

# STRUCTURE OF LEAF PHOTOSYNTHESIS

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3<sup>rd</sup> form

Introduction:

**Autotrophs**

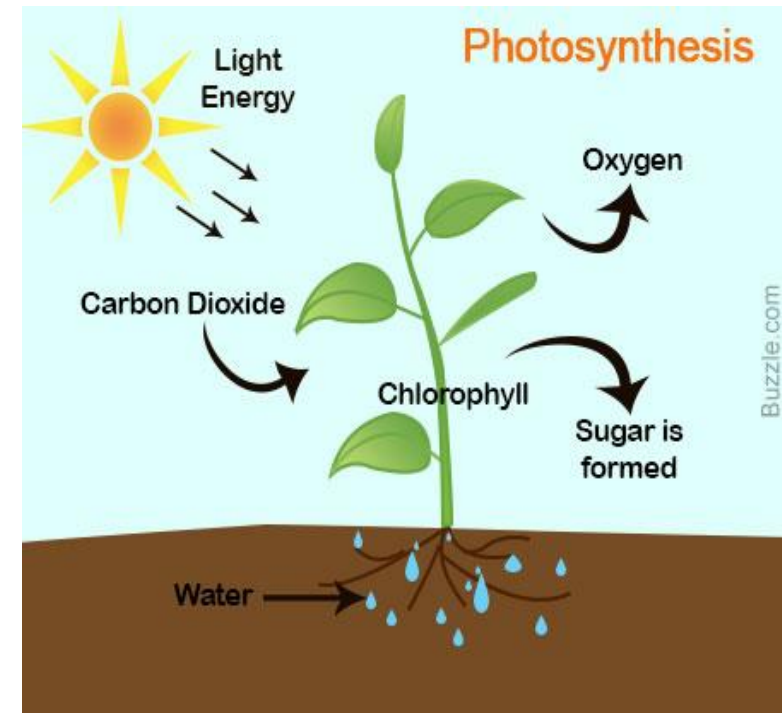
**Heterotrophs**

Explore:



# Explain:

- What is photosynthesis?
- What is the equation?
- Give one organic substance and two examples of inorganic molecules in photosynthesis?



Elaborate:

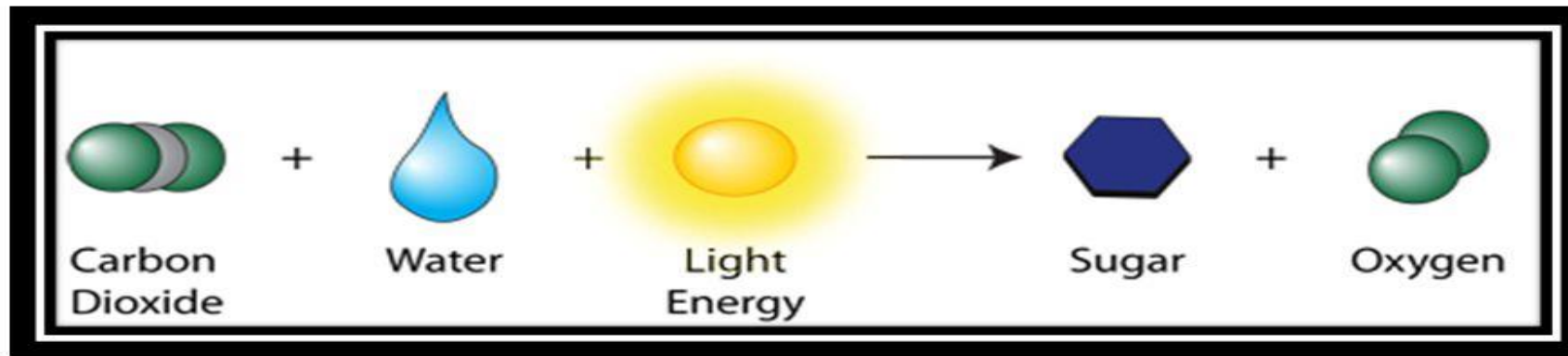
## Photosynthesis Equation

**REACTANTS**

**PRODUCTS**

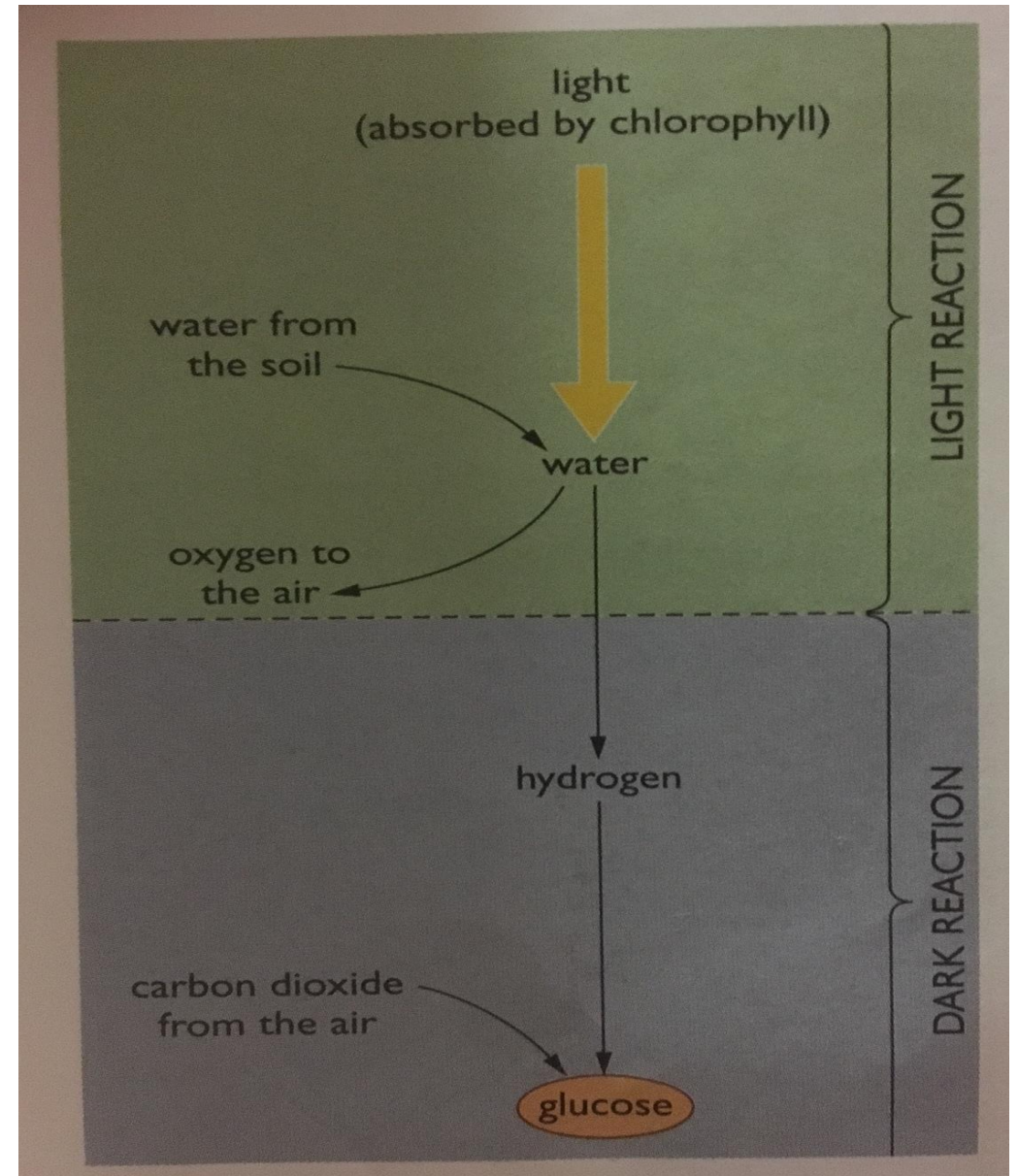


carbon dioxide + water + energy  $\rightarrow$  glucose + oxygen



# Stages of photosynthesis

- Light reaction stage: light energy absorbed by the chlorophyll is used to split water molecules into hydrogen and oxygen. (oxygen give off as gas).
- Dark reaction stage: the hydrogen from the water used to to reduce the carbon dioxide to glucose.
- Carbon dioxide joins the hydrogen which is fixed or converted into an organic compound (glucose)



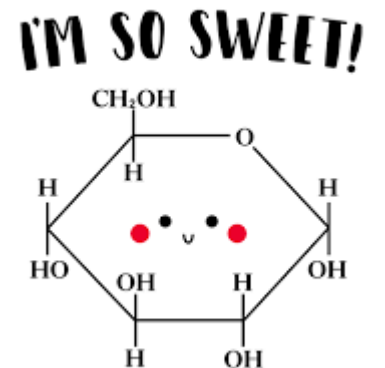
# Closure:

- Write a word equation and a balanced symbol equation for photosynthesis?
- What is chlorophyll and what is its function?
- Explain what happens in the light and dark reactions of photosynthesis?

# The fate of glucose

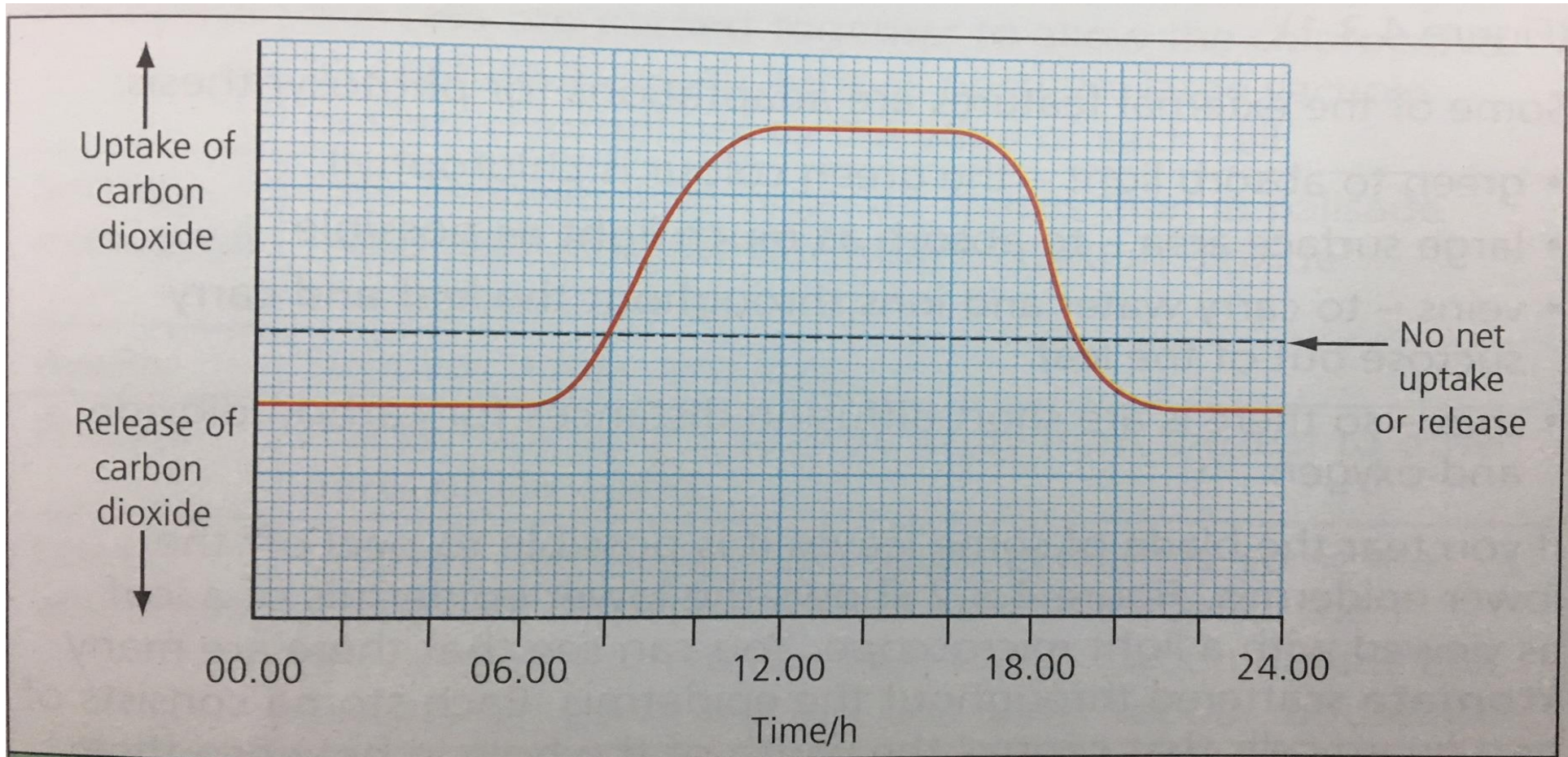
The plants use the glucose they produce to make:

- Sucrose- this is transported around the plant in the phloem. It is used in nectar and fleshy fruits to attract animals for pollination and seed dispersal.
- Starch in storage organs, such as seeds, swollen roots (e.g yams), swollen stems (e.g Irish potatoes) as a long-term energy store.
- Starch in leaves to store energy for use in respiration at night.
- Cellulose to make cell walls, also used to make fibres in cotton bolls to help seeds disperse in the wind.
- Lipids to make cell membranes and for energy storage. E.g in seeds





# Gas exchange in plants.

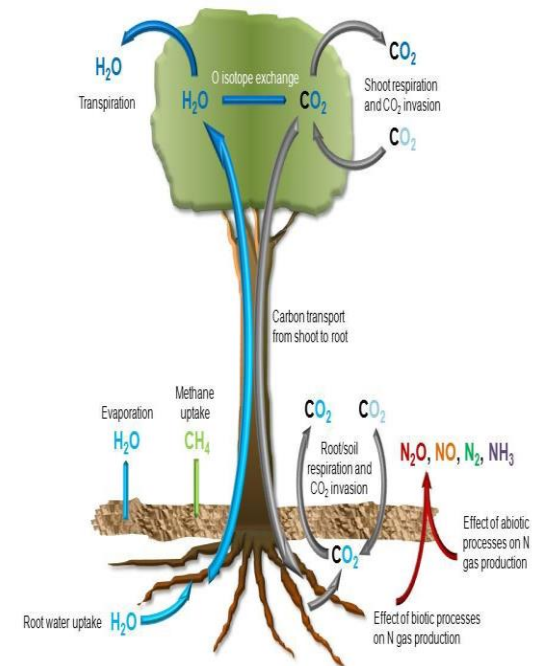


**Figure 4.2.2**

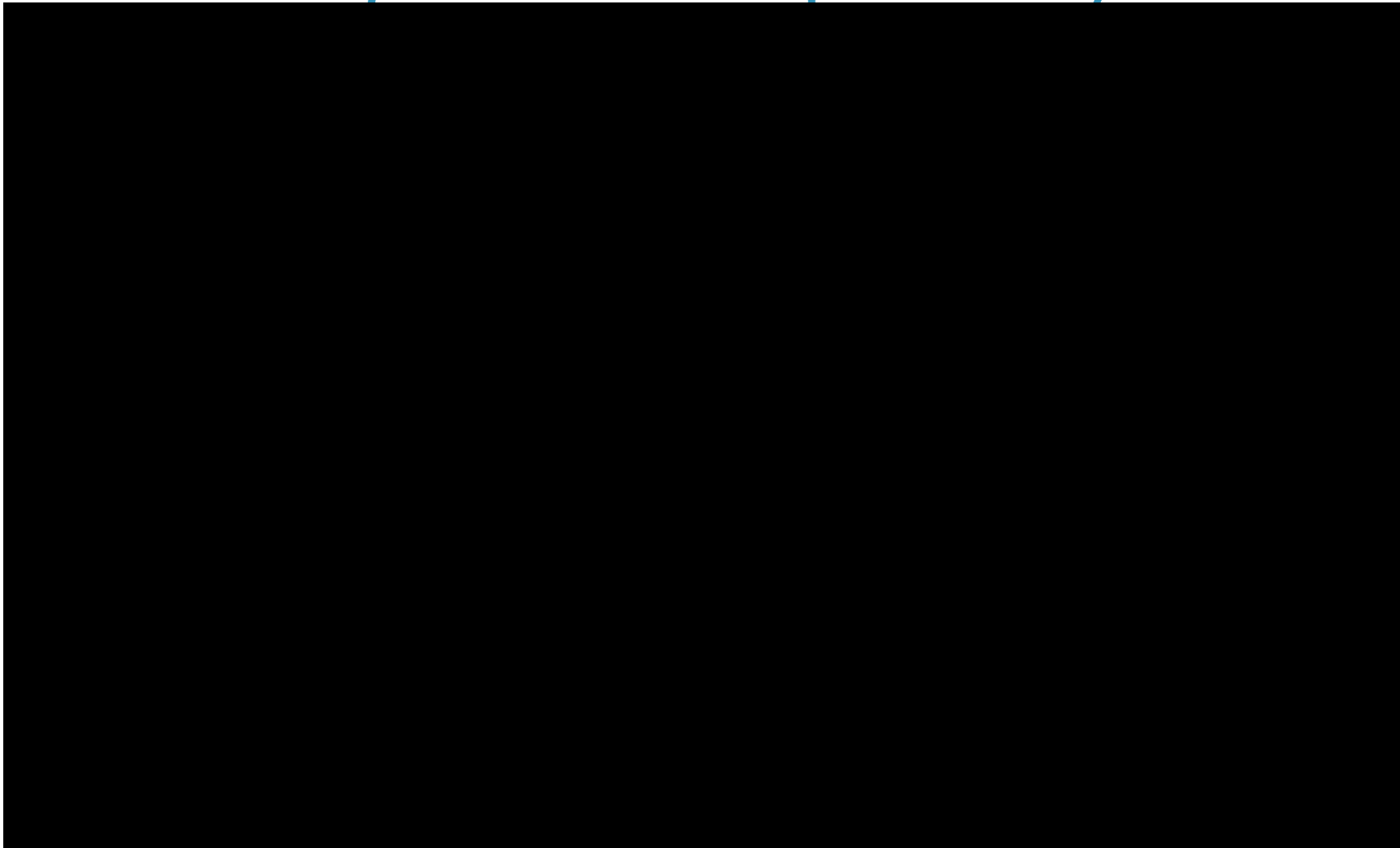
The uptake and release of carbon dioxide from a plant during 24 hours on a very bright sunny day.

# Gas exchange:

- Plants use the oxygen they make for their own aerobic respiration. BUT
- They cannot use all of it and much diffuses out of leaves .
- During the day carbon dioxide diffuses into leaves through stomata and oxygen diffuses out.
- At night, photosynthesis cannot occur as there is not light.
- Most stomata tend to close at night to conserve water but some remain partially open to allow some oxygen to diffuse into leaves and some carbon dioxide diffuses out.
- Carbon dioxide is absorbed during the day.



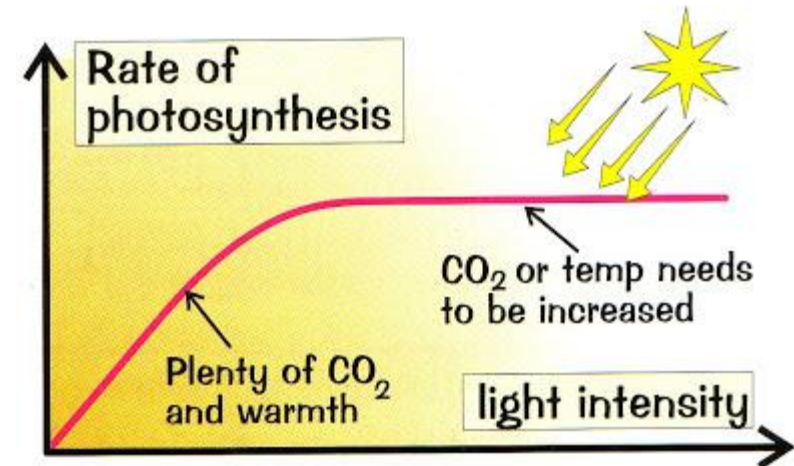
# Testing leaves for photosynthesis



IF the leaf goes blue-black Starch is present. If it stays a light yellow-brown colour there is no starch. If you test a leaf from a plant that has been in a dark place for about a week you will find it has no starch in it. All of the starch has been converted to sugars and used in respiration. The plants is destarched. Plants that have been destarched are used to show that light is necessary for photosynthesis.

# How much photosynthesis?

- Light intensity: by putting a lamp at different distances from the plant.
- Temperature- by putting the plant in beakers of water at different temperatures.
- Carbon dioxide concentration- by adding different quantities of sodium hydrogen carbonate (  $\text{NaHCO}_3$  ) to the water.



# Water weed

- You can measure the rate of photosynthesis of a plant by measuring how quickly it produces oxygen.
- With a land plant, this is difficult because the oxygen is released into the air, but with an aquatic plant bubbles of oxygen are released into the water around the plant.
- If you count the bubbles formed per minute, this is measure of the rate of photosynthesis of the plant.
- Closer the lamp the greater the rate of photosynthesis. ( until it remains constant)

