

MINISTRY OF EDUCATION
SECONDARY ENGAGEMENT PROGRAMME
GRADE 8
INTEGRATED SCIENCE

Week 8

Lesson 1

Topic: Respiration

Sub-topic: Types of Respiration

Objectives: After reading the handout, students will:

- describe the importance of respiration to living organisms.
- state the similarities and differences between aerobic and anaerobic respiration.
- differentiate between respiratory reactants and products correctly.

Content

Respiration

Respiration is the process by which living cells oxidize food or burn food and release energy, at the same time giving off carbon dioxide.

Respiration is the process whereby potential energy, stored in food is released in steps as energy to do work. Respiration takes place in every cell of every organism, and the energy in food is released with the help of enzymes- special chemicals that speed up reactions.

Respiratory enzymes control the rate of the release of energy from the food. The enzymes ensure that the reactions occur at body temperature which is much lower than temperatures at which fuel burns. The 'burning process' or oxidation of food to release energy, usually needs oxygen which is in the air organism breathe in.

There are two (2) types of Respiration

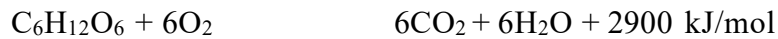
1. Aerobic Respiration
2. Anaerobic Respiration.

Aerobic Respiration

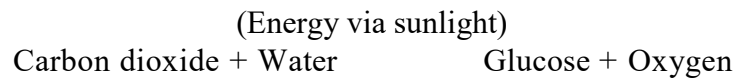
Aerobic means “with air”. This type of respiration needs oxygen for it to occur so it is called aerobic respiration. The word equation for aerobic respiration is:

Glucose + Oxygen Carbon dioxide + Water + Energy

The chemical equation is:



Aerobic respiration occurs in plants as well as animals. Oxygen enters plant cells through the stomata. Plants produce their food via photosynthesis and release energy from it through the process of respiration. Below is a reminder of what the equation for photosynthesis is:

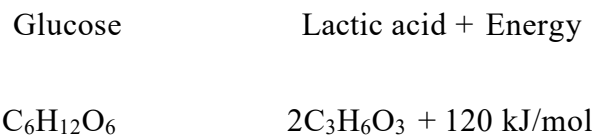


Anaerobic Respiration

Anaerobic means without air (“an” means without). Sometimes there is not enough oxygen around for animals and plants to respire, but they still need the energy to survive. Instead, they carry out respiration in the absence of oxygen to produce the energy they require. This is called anaerobic respiration.

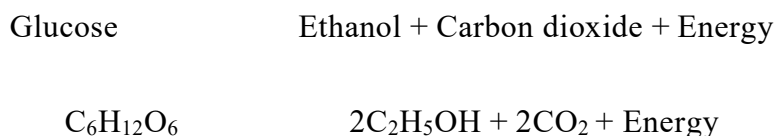
a) **In animals**-Our muscles need oxygen and glucose to respire aerobically and produce the energy they require; these are carried to the muscle via the blood. However, if we were to carry out vigorous exercise our heart and lungs would not be able to get sufficient oxygen to our muscles for them to respire. In this case, muscles carry out anaerobic respiration.

The word and chemical equation for anaerobic respiration is:



b) In Plants

The oxygen supply to plants can also run out, this happens for example if the soil gets waterlogged. In this case, they have to obtain their energy via anaerobic respiration. Below is the word and chemical equation for anaerobic respiration in plants:

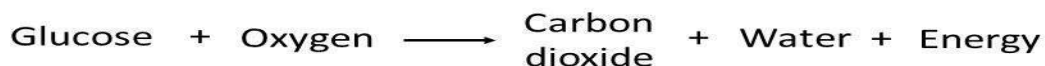


Differences between aerobic and anaerobic respiration

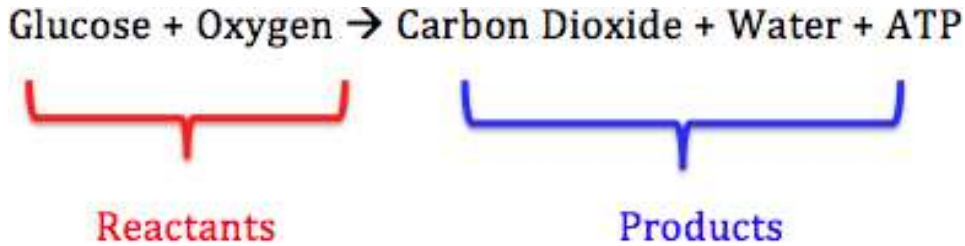
Aerobic	Anaerobic
Oxygen necessary	Oxygen not necessary
Occurs in mitochondria	Occurs in cytoplasm
Large amt of ATP made	Small amt of ATP made
Total breakdown of glucose	Partial breakdown of glucose
End products; carbon dioxide and water	End products; carbon dioxide and lactic acid or alcohol

Tissue Respiration

- Tissue respiration is the process by which **food substances** are broken down in living cells.
- A **large amount of energy** is **released** for the cells to perform different activities.
- In tissue respiration, **glucose combines with oxygen to release energy, carbon dioxide and water.**



Respiratory Reactants and products



Home work

1. Define the term Respiration.
2. State the difference between Breathing and Respiration.
3. State two (2) differences between Aerobic and Anaerobic respiration.

References

1. <http://passmyexams.co.uk/GCSE/biology/aerobic-and-anaerobic-respiration.html>
2. https://www.google.com/search?q=difference+between+aerobic+and+anaerobic+respiration&sxsrf=ALeKk01-ATvXaRkvJUoAI_6vDGEJ1S-1WA:1600211684373&source=lnms&tbm=isch&sa=X&ved=2ahUKEwjBr4yIpezrAhVRdt8KHSZfCdYQ_AUoAXoECA4QAw&biw=1600&bih=789#imgrc=VV5U5PUTVYigIM
3. Blackman, S., Bernard, M., Dalgety, F., & Sadoo, d.s (2000) Science in Daily Life Bk.2. Georgetown, Guyana. Ministry of Education, Guyana