

# 7.2.2 How materials are cycled

## AQA GCSE Biology (Higher) Question and answer notes

For more resources, visit [www.mooramo.com](http://www.mooramo.com)

### How to use these notes

These notes cover everything you need to know for this part of the specification. They have been written in question-answer format to make them easier for you to study from.

In order to study successfully, I recommend you do the following for each question and answer:

- Read it carefully and make sure you **understand** it.
- **Memorise** the answer.
- **Practice** applying your understanding to past exam questions.

A good way to memorise information is to use **retrieval practice**. This is when you practise retrieving information from your memory. You could do this by making a flashcard for each question with the question on one side and the answer on the other. Or you could use a flashcard app. Alternatively, use a sheet of paper to cover up the answer so you can only see the question. Try to answer the question and then check how you did.

You should practise retrieving each answer from your memory until you can do it perfectly. Even once you can retrieve the answer perfectly, your ability to retrieve it will probably fade as time passes without practising. Therefore you will need to keep going back to the questions that you have previously mastered and practising them again. However, each time you re-learn the answer, the memory will be stronger and will last longer than the time before.

### **What is a material cycle? Give two examples.**

A material cycle is a set of processes through which a material moves between living things and their physical environment. Examples of material cycles include the water cycle and the carbon cycle.

### **Why are the water cycle and the carbon cycle important to living organisms?**

The water cycle and the carbon cycle are important because they allow water molecules and carbon atoms to be reused. Living organisms are constantly taking up water molecules and carbon atoms from their surroundings. The water cycle and carbon cycle ensure that these materials are returned to the physical environment so that they can then be used by other organisms.

### **Why are microorganisms important in material cycles?**

Microorganisms are important in material cycles because they break down dead organisms and waste material. This is called decomposition. Through this process, useful materials are returned to the physical environment. For example, carbon is returned to the atmosphere as in the form of carbon dioxide molecules, and mineral ions are returned to the soil.

### **What are the main places that water molecules can be found as they move through the water cycle?**

The main places that water molecules can be found as they move through the water cycle are:

- In oceans, lakes, rivers, puddles and other bodies of water.
- In the clouds.
- In precipitation (rain, snow, hail).
- In the ground (e.g. water in soil).
- In living organisms.

### **What are the main processes by which water molecules move between one location and another in the water cycle?**

The main processes by which water molecules move between one location and another in the water cycle are:

- Evaporation. This is when the sun's heat causes liquid water in oceans, rivers, lakes, puddles, etc. to turn into water vapour which then rises up through the air and forms clouds.
- Transpiration. This is the evaporation of water from plants (through the stomata).
- Precipitation. This is when water vapour in clouds becomes liquid (rain) or solid (snow or hail) and falls to the ground.
- Uptake of water by living organisms. This includes plants absorbing water from the soil through their roots and animals drinking.
- Percolation. This is when water trickles through gaps in soils and rocks and makes its way to rivers, lakes, oceans etc.
- Rivers flowing into ocean/lakes. Rivers generally flow into large bodies of water such as oceans and lakes.
- Surface run-off of water. This is when water on the ground runs into a body of water such as a lake or ocean.

### **What are the main places that carbon atoms can be found as they move through the carbon cycle?**

The main places that carbon atoms can be found as they move through the carbon cycle are:

- In biological molecules (carbohydrates, lipids, proteins, DNA, etc.) in living organisms.
- In biological molecules in dead organisms.
- In biological molecules in waste produced by living organisms (e.g. fallen leaves, faeces, urine).
- In carbon dioxide molecules in the air.
- In carbon dioxide molecules dissolved in oceans, lakes, rivers, etc.
- In hydrocarbon molecules in fossil fuels (coal, oil and natural gas).

### **What are the main processes by which carbon atoms move between one location and another in the carbon cycle?**

The main processes by which carbon atoms move between one location and another in the carbon cycle are:

- Photosynthesis
- Respiration
- Feeding
- Death
- Decomposition
- Combustion (burning)

### **What is the role of photosynthesis in the carbon cycle?**

Photosynthetic organisms take in carbon dioxide from the air or water around them and use it in photosynthesis to make glucose. The carbon atoms are now in the glucose molecules, which can then be used to make other biological molecules.

### **What is the role of respiration in the carbon cycle?**

When living organisms respire, glucose is broken down to form carbon dioxide. The carbon atoms that were in glucose are now in carbon dioxide molecules, which are released to the surrounding air or water.

### **What is the role of feeding in the carbon cycle?**

When one organism eats another, carbon atoms in biological molecules are transferred from the organism that is eaten to the organism that is eating it.

**What is the role of death in the carbon cycle?**

When living organisms die, their carbon atoms are now in a dead organism rather than a living one. The dead organisms may then decompose which results in their carbon atoms becoming part of carbon dioxide molecules in the air or water.

**What is the role of decomposition in the carbon cycle?**

Dead organisms and waste material are broken down by organisms called decomposers (e.g. bacteria, fungi, worms). The decomposers take in biological molecules from the dead/waste matter and then carry out respiration, forming carbon dioxide. This overall process means that the carbon atoms that were in biological molecules in the dead/waste material are now in carbon dioxide molecules in the surrounding air or water.

**What is the role of combustion (burning) in the carbon cycle?**

When substances containing carbon, such as fossil fuels, or wood, or dead organisms, are burnt, their carbon atoms are oxidised to form carbon dioxide, which is released into the air.