

1 A student investigated the rate of respiration in yeast using different concentrations of glucose.

They used a 5% glucose solution to make a 1% glucose solution and a 4% glucose solution.

The student used this method:

- Step 1 Label two small test-tubes **1%** and **4%**.
- Step 2 Use a syringe to put 1 cm<sup>3</sup> of 5% glucose solution into the small test-tube labelled **1%**.  
Put 4 cm<sup>3</sup> of 5% glucose solution into the small test-tube labelled **4%**.
- Step 3 Use a clean syringe to put 4 cm<sup>3</sup> of distilled water into the small test-tube labelled **1%**.  
Put 1 cm<sup>3</sup> of distilled water into the small test-tube labelled **4%**.
- Step 4 Pour yeast suspension into the small test-tube labelled **1%** until it is completely full.
- Step 5 Keep the small test-tube upright and carefully place a large test-tube over the top of the small test-tube labelled **1%**. Push the small test-tube up to the top of the large test-tube, as shown in Fig. 1.1A. Quickly invert the test-tubes, as shown in Fig. 1.1B.

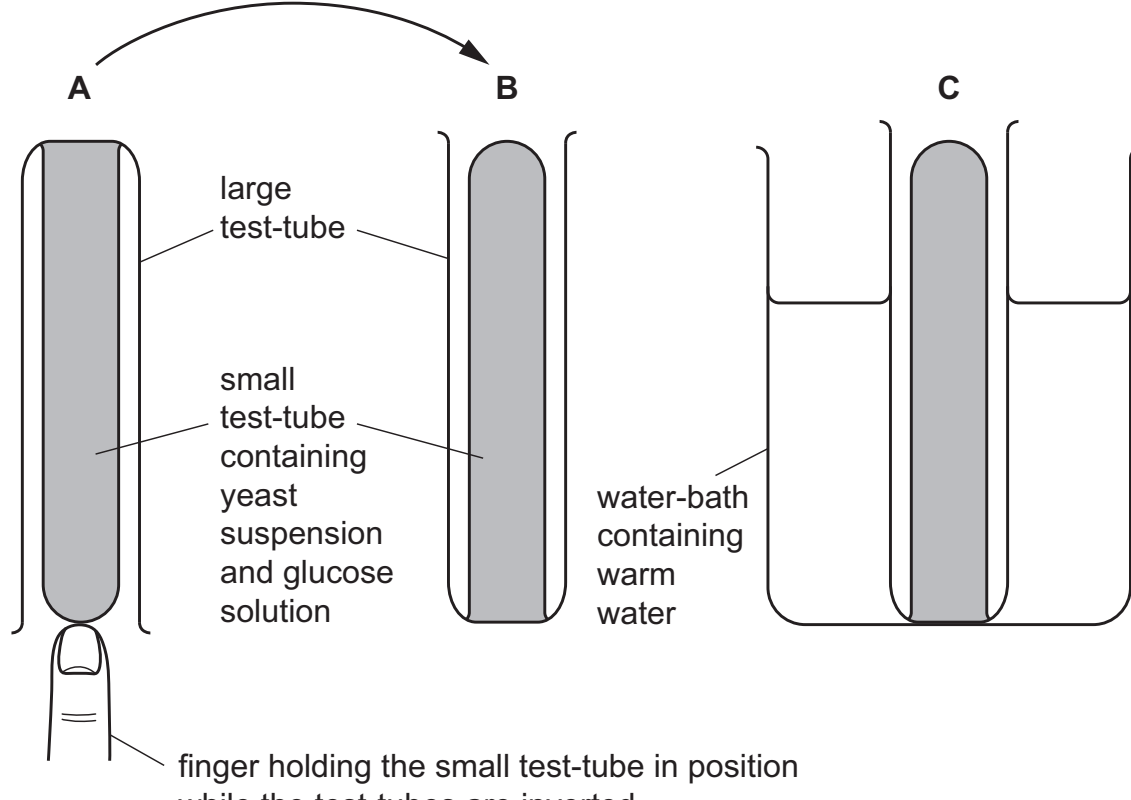


Fig. 1.1

Step 6 Put the large test-tube and the small test-tube labelled **1%** into a warm water-bath, as shown in Fig. 1.1C.

Step 7 Start the stop-clock and wait for five minutes.

Step 8 After five minutes, stop the stop-clock and use a ruler to measure the height of the yeast suspension in the **large** test-tube, as shown in Fig. 1.2.

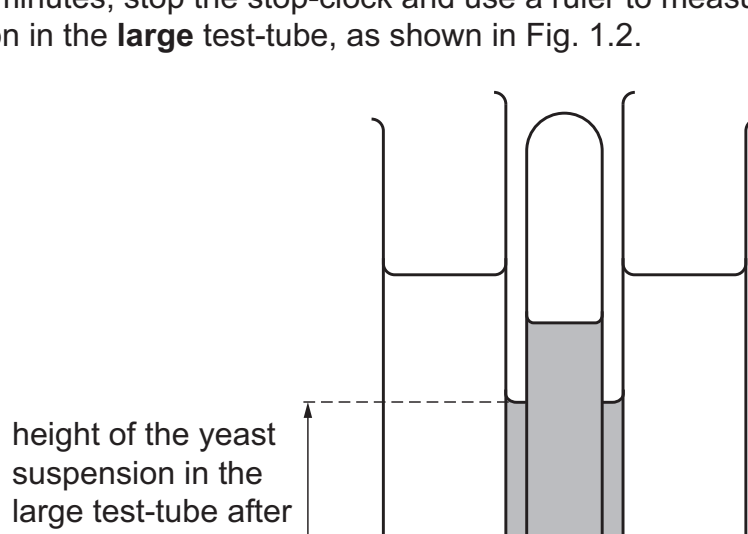


Fig. 1.2

Step 9 Remove the test-tubes from the warm water-bath and discard them.

Step 10 Pour yeast suspension into the small test-tube labelled **4%** until it is completely full.

Step 11 Repeat steps 5 to 8 with the small test-tube labelled **4%**.

(a) Fig. 1.3 is a diagram of the water-baths in steps 8 and 11.

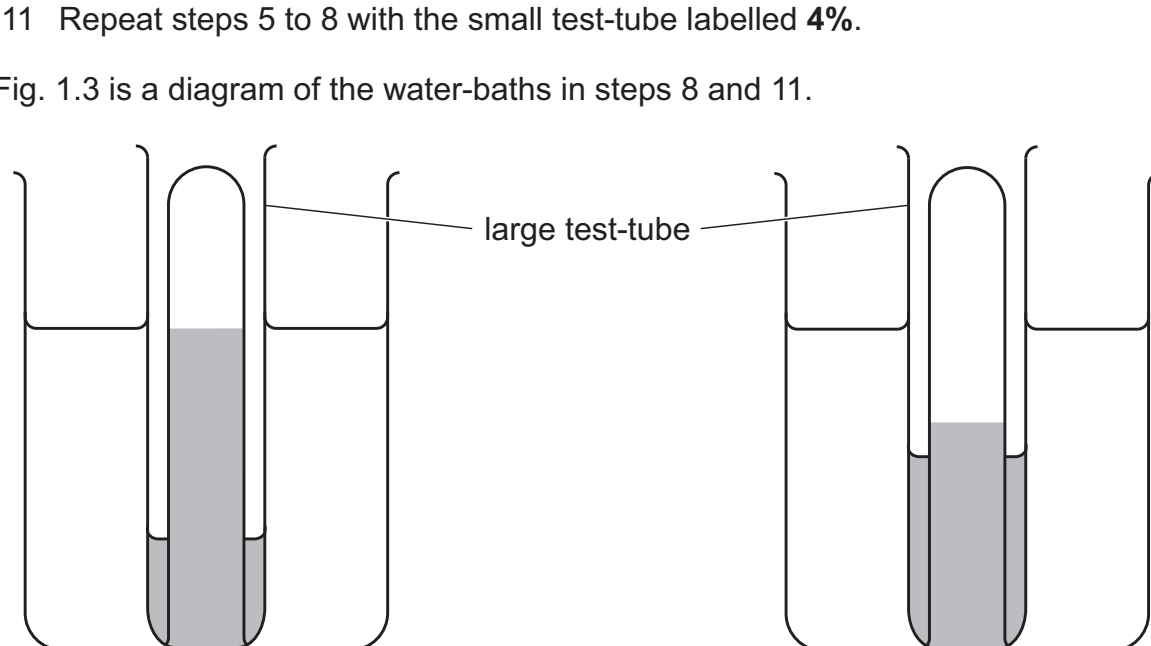


Fig. 1.3

(i) Measure the height of the yeast suspension in each of the **large** test-tubes shown in Fig. 1.3.

Prepare a table for the results and record your measurements from Fig. 1.3.

[4]

(ii) State a conclusion for the results of this investigation.

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 .....  
 .....

[1]

(iii) State the independent and dependent variables in this investigation.

independent variable .....

dependent variable .....

[2]

(iv) Describe how the temperature of the water-bath could be maintained.

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 .....

[1]

(v) Explain why a clean syringe was used in step 3.

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 .....

[1]

(b) A student extended the investigation by using more concentrations of glucose solution.

Calculate the volumes of 5% glucose solution and distilled water that are needed to make 5 cm<sup>3</sup> of a 3% glucose solution.

volume of 5% glucose solution ..... cm<sup>3</sup>

volume of distilled water ..... cm<sup>3</sup>

[1]

(c) Sports drinks often contain glucose, which is a reducing sugar.

State how you could test a sample of a sports drink for reducing sugar.

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 .....  
 .....

[2]

(d) (i) The ethanol emulsion test can be used to show that a sample of food contains fat.

State the result of a positive test.

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[1]

(ii) Suggest **one** safety precaution that should be followed when using ethanol.

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[1]

[Total: 14]