive behaviour in young children.

These food colourings are added to some sweets.

W, X, Y and Z are food colourings that may cause hyperactive behaviour in young children. A scientist used chromatography to see if these food colourings were used in two sweets, S and P.

The results are shown on the chromatogram.



(a) Food colourings, such as W, X, Y and Z, are added to some sweets. Suggest one reason why.

_____

(1 mark)

(b)

$$\text{In chromatography, the } R_f \text{ value} = \frac{\text{distance moved by the colouring}}{\text{distance moved by the solvent}}$$

Use the scale on the chromatogram to help you to answer this question. Which food colouring, W, X, Y or Z, has an R_f value of 0.7?

_____

(1 mark)

(c) From the chromatogram, what conclusions can the scientist make about the colourings in sweets S and P?

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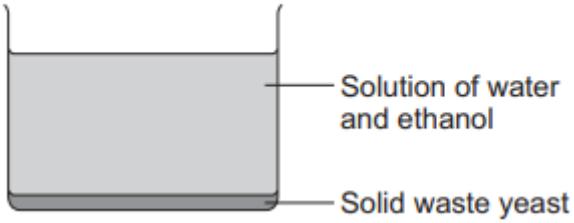
(3 marks)

Q5. Fermentation is used to produce ethanol from sugar by:

- dissolving the sugar in water
- adding yeast to the sugar solution
- leaving the mixture for three days.

The figure shows the substances after three days.

Figure 2



Suggest:

- how the solid waste yeast is removed
- how ethanol is obtained from the solution.

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_____

(2 marks)