Edexcel Biology GCSE

CP 06: Photosynthesis

Practical notes

Photosynthesis

Aim

Investigate the effect of light intensity on the rate of photosynthesis using an aquatic organism such as pondweed, measured by observing the degree of colour change in the bicarbonate indicator solution, which changes colour with increasing concentrations of CO_2.

Equipment

- a boiling tube
- algal beads (algae immobilised in sodium alginate)
- a light source
- a ruler
- a test tube rack
- a stopwatch
- a glass rod
- measuring cylinder
- bicarbonate indicator solution
- bicarbonate indicator colour standard chart

Method[1]

1. Place a test tube rack containing a boiling tube 10 cm away from the light source, measured using the ruler.
2. Place the algal beads into the boiling tube.
3. Fill the boiling tube with a fixed volume of bicarbonate indicator.
4. Record the initial colour and pH (using the colour standard) of the solution and start timing.
5. After 30 minutes, record the final colour and pH (using the colour standard) of the solution.
6. Repeat steps 1-5 for 3 more distances (20, 30, 40 cm) of the boiling tube from the light source.
7. Plot a graph of the rate of photosynthesis (given by the no. of bubbles) against light intensity (using the inverse square law, light intensity = 1/distance^2).

Distance between pondweed and light source in cm	Colour	pH

Controlled variables

- Temperature (a water bath can be used to better control this variable)
- Amount of carbon dioxide available at the start
- Volume of indicator solution

Sources of error

[1] saps.org.uk

Temperature may also be a factor affecting the rate of photosynthesis.
The colour of the solution may be difficult to judge and match to the colour standard chart in order to determine the pH.

Potential Hazards

Be careful with boiling water.
There is a potential allergy risk from the algae.
Lamp may get hot.
Be careful to keep water away from electrical power outlets and wiring.