Seaweed Photosynthesis Experiment

Seaweed and other algae make over 70% of the world's oxygen through photosynthesis. Just like on land, photosynthesis in the ocean needs water, sunlight (energy) and carbon dioxide (which is taken from seawater). This experiment shows photosynthesis in action! Start simple, and then try comparing different species and conditions.

You will need:

a) *Collection buckets (for seaweed)*
b) *Bottle, small bucket (for clean seawater)*
c) *Seaweed*
d) *Glass jar/container*
e) *Clear funnel (that fits inside the jar)*
f) *A clear test-tube, measuring cylinder or small jar that can sit over the top of the funnel (it's important that light can get through each of these)*
g) *A sunny day or strong lights*

Note: If you don't have lab equipment you can also see seaweed making oxygen through photosynthesis by putting it into a sealed glass jar (see below).

Optional additional equipment:
Thermometer
pH meter
Weighing scale
Ruler

Method

1. Collect small amounts of different seaweed species from your beach. Green sea lettuce (rimu kaikai) is a great one to start with. Check out our **Love Rimurimu Seaweed Identification Guide.**

2. *Follow good practice guidelines (see our **Seaweed Harvesting and Storage Methods**)*
   - Stick to fresh beach-cast seaweeds (the stuff washed up).
   - Make sure you are gathering seaweed from a non-protected area.
   - Spread out your gathering, even the beach cast seaweeds are an important part of the ecosystem.

These resources have been developed by the Mountains To Sea Wellington Trust to support delivery of the Love Rimurimu education programme.

3. Before you leave the coast, rinse seaweeds with clean seawater to remove any dirt or creatures. Animals want to stay where they are, not become your lab partner!

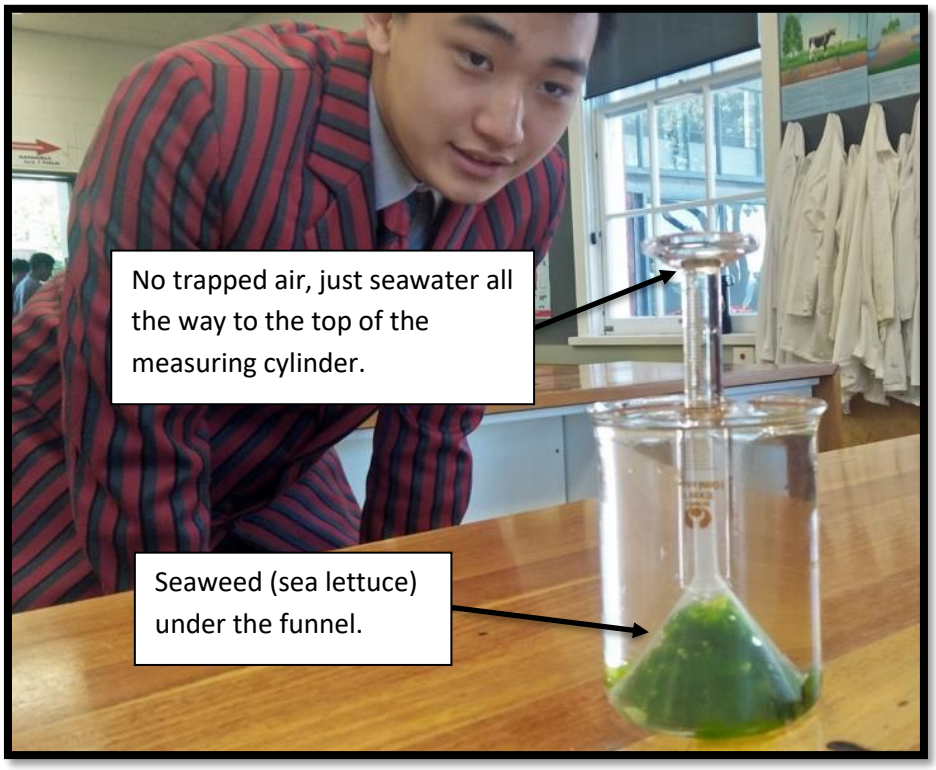
4. Keep seaweed in clean seawater until it's ready to use -same day is best before it starts to break down.

5. Fill your spare container/bottle with clean seawater with NO seaweed inside it. You'll need this for the experiment.

When back in class

1. *Place some of the seaweed into the beaker or jar*
2. *Fill with fresh seawater from your container (with no seaweed)*
3. *Put a funnel upside down over the top of it (this makes a spout for the oxygen produced by photosynthesis to go up!)*
4. *Place a clear test tube or measuring cylinder over the top of the funnel. Make sure there is no trapped air inside. (This can be tricky. You can fill it up first with seawater, put your thumb over the end to stop it escaping, and then hold it underwater until it's in place. If you have a big enough bucket you can fill everything underwater, then put all the pieces together underwater as well to make sure there is no trapped air)*

Once set up it should look this:



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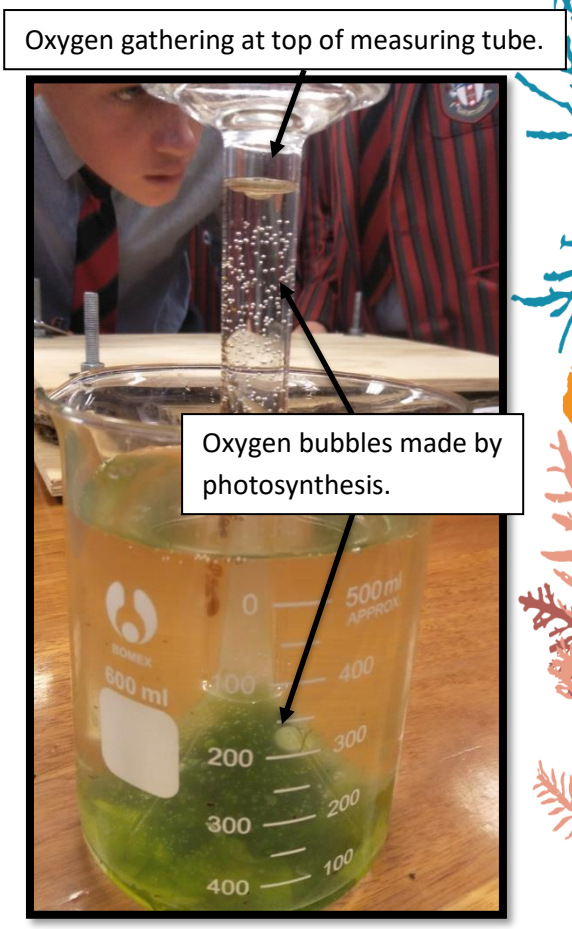
5. *Place it in the sun or under strong lights.*
6. *Leave for 30 mins or longer (if it's working you'll see bubbles start to form on the inside of the funnel)*
7. *Check on it and see if oxygen has started to gather in the top. You'll see the water getting pushed out if it is, and replaced by a gas.*
8. *Once the tube has filled up a bit you can text if it's pure oxygen by using the gas to light a match (be safe!). If it's oxygen it will burn strongly. If it's carbon dioxide it'll go out.*



EXTEND YOURSELF

You can measure different factors or conditions to see which species produce the most oxygen. Set up an experiment by measuring the impact of any changes you make to the original conditions.

To measure how much oxygen is being produced in different conditions, only change one thing at a time. Weigh seaweed where possible and record everything you can; time left, temperature, etc.

Some examples of things you could measure or test:

- *How long you leave the seaweed in the sun for*
- *Trying out different species and seeing which produce more/less (use a measuring cylinder if you're doing that)*
- *Weighing samples to compare if more seaweed produces more oxygen in the same time*
- *Increasing/reducing how much light the seaweed gets e.g. shade vs sunlight*
- *Adding sediment/dirt to the water to reduce light and simulate the impact of sediment on seaweeds*
- *Try different temperatures of water*
- *Compare freshwater to your saltwater photosynthesis rates*

Don't have all the fancy equipment? You can also see seaweed making oxygen by putting it into a sealed glass jar, filling it with seaweed and then flipping it over. Leave it in the sun for a while and you'll see bubbles form too!

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