

Edexcel B Biology A-Level

Core Practical 10

Investigate the effects of different wavelengths of light on the rate of photosynthesis





Chloroplasts contain different **photosynthetic pigments** (e.g. chlorophyll alpha, chlorophyll beta, carotene etc.) which absorb **different wavelengths of light**. This means that more light can be absorbed in total, and so **increases rate of photosynthesis**. Light which is not absorbed will be reflected. Filters will block out certain wavelengths (and therefore colours) of light from reaching the chloroplast, which will affect rate of photosynthesis. Rate of photosynthesis can be measured by measuring **volume of gas produced** (this gas is assumed to be oxygen; carbon dioxide from respiration is ignored).

Equipment

- Pondweed
- Beaker
- Sodium hydrogencarbonate
- Aluminum foil
- Spatula
- Light filters (pieces of coloured cellophane)
- Photosynthometer
- Paperclip
- Bench lamp
- Ruler
- Thermometer
- Stop clock

Method

1. Place a piece of **pondweed** in a beaker of water.
2. Cover one side of the beaker with the aluminium foil to **block out the light**.
3. Cover the other side of the beaker with one of the **light filters**.
4. Add half a spatula of sodium hydrogencarbonate to the water to **provide carbon dioxide**.
5. Leave for 5 minutes.
6. Place the bench lamp a set distance from the beaker.
7. Set up the **photosynthometer**. Leave for five minutes.
8. Record the **volume of gas produced** during this time.
9. Replace the filter with another colour of filter and repeat the experiment.





Risk Assessment

Hazard	Risk	Safety Precaution	In emergency	Risk Level
Biohazard	Contamination	Use disinfectant; wash hands with soap after handling.	Seek assistance	Low
Lamps	Temporary damage to eyes	Do not look directly at lamp	Wait for afterimage to disappear; seek appropriate assistance if needed	Low
Sodium hydrogen carbonate	Low hazard, avoid inhalation/contact with eyes	Wear eye protection; avoid contact with skin	Seek medical attention if necessary; flood eye/cuts with cold water	Low

Graph

- Plot a bar graph of **colour of filter** against **volume of gas produced**.

Conclusion

- Volume of gas produced is **proportional** to rate of photosynthesis.
- The greatest volume of gas will be produced when there is **no filter used**, because **all wavelengths of light can be absorbed**.
- All filters will decrease volume of gas, but a **green filter will decrease it the most** because chloroplasts don't absorb much green light - it is mostly reflected, which is why chloroplasts appear to be green.

