Aerobic/Anaerobic Respiration

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- The Marathon -

- If somebody challenged you to a run a race, how should you prepare to win?

1. Practice
2. Eat the right foods
3. Drink the right liquids

All living organisms break down sugars to get energy. In humans this breakdown usually occurs with oxygen.

Aim:

To understand how Aerobic and Anaerobic Respiration Occurs

SWBAT:

- Learn how the type of sugar affects the rate of respiration.
- Learn how the concentration of sugar affects the amount of energy produced.
- Determine the rate of respiration while using yeast to breakdown different sugars.

What is Aerobic Respiration?

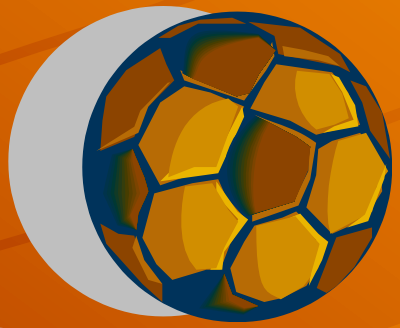
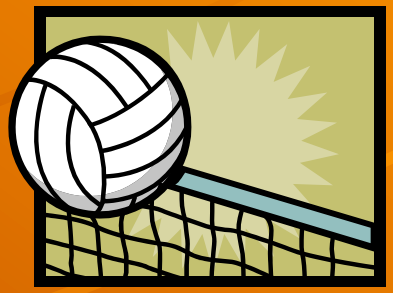
- The breaking down of sugar to produce energy where oxygen is present.

$$C_6H_{12}O_6 + 6O_2 \xrightarrow{Enzymes} 6CO_2 + 6H_2O + 36ATP$$

Glucose + Oxygen → Carbon Dioxide + Water+ Energy

When We Exercise…

- After two minutes of exercise, the body responds by supplying working muscles with oxygen.
- When oxygen is present, glucose can be completely broken down into carbon dioxide and water

Anaerobic Respiration refers to the oxidation of molecules in the absence of oxygen to produce energy

It is also known
As Fermentation

What happens when fermentation occurs?

1. **In Muscle Cells**- During extraneous activities, the oxygen in the muscle tissue is decreased to an extent that aerobic respiration does not occur at a sufficient rate. Hence, there is a buildup of lactic acid and your muscles get tired

2. **In Yeast**- The fermentation end product is ethyl alcohol, and CO_2

Chemical Formula for Anaerobic Respiration

$$2ATP + C_6H_{12}O_6 \xrightarrow{Enzymes} 2CH_3CH_2OH + 2CO_2 + 4ATP$$

Energy + Glucose $\xrightarrow{Yeast}$ Ethanol + Carbon Dioxide + Energy

Lab Experiment

We will be testing four different drinks to see which will give us the most energy

So how do we decide which is best?

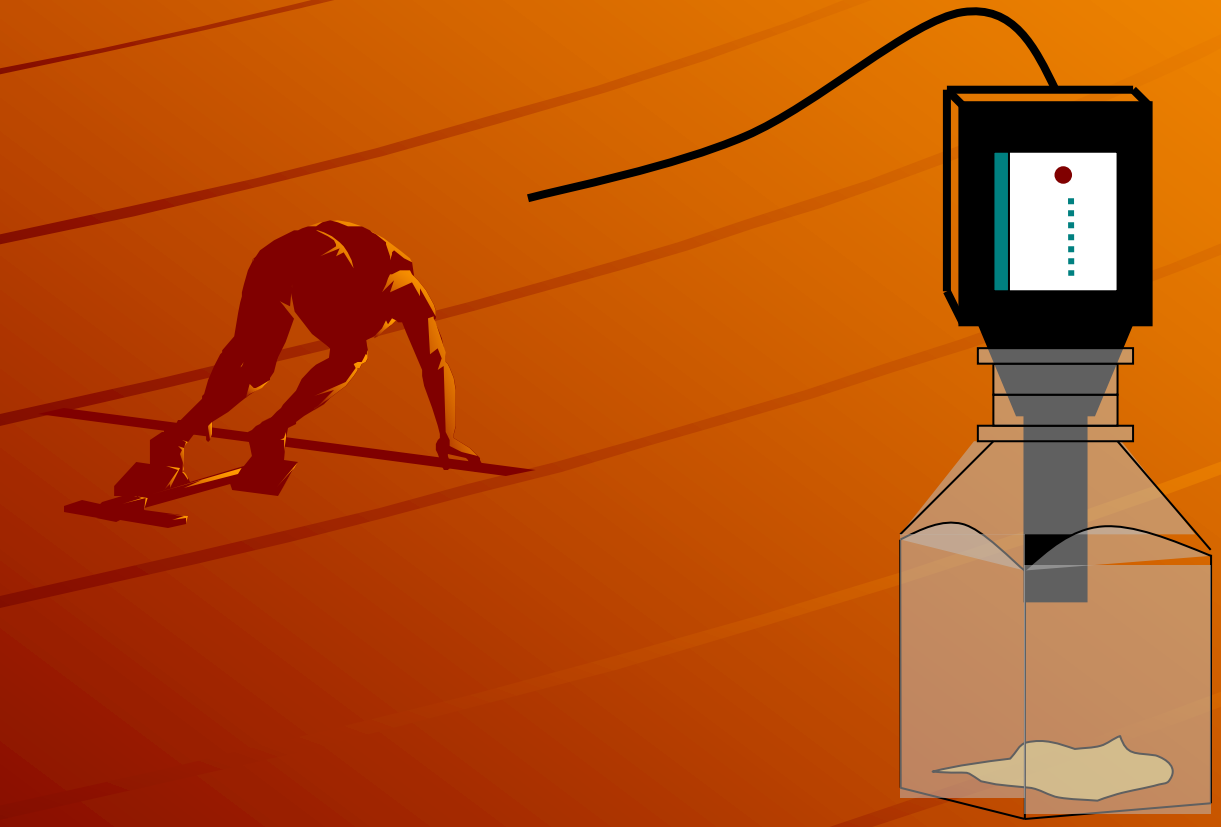
Hint: Go back to the formula

$$2ATP + C_6H_{12}O_6 \xrightarrow{Enzymes} 2CH_3CH_2OH + 2CO_2 + 4ATP$$

We can measure the carbon dioxide released by each drink in the enzyme

Lab Procedure

- CO2 Gas Sensor to measure total concentration of CO2



Lab Procedure

- Incubate the yeast solution in a 37 – 40 water bath
- Label the five test tubes G, C, F, M, and W
- Pour 2.5 mL of Gatorade into the test tube labeled G
  - Pour 2.5 mL of Coke into the test tube labeled C
  - Pour 2.5 mL of fruit juice into the test tube labeled F
  - Pour 2.5 mL of milk into the test tube labeled M
  - Pour 2.5 mL of water into the test tube labeled W
- Lightly stir the yeast suspension to mix the yeast that settled to the bottom.
- Put 2.5 mL of the yeast suspension into all five of the test tubes.
- Then incubate the test tubes for 10 minutes in the water bath.
- Place the Gas Sensor, and start collecting the data. for 4 minutes.