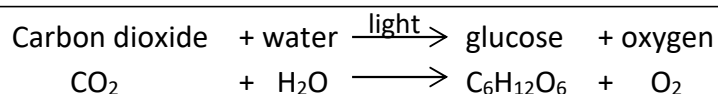


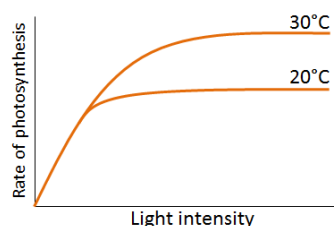
Photosynthesis



Uses of Glucose

- **respiration:** to transfer energy from glucose
- making **cellulose:** to make strong cell walls
- making **amino acids:** glucose is combined with nitrate ions to make amino acids which are the building blocks of proteins
- **stored as oil or fat:** glucose is converted into lipids and stored in seeds
- **stored as starch:** stored in roots, stems and leaves as an energy source when the rate of photosynthesis is slow. Storing glucose would cause the cell to absorb water and swell up. Starch is insoluble so does not cause this problem.

Interpreting Limiting Factor Graphs



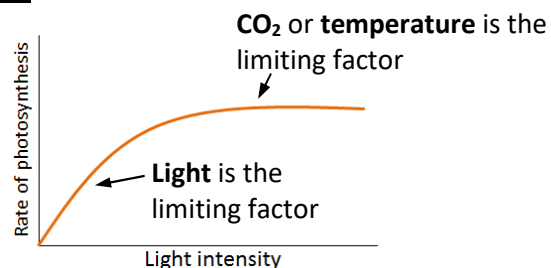
Initially the rate of photosynthesis increases for both lines as light intensity increases (light is the limiting factor).

Once light stops becoming the limiting factor: the lower temperature levels off sooner showing that 30°C produces a higher rate of photosynthesis. This means that temperature is a limiting factor at 20°C.

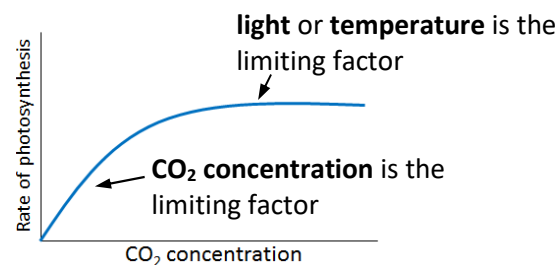
Limiting Factors

These three factors can prevent the rate of photosynthesis happening faster:

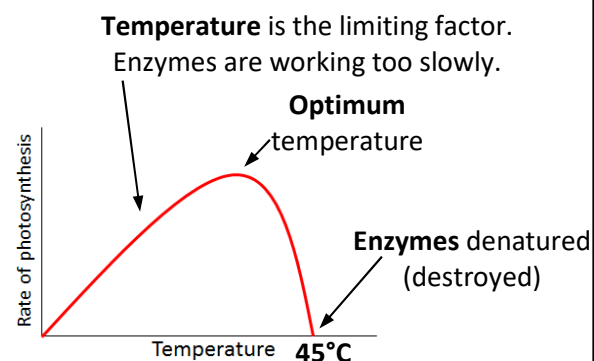
Light



Carbon dioxide



Temperature



Artificially Controlling Photosynthesis

Greenhouses can be used to provide ideal growing conditions for plants.

They trap the Sun's **heat**. In winter a heater can be used.

Artificial **lighting** can be used at night to increase the amount of time plants can photosynthesis for.

CO₂ levels can be increased with a **paraffin heater**. CO₂ is a product of the combustion of paraffin.

An enclosed greenhouse helps to limit **pests** and **disease** outbreaks. **Fertilisers** can be applied to provide the necessary minerals.

Controlling these conditions **costs money**. It is important the farmer provides the right amount of each to maximise the rate of photosynthesis (and therefore growth) without wasting money.

Measuring Photosynthesis

REQUIRED PRACTICAL
SEE PRACTICAL SHEET FOR DETAIL

Oxygen production is a measure of the rate of photosynthesis. Pond weed can be used to investigate the effect of light, temp. and CO₂ on the rate of photosynthesis.