

GCSE Biology B (Twenty First Century Science)
J257/02 Depth in Biology (Foundation)

Question Set 11

1 Photosynthesis takes place in plants.

(a) Put **one** tick in each row of the table to show the function of each plant structure.

Plant structure	Function		
	Transports sugars made by photosynthesis.	Carries out the reactions of photosynthesis.	Transports water needed for photosynthesis.
Chloroplast		✓	
Phloem	✓		
Xylem			✓

[1]

Eve is investigating the effect of temperature on photosynthesis in pondweed.

This is her method.

1. Put a piece of pondweed in a boiling tube.
2. Cover the pondweed with sodium hydrogen carbonate solution (a source of carbon dioxide).
3. Put the boiling tube in a beaker of water at one of six temperatures.
4. Use a gas syringe to collect the bubbles of gas released from the pondweed.
5. Record the volume of gas collected in five minutes.
6. She repeats the experiment three times at each temperature.

Fig. 6.1 shows the apparatus Eve uses.

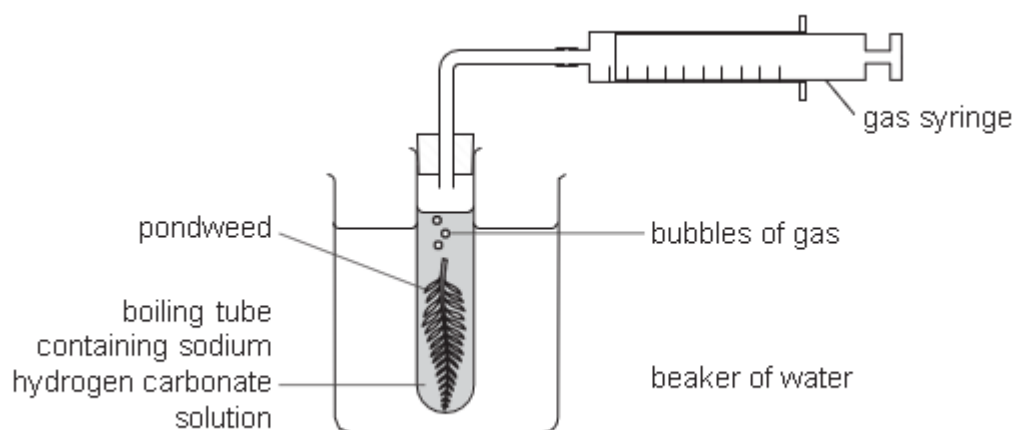


Fig. 6.1

(b) Temperature is the variable that Eve will change.

Write down **one** variable that Eve should control **and** describe how she could control it. **light intensity by carrying the experiment in the same location, on the same day.** [2]

(c) After she has finished the investigation, Eve uses her data to plot the graph in Fig. 6.2.

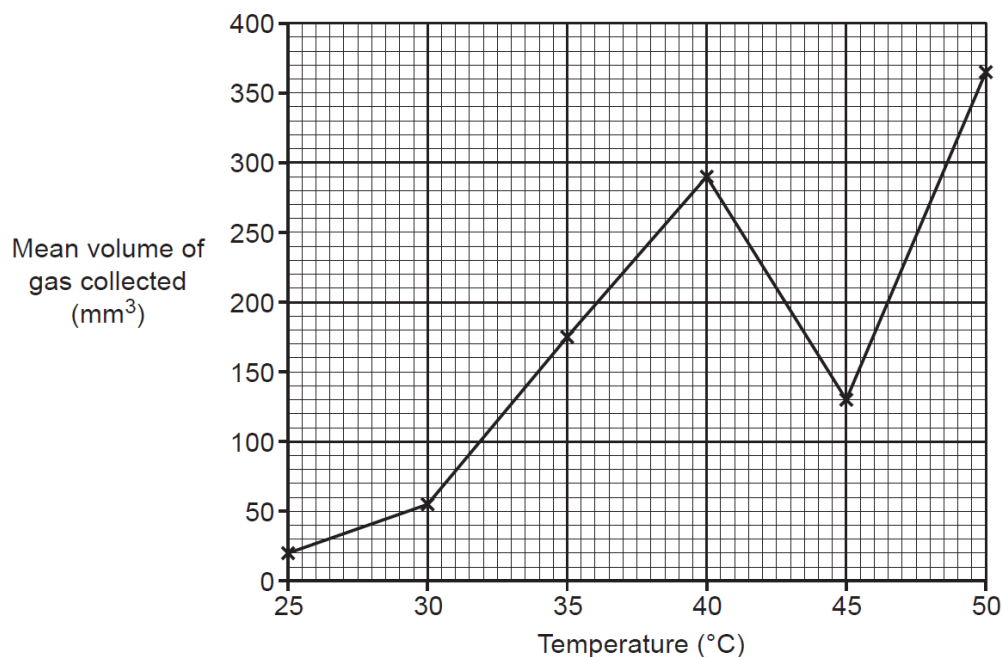


Fig. 6.2

(i) Eve decides to repeat the experiment at 45°C so that she can take new measurements at this temperature.

Use evidence from Fig. 6.2 to justify Eve's decision.

[2]

The general trend is a temperature increases, the volume of gas increases. However, at 45°C, the data does not follow the trend, indicating that this is an anomaly and there might have been some error in the investigation.

(ii) Here are Eve's new measurements.

Temperature (°C)	Volume of gas collected (mm ³)		
	Repeat 1	Repeat 2	Repeat 3
45	354	360	351

$$\text{mean} = \frac{354 + 360 + 351}{3} = 355 \text{ mm}^3$$

Use Eve's new measurements to complete the graph in Fig. 6.3.

You may use the space below for working out.

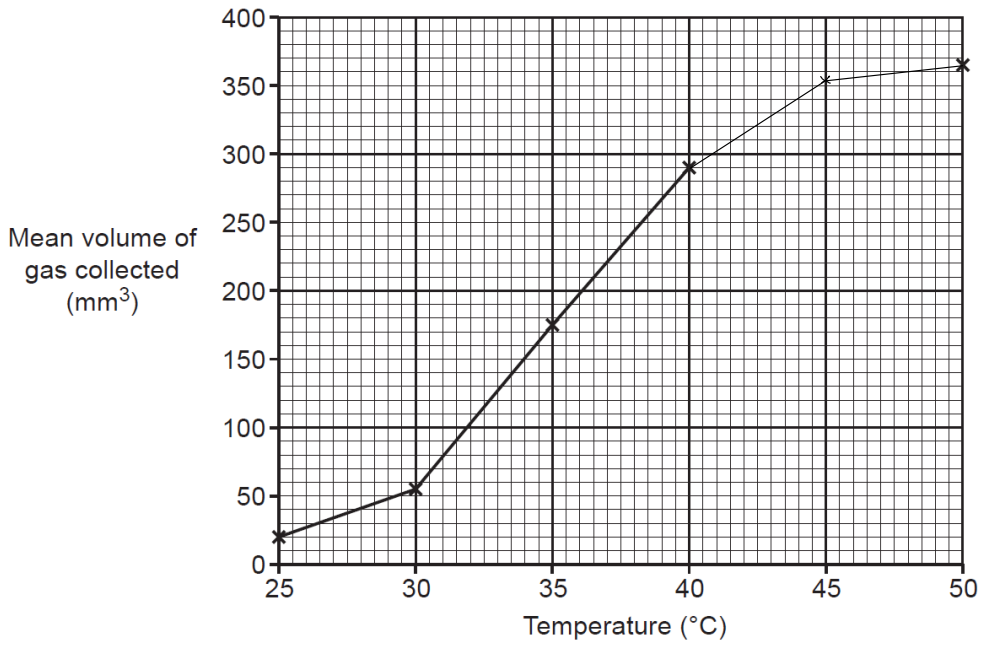


Fig. 6.3 [2]

(d) Describe the trend in the data shown in the graph in Fig. 6.3.

Use data from Fig. 6.3 to support your answer. [3]

as temperature increases, the volume of gas produced increases. For instance, at 30°C, 55mm³ is produced, and at 40°C, 290mm³, an increase of 235mm³ over 10°C. Eventually, the graph levels off, thus increasing the temperature further has no impact on the volume of gas made.

(e) The volume of gas collected changed as the temperature changed.

Calculate the change in volume per degree between 35°C and 40°C.

$$290 - 175 = 115$$

$$\frac{115}{5} = 23$$

Change in volume per degree = 23 mm³/°C [2]

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