

CIE A-Level Biology 9700 Paper 5 Practice

Paper (Planning, Analysis and Evaluation)

Total: 30 marks · 1 h 15 min · 2 questions · 11 parts

Data and formulae

Quantity	Value
Acceleration of free fall g	9.81 m s ⁻²
Molar volume at room temperature	24.0 dm ³ mol ⁻¹
Molar mass of oxygen	32.0 g mol ⁻¹
Mr of glucose	180
Standard atmospheric pressure	101 kPa
Vapour pressure of water at 20 °C	2.3 kPa

Q 1 · Planning: effect of temperature on catalase activity [15]

- (a) A student investigates the effect of temperature on catalase activity in potato, using the rate of oxygen release from hydrogen peroxide as the measurement. State the independent variable, the dependent variable and two control variables. [2]
- (b) Describe how the reaction mixture is kept at each chosen temperature between 10 °C and 50 °C and how the temperature of the mixture is determined accurately. [3]
- (c) Describe how the rate of oxygen release is measured accurately. [4]
- (d) State which graph should be plotted to show the relationship between temperature and rate, describe its expected shape, and explain how Q10 is calculated from the rates. [3]
- (e) State two precautions that make the experiment more reliable or safer and explain the reason for each. [3]

Q 2 · Analysis and evaluation: light intensity and the rate of photosynthesis [15]

- (a)** A student investigates the effect of light intensity on photosynthesis in pondweed (*Elodea*). Oxygen released in 5 minutes is collected in a gas-tight measuring tube, and the distance d between the lamp and the weed is changed; the light intensity at the weed is assumed to be proportional to $1/d^2$. The results are shown in the table. Complete the table by calculating the rate of oxygen release in $\text{cm}^3 \text{ min}^{-1}$ for each distance, giving each value to 2 decimal places. [3]
- (b)** Plot a graph of rate ($\text{cm}^3 \text{ min}^{-1}$) on the y-axis against $1/d^2$ (cm^{-2}) on the x-axis, describe the relationship obtained and state what the gradient represents. [4]
- (c)** Use the gradient of your graph to predict the rate at $d = 25 \text{ cm}$, and compare it with the value obtained from the raw data. [3]
- (d)** Calculate the percentage uncertainty in the rate at $d = 50 \text{ cm}$ (volume reading $\pm 0.05 \text{ cm}^3$, timing $\pm 1 \text{ s}$). [2]
- (e)** State two limitations or sources of error that affect the results and suggest an improvement for each. [3]