Yeast Fermentation Lab

Background:
Yeast are tiny single-celled (**unicellular**) fungi. The organisms in the **Kingdom Fungi** are not capable of making their own food. Fungi, like any other organism, need food for energy. They rely on sugar found in their environment to provide them with this energy so that they can grow and reproduce.

Yeast, like bacteria grow in or on their food source. They produce and release digestive proteins (**enzymes**) into their environment where the sugar molecules are found. Sugar molecules then break down into smaller molecules that can be absorbed by the yeast and used for food (**energy**).

There are many **species** of yeast, and each has a particular food source.

- Certain yeast feed on a variety of natural sources of sugar such as fruits, nectar from plants, and molasses from the plant crop called sorghum.
- Others break down wood and corn stalks. In doing this, a compound called ethanol is produced. This compound can be used in our cars like gasoline.
- Another species break down sugar from grain into alcohol. Others break down fruits into wine, which is another type of alcohol.
- Bread recipes rely on yeast to break down sugar in our dough.

All of these processes are called **fermentation**. The formula for the yeast fermentation reaction is:

$$C_6H_{12}O_6 = 2CH_3CH_2OH + 2CO_2 + \text{energy}$$

glucose = ethyl alcohol + carbon dioxide

For the yeast cell, this chemical reaction is necessary to produce the energy for life. The alcohol and the carbon dioxide are waste products produced by the yeast. It is these waste products that we take advantage of.

The chemical reaction, known as fermentation can be watched and measured by the amount of carbon dioxide gas that is produced from the break down of glucose.

???? Do you think that the volume of carbon dioxide produced during fermentation would be affected by using different masses of sugar ????

Purpose: to observe the effect of environment on yeast activities.

Materials:

- package of dry active yeast
- 250 mL beaker
- 250 mL flask
- sugar packets
- ruler or meter stick
- string
- balloon
- warm water (110 °F)

Procedure:

1) Fill the beaker with 100 mL of warm tap water.
2) Add 1 package of yeast to the warm water and stir until it is in solution.
3) Carefully pour the yeast solution into the flask.
4) Complete the lab according to the group you have been assigned.

Group 1: After pouring your yeast solution into the flask, immediately place the balloon on the top of the flask. Note the time on your lab chart.

Group 2: After pouring your yeast solution into the bottle, add 1 packet of sugar to the mixture and swirl it gently until it dissolves. Then place the balloon on top of the bottle. Note the time on your lab chart.

Group 3: After pouring your yeast solution into the bottle, add 2 packets of sugar to the mixture and swirl it gently until it dissolves. Then place the balloon on top of the bottle. Note the time on your lab chart.

Group 4: After pouring your yeast solution into the bottle, add 3 packets of sugar to the mixture and swirl it gently until it dissolves. Then place the balloon on top of the bottle. Note the time on your lab chart.

Group 5: After pouring your yeast solution into the bottle, add 4 packets of sugar to the mixture and swirl it gently until it dissolves. Then place the balloon on top of the bottle. Note the time on your lab chart.

5) Using your string, measure the size of your balloon every 5 minutes. Record the information on your data table.

Results: **SIZE OF BALLOON**

	Start	5 min.	10 min.	15 min.	20 min.	25 min.
Group 1						
Group 2						
Group 3						
Group 4						
Group 5						

Discussion:

6) Which of the balloons reached the largest size? What material was collected in the balloons?
7) What were the variables in this experiment?
8) Which one of the groups was the control? Why was it the control?
9) Make a multiline graph of the data. Include a legend.
10) What is fermentation? What are the products of fermentation? What caused the balloons to increase in size?

Conclusion:

Yeast is used in making bread. Using the information obtained in this experiment, explain what causes bread to rise and what conditions are necessary for optimum rising?