

2023 Bi H1 Q19

Section: Metabolism and Survival

Topic: Metabolic Pathways

Question Summary

The experiment investigates the effect of wavelength of light on the rate of photosynthesis in algae. An indicator solution changes colour as carbon dioxide is used up, and this colour change is used to measure the rate.

Worked Solution

The experiment measures how quickly photosynthesis occurs under lights of different wavelengths. To make this comparison valid, only one variable (wavelength) should change — all others must be kept constant.

Let's examine the options:

- A. Repeating the experiment three times – improves reliability, but not validity.
- B. Placing a heat shield between the light source and the bottle –
■ correct, because it prevents temperature (a second variable) from affecting photosynthesis rate.
- C. Increasing the number of gel beads – changes the amount of algae, so not valid.
- D. Using a colorimeter – makes measurement more accurate, not

more valid.

■ Answer: B — Placing a heat shield between the light source and the bottle

Revision Tips

- Validity: only the independent variable (wavelength) should change.
- Reliability: achieved by repetition and averaging results.
- Accuracy: improved by using precise instruments such as colorimeters.
- Photosynthesis variables: light intensity, temperature, and carbon dioxide concentration must all be controlled.