

Amazing Algae

Activity Sheet

1. Identifying Algae with a Dichotomous Key

Instructions

- Open or Download the 'Algae Identification Dichotomous Key Slideshow'.
- Work your way through each step until you identify the algae in each image.

Note

A rough scale bar has been included on each image to give an indication of the algae's size.

The unit μm represents micrometre (or micron) - $1 \mu\text{m} = 0.001 \text{ mm}$

The abbreviation sp. is used when the exact species is unknown. In this exercise you'll mostly be identifying the algae to Genus level. Genus is the classification before species - i.e 'Homo' in *Homo sapiens*.

Dichotomous Key

1. Size:

- | | |
|--------------------------------------|---------|
| (a) Large (visible to the naked eye) | Go to 2 |
| (b) Microscopic | Go to 4 |

2. Cell Number:

- | | |
|--|---------------------------|
| (a) Multi-celled (many cells, many different structures) | Go to 3 |
| (b) Single-celled, one structure | <i>Valonia ventricosa</i> |

3. Branching:

- | | |
|----------------------------------|-------------------------|
| (a) Fine, feather-like branching | <i>Asparagopsis sp.</i> |
| (b) Thick, ribbon-like blades | <i>Macrocystis sp.</i> |

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4. Cell Shape:

- (a) Circular Go to 5
- (b) Rectangular with curved spines *Chaetoceros sp.*
- (c) Long and narrow Go to 5

5. Grouping:

- (a) Free-living (singular) *Arachnoidiscus sp.*
- (b) Colonial (attached together) Go to 6

6. Colour

- (a) Green *Nostoc sp.*
- (b) Brown Go to 7

7. Colony Shape

- (a) Star *Thalassionema sp.*
- (b) Fan *Licmophora sp.*

Write your answers here:

Algae A _____ Algae E _____

Algae B _____ Algae F _____

Algae C _____ Algae G _____

Algae D _____ Algae H _____

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2. Exploring the Photosynthesis Equation

- **Open or download the 'Exploring Photosynthesis Powerpoint' to learn about chemical reactions and complete the activities below:**

Let's explore the chemical transformations that occur in photosynthesis

1. Write out the chemical formulas for:

- (a) Carbon dioxide -
- (b) Water -
- (c) Oxygen -
- (c) Glucose -

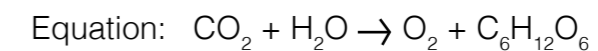
2. Write out the photosynthesis equation, and identify the reactants and the products

- (a) Word equation
- (b) Chemical equation

3. Now to balance the equation:

In chemical reactions, the number of atoms in the reactants must equal the number of atoms in the products - so we need to balance equations.

- (a) For each element present in this reaction - H, C, O - Start by tallying how many atoms of each there are on the 'reactants' and 'products' side of the equation.



Number of atoms:

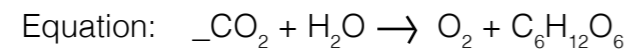
	C	H	O
CO ₂			
H ₂ O			
TOTAL			
O ₂			
C ₆ H ₁₂ O ₆			
TOTAL			

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(b) Now that you know how many atoms you are starting with, it's time to balance the equation. Start by balancing Carbon.

What number do you need to place in front of CO_2 to balance the 'C' atoms in $\text{C}_6\text{H}_{12}\text{O}_6$?



How many hydrogen (H), Carbon (C) and Oxygen (O) atoms are there now on the products and reactants side?

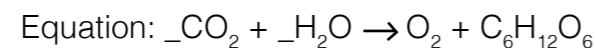
Hint: Remember that subscripts act as a multiplier (e.g '2' in CO_2 means there are 2 oxygen atoms present)

Number of atoms:

	C	H	O
$_ \text{CO}_2$			
H_2O			
TOTAL			

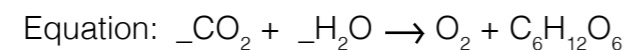
	C	H	O
O_2			
$\text{C}_6\text{H}_{12}\text{O}_6$			
TOTAL			

(c) Now that our Carbon is balanced, let's balance Hydrogen - What number do you need to place in front of H_2O to balance the 'H' atoms in $\text{C}_6\text{H}_{12}\text{O}_6$?



Hint: Remember that numbers in front of a formula multiply the number of atoms in each element.

How many hydrogen (H), Carbon (C) and Oxygen (O) atoms are there now on the products and reactants side?



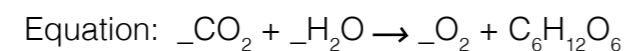
Number of atoms:

	C	H	O
$_ \text{CO}_2$			
$_ \text{H}_2\text{O}$			
TOTAL			

	C	H	O
O_2			
$\text{C}_6\text{H}_{12}\text{O}_6$			
TOTAL			

(d) Now our hydrogen and carbon is balanced, we can finally balance oxygen.

What number do you need to place in front of O_2 to balance the total 'O' atoms in the equation?



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How many hydrogen (H), Carbon (C) and Oxygen (O) atoms are there now on the products and reactants side?

Number of atoms:

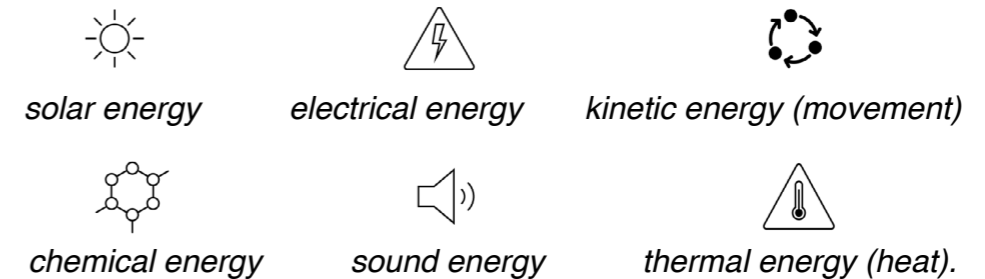
	C	H	O
$_ \text{CO}_2$			
$_ \text{H}_2\text{O}$			
TOTAL			

	C	H	O
$_ \text{O}_2$			
$\text{C}_6\text{H}_{12}\text{O}_6$			
TOTAL			

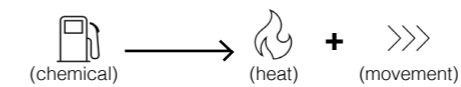
If the number of each atom is the same on both sides of the equation - it is balanced!

3. Understanding Energy Transformations

Energy is all around us in many different forms including:



In many chemical and physical reactions, energy is transformed from one form to another. For example, a car transforms the chemical energy in fuel into heat energy during combustion, and kinetic energy (movement).



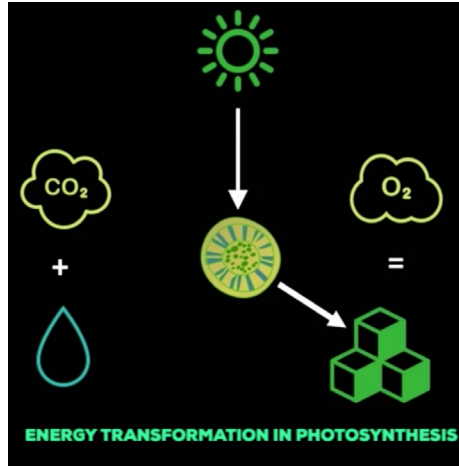
Energy transformations are constantly occurring in nature through the foodchain. What makes algae such a sustainable resource is that it derives its energy from the sun. This energy stored in algae cells can then be harnessed for a variety of different uses.

Read more about energy [here](#), and complete the energy transformation exercises on the following page.

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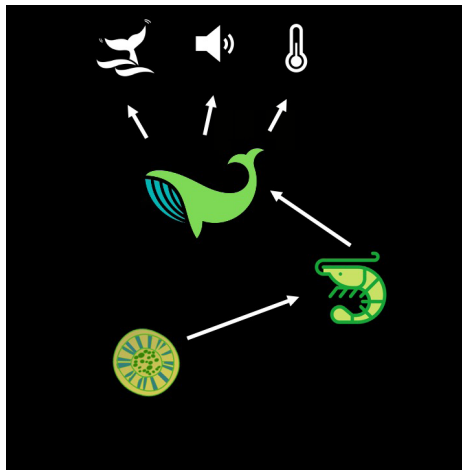
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1. What energy transformation is occurring when algae or plants photosynthesise?



_____ → _____

2. What energy transformation is occurring when food is consumed up the food chain? For example, when an animal eats a plant?



_____ → _____ + _____ + _____

3. Consider that fossil fuels are the ancient remains of plants and algae. If you think about the energy flows we have explored here, what energy type is in fossil fuels? What was the original source of this energy?

Energy Type: _____

Origin: _____