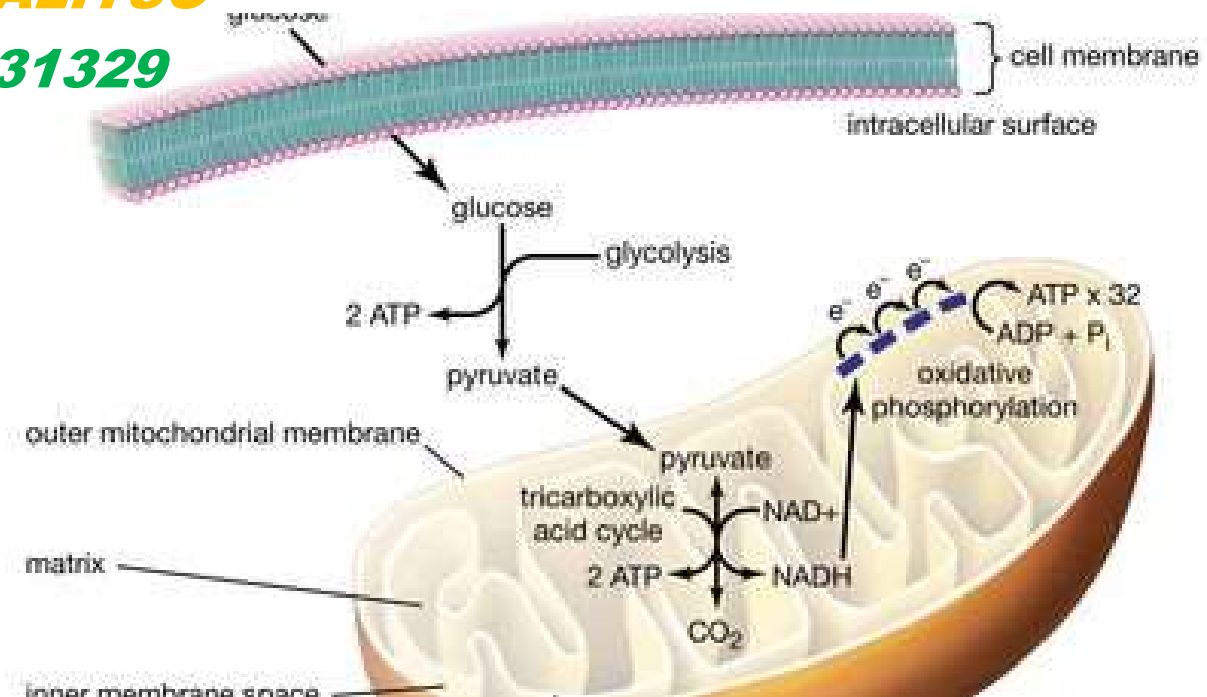




TISSUE RESPIRATION

BY ELLY KENEDDY NALITSO

0708838163- 0779031329



LEARNING OUTCOMES



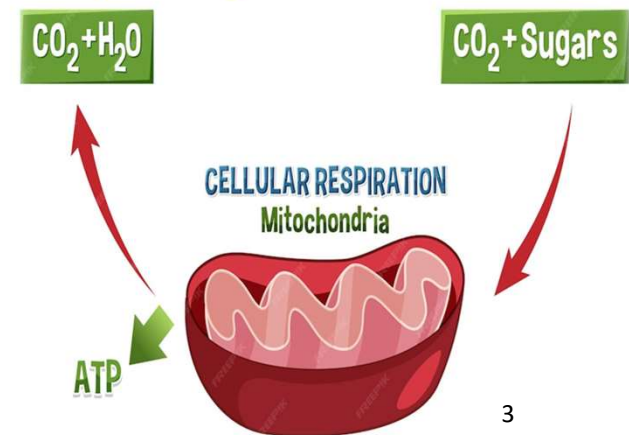
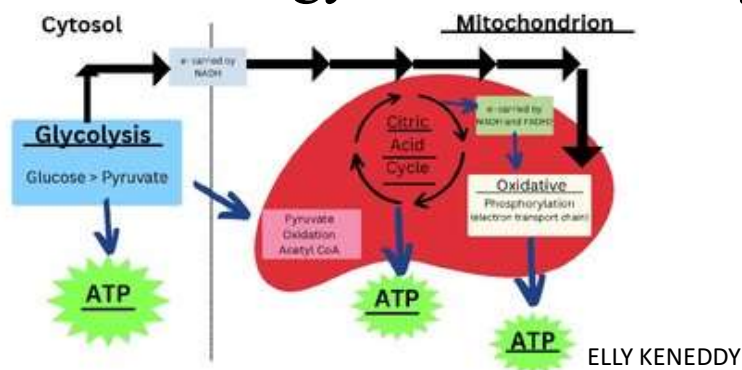
The learner should be able to:

- a) appreciate the importance of the process of respiration (both aerobic and anaerobic) (u)
- b) understand and outline the process and site of aerobic respiration (u)
- c) appreciate the relationship between plants and animals in relation to aerobic respiration and photosynthesis (s)
- d) understand circumstances in which organisms including humans use anaerobic respiration (u)
- e) understand and outline the process of anaerobic respiration (u)
- f) carry out investigations to find the products of anaerobic respiration in plants and animals (s)
- g) understand some applications of anaerobic respiration in everyday life (u)
- h) compare aerobic with anaerobic respiration (s)

INTRODUCTION



- Respiration is the **process by which food substances are broken down by enzymes in cells to provide energy.**
- During respiration **carbon dioxide, water** and **alcohol** or **lactic acid** are formed. When there is enough oxygen during respiration, alcohol or lactic acid is not formed.
- The organelle in which respiration takes place is the **mitochondrion**.
- The **excess energy is stored as Adenosine tri phosphate (ATP)**, later broken down to release the energy when needed by the body.

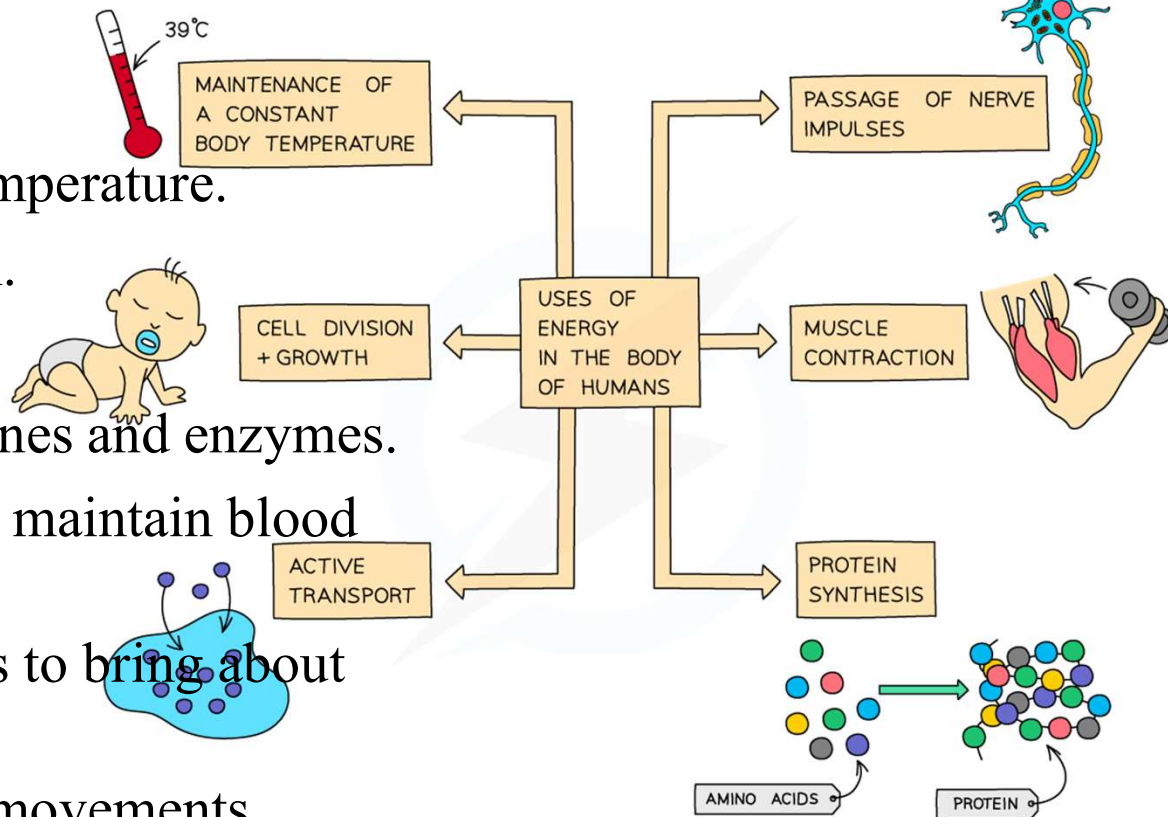


RELEVANCY OF RESPIRATION



The energy released is used by the body for the following activities:

- Transmission of nerve impulses.
- Maintenance of a constant body temperature.
- Cell division to bring about growth.
- Excretion of wastes.
- Secretion of substances like hormones and enzymes.
- Contraction of the heart muscles to maintain blood flow.
- Contraction of the thoracic muscles to bring about breathing.
- Muscle contraction to bring about movements.

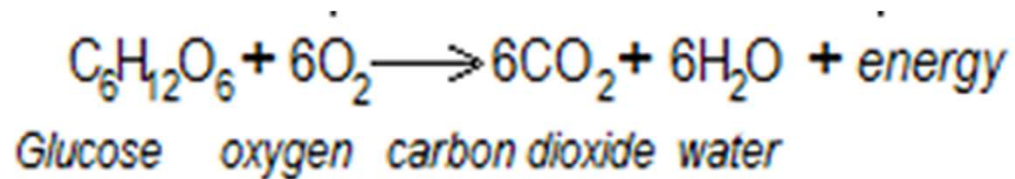


TYPES OF RESPIRATION



Aerobic respiration

- This is the breakdown of glucose using oxygen to release energy, carbon dioxide and water.
- This is the **most efficient process by which energy** is produced because **there is complete breakdown of glucose** and it therefore produces more energy.
- The overall equation for aerobic respiration is:



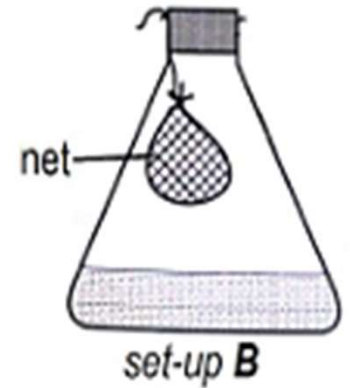
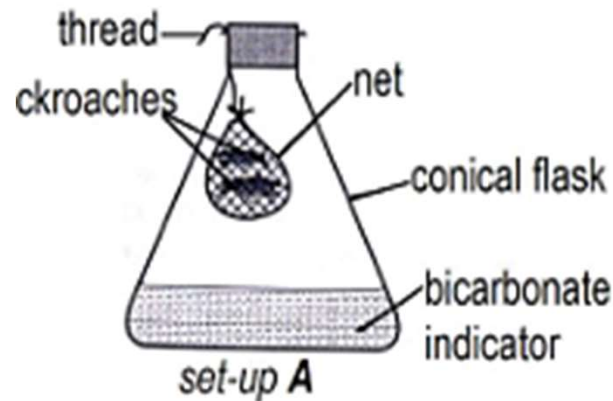
- The Carbon dioxide produced diffuses from the tissues into the blood and it is transported to the lungs for expiration

AN EXPERIMENT TO SHOW AEROBIC RESPIRATION IN ANIMALS



Materials

- Grasshoppers or cockroaches
- Two pieces of muslin cloths or net
- Bicarbonate indicator solution
- Two conical flasks
- Measuring cylinder
- Two rubber bungs and threads.



PROCEDURE



- ☐ Put 3 cc of bicarbonate indicator solution in the two conical flasks.
- ☐ Label conical flasks, A and B
- ☐ Put about two grasshoppers on a muslin cloth or net and place them in conical flask
- ☐ Cover the conical flask immediately with a cork as shown in the figure below.
- ☐ Place only a muslin bag or net in the conical flask labelled B and cover it also with a cork immediately.
- ☐ Leave the set up for 30 minutes. • After 30 minutes, observe the bicarbonate indicator solution in both flasks A and B.

RESULTS.



- Observation
- Conclusion
- Explain your results.



RESPONSE.



- **Observation**

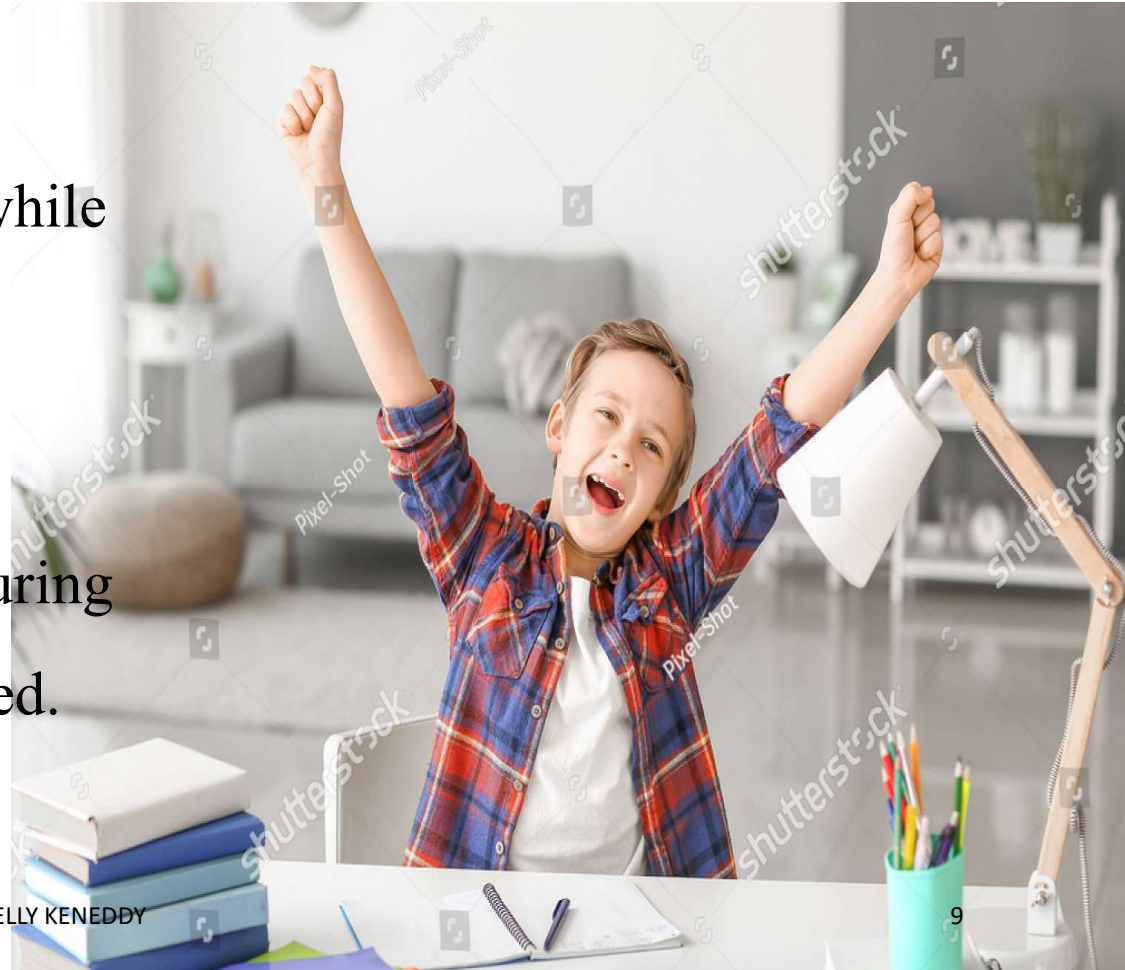
Limewater in flask B turned milky while that in flask A remained clear.

- **Conclusion**

- Respiration takes place in plants during which carbon dioxide gas is released.

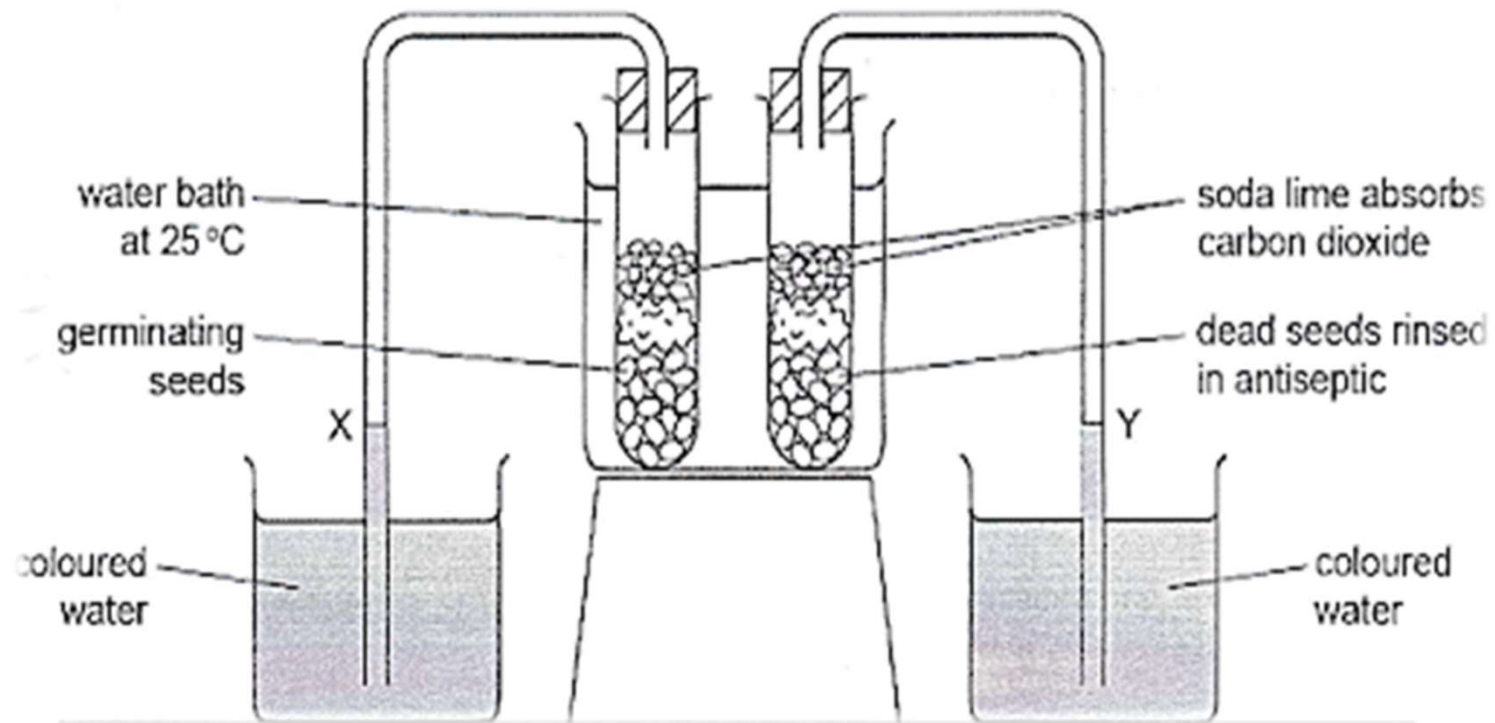
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ELLY KENEDDY





DEMONSTRATING THE USE OF OXYGEN BY GERMINATING SEEDS DURING REPIRATION



AN EXPERIMENT TO SHOW THAT RESPIRATION TAKES PLACE IN PLANTS



Materials

Soda lime (sodium hydroxide pellets)

Lime water

Filter pump

Black cloth

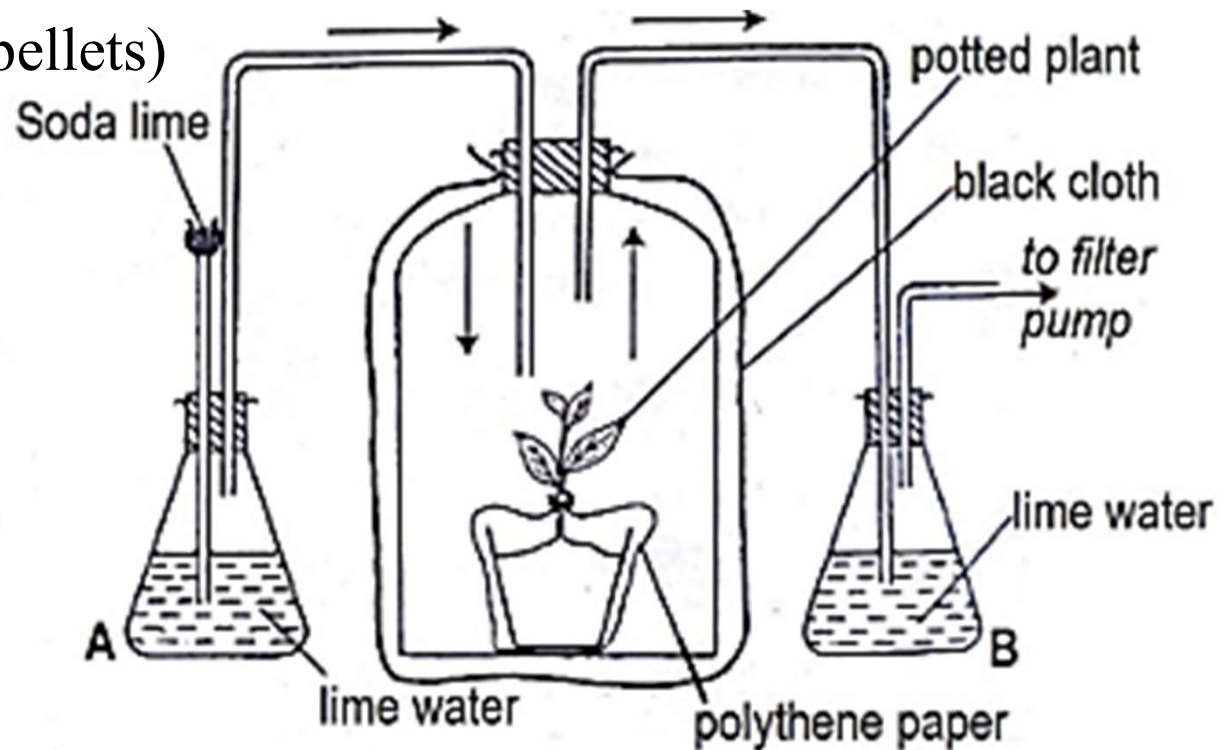
Potted plant

Delivery tubes

Conical flasks

Corks

Bell jar and petroleum jelly or wax.



PROCEDURE.



- Set up the apparatus and materials as shown in the figure above.
- Use the petroleum jelly or wax to seal off any gaps to prevent air from entering into the apparatus.
- Place the potted plant under the bell jar and cover the bell jar with a black cloth.
- A stream of air should be drawn slowly through the apparatus by means of a filter pump.
- Observe any changes in the conical flasks A and B.

➤ **Observation:**

➤ **Conclusion :**

FOLLOW UP QNS



1. Why did you cover the pot with a polyethene bag?
2. Of what importance was the black polyethene bag on the glass jar?
3. How would the number of bubbles change if the experiment was repeated at temperature 5°C higher than what was used?
4. How would the results change if you were to use a small mammal for the experiment?
5. Write an equation for the reaction that took place

NB. The black cloth prevents the green plant from carrying out photosynthesis.

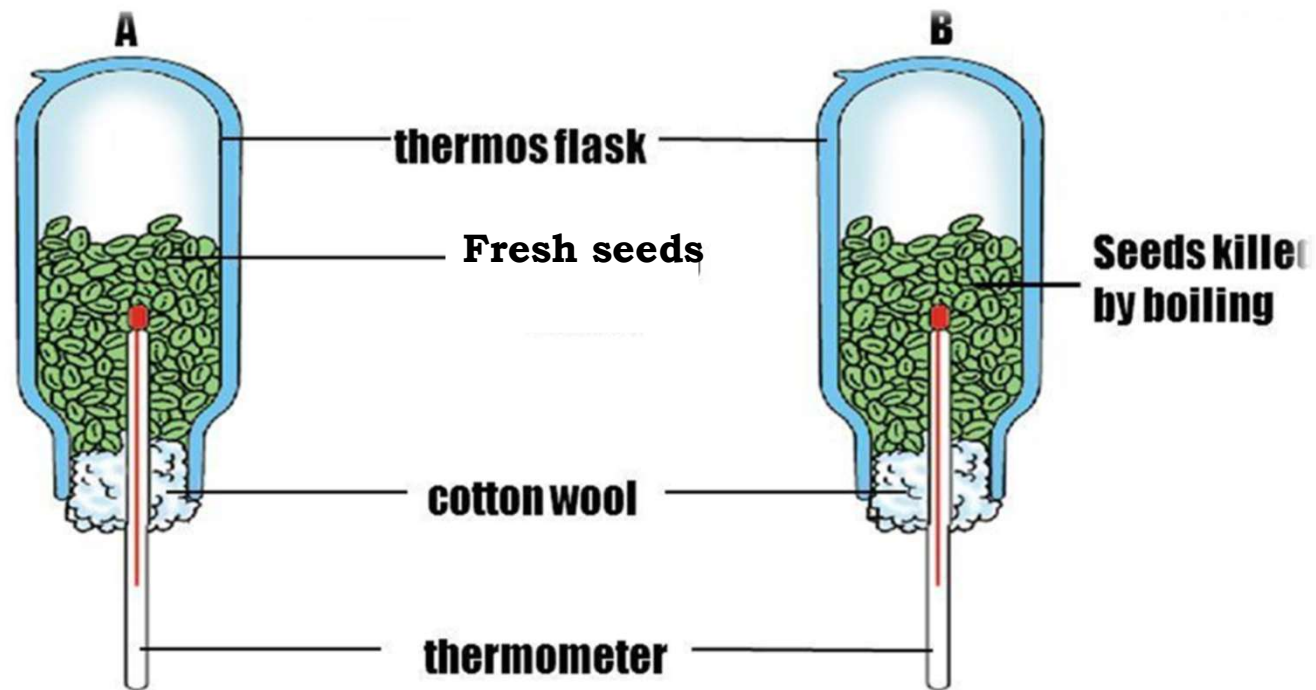
The soil is also covered with polythene paper to exclude any gas from the soil

EXPERIMENT TO SHOW THAT HEAT IS PRODUCED BY GERMINATING SEEDS DURING RESPIRATION

Materials

- ☐ Two vacuum flasks
- ☐ Beans
- ☐ Cotton wool
- ☐ Two thermometers and sterilizer
- ☐ Sodium hypochlorite or formalin.

DEMONSTRATING PRODUCTION OF HEAT DURING RESPIRATION



PROCEDURE



- Soak bean seeds for 24 hours in water after which divide the seeds into two equal portions.
- Boil one portion for 10 minutes to kill the protoplasm in the seeds.
- Soak the boiled beans.
- Both sets of seeds are soaked in formalin for 15 minutes in order to kill any bacterial and fungal spores.
- Place unboiled beans in vacuum flask A and the boiled beans in vacuum flask B.
- Insert a thermometer in each of the flasks and plug their mouths with cotton wool.
- Make sure that the bulbs of the thermometer are dipped in the beans.
- Leave the experiment to stand for three days.

RESULTS.



- Observation
- Conclusion
- Explain your results.





RESPONSE

Observation:

- After three days the temperature in the germinating seeds (unboiled beans) is higher than that of the boiled seeds.
- That of the boiled seeds remains constant.

Conclusion:

Germinating seeds give out heat.

Explanation:

During germination oxygen is absorbed to carry out respiration, which gives out energy in form of heat.





FOLLOW UP QTNS

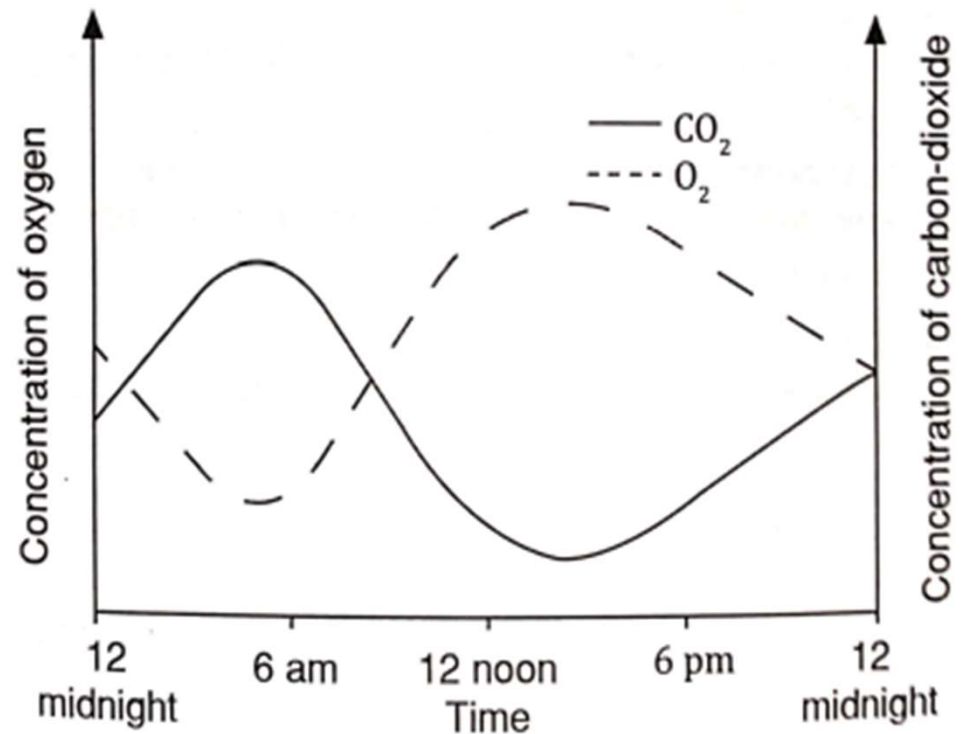
1. Why were both boiled and fresh seeds obtained from the same group of seeds?
2. Why did you:
 - a) Soaked the seeds in water?
 - b) Boiled the seeds in water?
 - c) Put the seeds together with antibiotics?
 - d) Use two flasks used for each set up?
3. Why did you:
 - i. wedge the flasks with cotton wool plugs
 - ii. Partially filled with seeds?
4. What are some of the challenges you encountered?

VARIATION OF OXYGEN AND CARBON DIOXIDE CONCENTRATIONS WITH TIME IN AN AQUATIC ENVIRONMENT



Observe the graph displayed and explain the changes in the concentrations of carbon dioxide and oxygen with time within the aquatic environment.

Graph showing the variation of concentration of carbon dioxide and concentration of oxygen with time in an aquatic environment



PLANTS AND ANIMALS CAN LIVE AND SURVIVE INDEPENDENTLY OF ONE ANOTHER



CHAIRPERSON:
SECRETARIES:

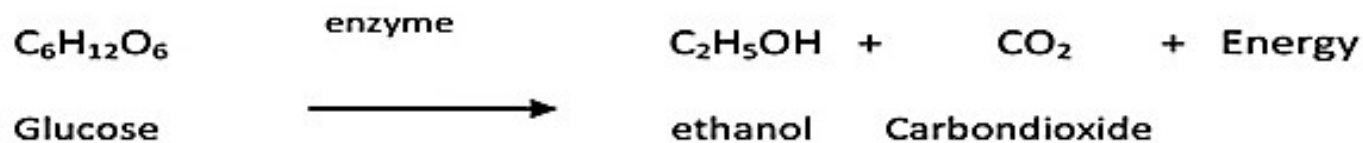
Proposers

Opposers

ANAEROBIC RESPIRATION IN PLANTS



- This is the **breakdown of glucose to release energy in absence of oxygen**. In this process, **glucose is not completely broken down**.
- In plants, glucose is oxidized in the absence of oxygen to release carbon dioxide, energy and ethanol as shown in the equation below:



- Anaerobic respiration in a solution leading to release of bubbles of gas is called **fermentation**
- Fermentation occurs when bacteria or fungi like yeast break down glucose in sugar solutions to form alcohol, carbon dioxide and heat energy.
- Such organisms only respire anaerobically because they live where oxygen is absent or in short supply.

ANAEROBIC RESPIRATION IN ANIMALS



- In animals, glucose is broken down in absence of oxygen to form lactic acid and energy only as shown in the equation below



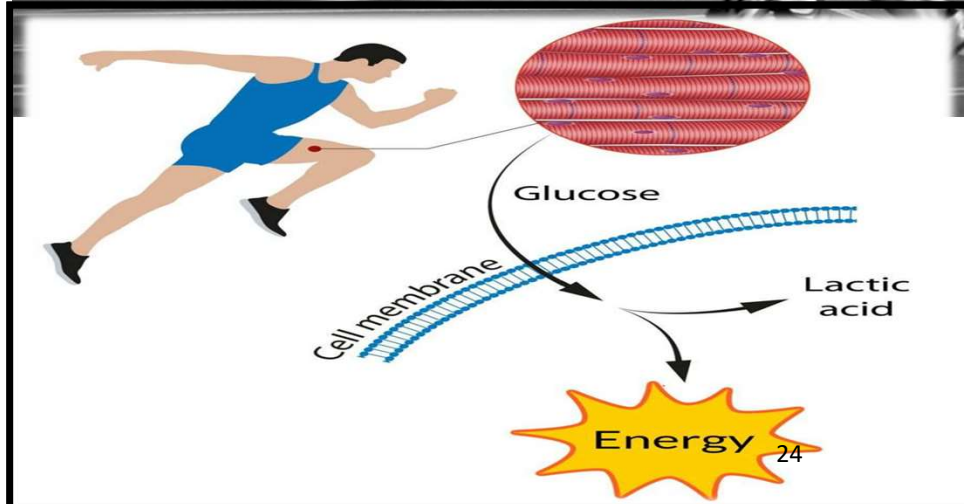
Glucose

lactic acid

- Most of the energy remains blocked in the intermediate substances (ethanol and lactic acid).
- When oxygen is provided lactic acid can be **further broken down to release the** remaining energy.
- Anaerobic respiration occurs in animals during **strenuous exercises such as** flying in birds and running in animals.



- This leads to build up of lactic acid in the muscles.
- Lactic acid is **toxic to body cells**.
- During vigorous exercises, the energy demand increases and the oxygen consumption in the animal exceeds the oxygen supply, leading to an **oxygen debt**.
- In the process, the muscle cells **respire anaerobically** to provide more energy leading to **accumulation of lactic acid** in the muscles which has to be oxidized when the race is over.

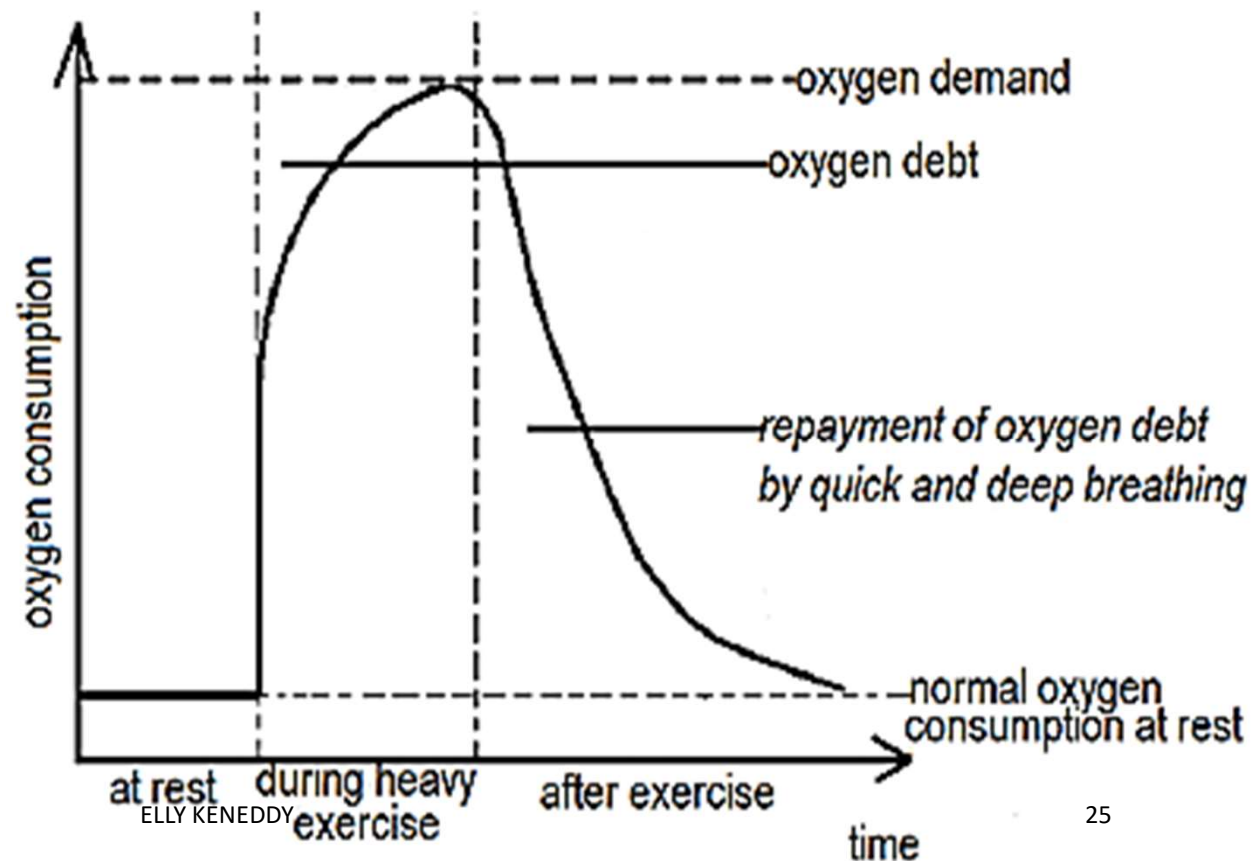


A GRAPH SHOWING THE RATE OF OXYGEN CONSUMPTION BEFORE EXERCISE, DURING EXERCISE AND AFTER EXERCISE

As a result, the supply of oxygen into the body increases by breathing more quickly and deeply after an exercise to provide the extra oxygen required to oxidize the accumulated lactic acid to CO₂, water and energy.

Oxygen debt therefore *is the amount of oxygen needed to break down the accumulated lactic acid* in muscles after vigorous exercises.

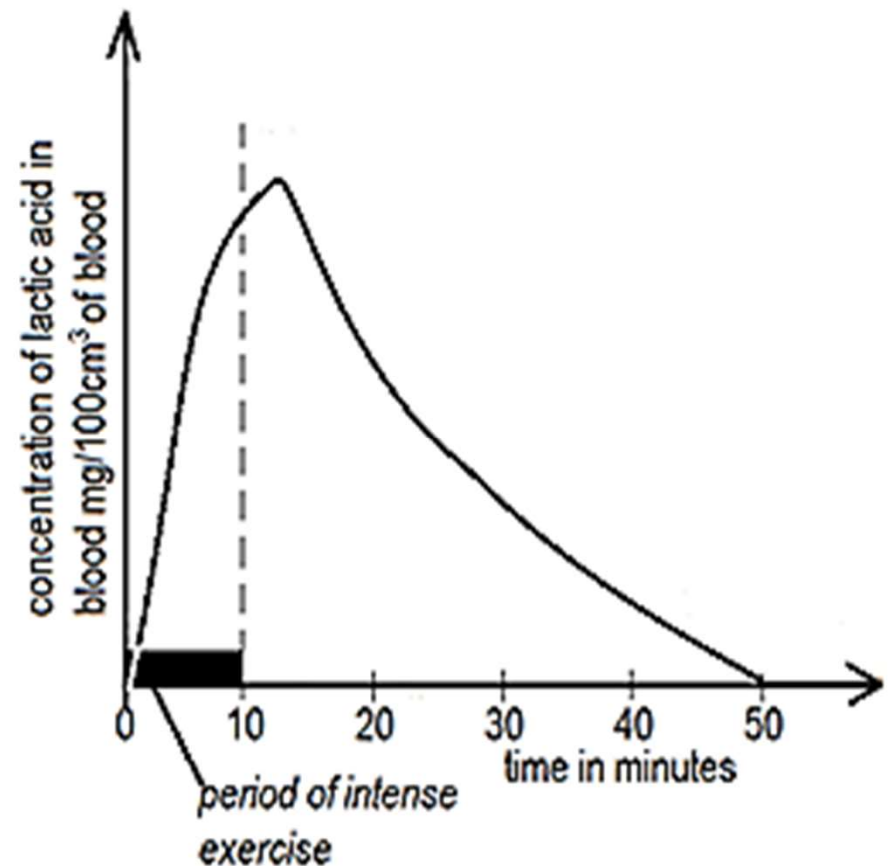
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CHANGE IN LACTIC ACID AND CONCENTRATION DURING AND AFTER EXERCISE



- Lactic acid increases rapidly during an exercise till the end.
- This is due to increased rate of anaerobic respiration due to limited supply of oxygen.
- At the end of the exercise, lactic acid content in muscles decreases rapidly because it is being oxidized to CO_2 , water and more energy in the liver.
- The oxygen used in breaking down this lactic acid is attained by breathing quickly and deeply.



DETERMINING THE PRODUCTS OF ANAEROBIC RESPIRATION USING YEAST

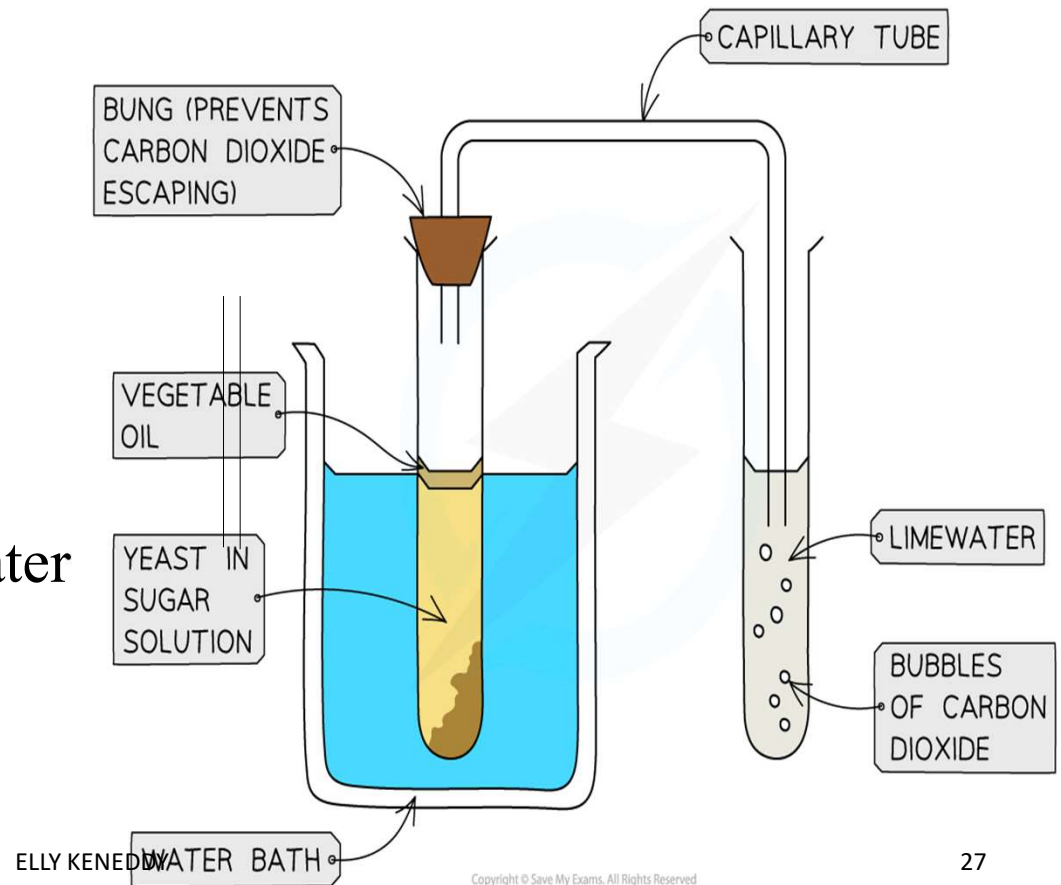


Qtns:

1. Why was:

- The solution boiled?
- Light oil added?

2. What was the color of the lime water at the end of the experiment



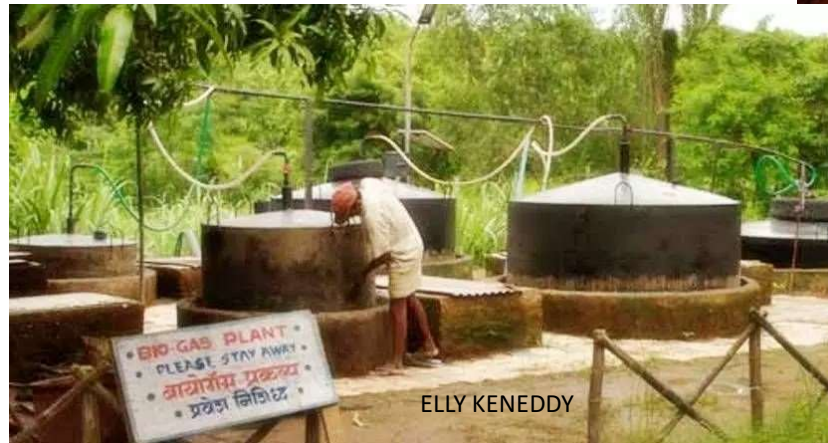


UNDERSTANDING THE APPLICATIONS OF ANAEROBIC RESPIRATION IN EVERYDAY LIFE

Scenario I



Scenario II



Name the applications of anaerobic respiration and outline the process in detail



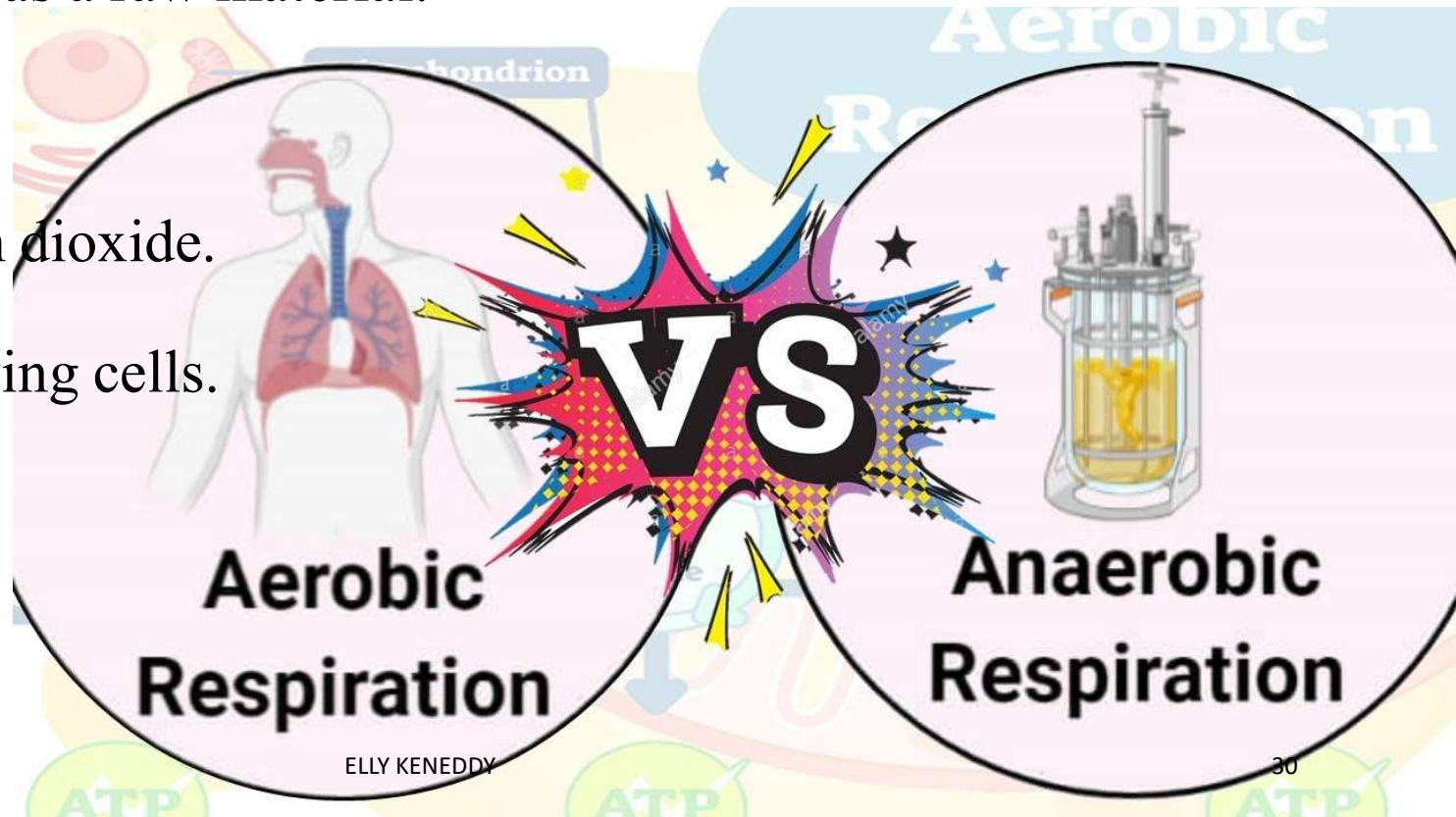
APPLICATION OF ANAEROBIC RESPIRATION

- ☐ Brewing to produce beer, wines and spirits through fermentation using yeast.
- ☐ It is also used in baking of bread to raise dough.
- ☐ Sewage and industrial effluent treatment to reduce any harmful effects to living organisms.
- ☐ Manufacture of dairy products such as butter, cheese and yoghurt.

SIMILARITIES BETWEEN AEROBIC AND ANAEROBIC RESPIRATION



- Both require glucose as a raw material.
- Both produce energy.
- Both produce Carbon dioxide.
- Both take place in living cells.



DIFFERENCES BETWEEN AEROBIC AND ANAEROBIC RESPIRATION



Aerobic respiration	Anaerobic respiration
✓ A common mode of respiration in both plants and animals	✓ Rare process limited to few plants and animals
✓ Produces more Carbon dioxide	✓ Produces less Carbon dioxide.
✓ Occurs throughout life	✓ Occurs temporary in very active muscles
✓ Liberates large quantities of energy	✓ Liberates less energy
✓ Products are water, Carbon dioxide and energy	✓ Products are Carbon dioxide, energy and alcohol or lactic acid.
✓ Complete breakdown of food	✓ Incomplete break down of food.
✓ Oxygen is used	✓ Oxygen is not used.

A close-up photograph of a baby with light skin and short, light-colored hair, focused on eating a large slice of watermelon. The baby's eyes are closed in concentration, and their hands are holding the edges of the watermelon slice. The background is a soft, out-of-focus green, suggesting an outdoor setting. Overlaid on the image is the text 'ALWAYS AIM FOR EXCELLENCE' in a white, stylized, gothic-style font. Below this, in red, is 'BY ELLY KENEDDY NALITSO', followed by the phone number '0708838163- 0779031329' in white. In the bottom left corner, the date '1/7/2025' is written in small black text. In the bottom center, the name 'ELLY KENEDDY' is written in small black text. In the bottom right corner, there is a small icon of the flag of the Republic of the Philippines, featuring three horizontal stripes of blue, red, and white, with a golden sun and three stars in the center.

ALWAYS AIM FOR EXCELLENCE

BY ELLY KENEDDY NALITSO

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1/7/2025

ELLY KENEDDY

