

PHOTOSYNTHESIS

Green plants are [producers](#). This means that they can survive without animals! They can make lots of organic chemicals from a few simple inorganic chemicals. They need simple things like carbon dioxide and water and can make complex things like sugar, starch, fat, and proteins.

Plants get their nutrients from the environment. Carbon dioxide comes from the air (unless they are aquatic plants, in which case they get it from the water surrounding them). They get water from the soil. They also need other inorganic nutrients like nitrate, sulphate and phosphate. A few plants cannot get nitrate out of the soil so they have to eat animals to get the nitrogen which they must have for growth.

Animals are [consumers](#); they cannot carry out photosynthesis. This means that they have to eat other things to get the carbohydrates, fats, proteins, vitamins and minerals which they need.

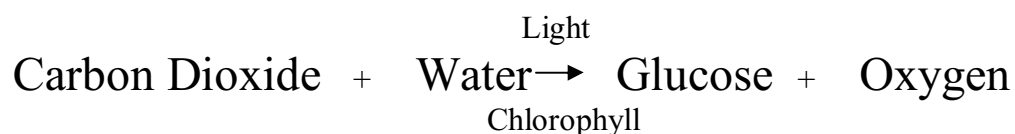
When plants are in the sunlight they can make a sugar called glucose. This is slightly different from the sugar (sucrose) which you put into your tea. Glucose contains three chemical elements:

- Carbon
- Hydrogen
- Oxygen

All the carbon needed for photosynthesis comes from carbon dioxide.

All the hydrogen comes from water.

When plants use carbon dioxide and water to make glucose there is a lot of oxygen left over. Here is a word equation:



Carbon dioxide and water are inorganic chemicals, whereas glucose is an organic chemical. Plants need energy to convert carbon dioxide and water into glucose; this energy comes from sunlight. Plants can also use artificial light providing that it contains the right frequencies ([colours](#)). Light energy is trapped by a green chemical called chlorophyll. In photosynthesis, light energy is converted into chemical energy. When animals and plants respire, the chemical energy in glucose can be converted into other forms of [energy](#) e.g. kinetic energy.

Plants can make enough glucose on a sunny day to last them through the night and through lots of cloudy dark days, but they cannot store up lots of glucose. What they do is convert the extra glucose into starch. When they need to use the energy, they can turn the starch back into glucose. Starch can be stored in leaves or other parts of the plant. they can turn glucose into sucrose: this is a sugar carried around the plant in special tubes called phloem.

Photosynthesis results in an increase in [biomass](#); i.e. there is more carbohydrate in the plant. They can turn some of the glucose into fat or protein. They have to make lots of different chemicals to grow, but the two most important ones are fats and proteins. To do this they need energy (growth requires energy from glucose). Plants also have to make a very special chemical called DNA: this is the hereditary chemical of all animals and plants. They must also make lots of new chlorophyll.

Like carbohydrates, fats also contain three elements:

- Carbon
- Hydrogen
- Oxygen

Proteins contain four or five elements:

- Carbon
- Hydrogen
- Oxygen
- Nitrogen
- Sulphur

Plants cannot make protein from pure carbohydrate, because proteins contain nitrogen and sometimes sulphur. They get the nitrogen which they need from the nitrates in the soil. They get the sulphur from sulphates in the soil.

DNA contains five elements:

- Carbon
- Hydrogen
- Oxygen
- Nitrogen
- Phosphorus

Plants need phosphate from the soil to make their DNA.

Chlorophyll contains five elements:

- Carbon

- Hydrogen
- Oxygen
- Nitrogen
- Magnesium

So you can see that they must also extract magnesium from the soil if they are going to grow properly.

Nitrate, sulphate, phosphate and magnesium are called mineral salts.

Here is a summary of the most important information on photosynthesis:

Photosynthesis requires:

- carbon dioxide,
- water,
- light energy,
- chlorophyll.

Photosynthesis produces:

- glucose,
- waste oxygen.

Photosynthesis is the conversion of:

- light energy into,
- chemical energy.

Photosynthesis is essential for:

- growth.

Photosynthesis takes place in:

- leaves !!!!!

Photosynthesis is the conversion of carbon dioxide and water into a sugar called glucose using sunlight energy. Oxygen is produced as a waste product.

Chlorophyll is the green chemical needed by plants for this process.