Yeast Metabolism Lab

**Purpose:** To determine the effects of different carbohydrates on the metabolism of live yeast.

**Background:**
Some organisms are capable of photosynthesis—using energy captured from sunlight to make food. Before the energy stored in that food can be used, cells must break down the food molecules. This process is called **cellular respiration**. Respiration occurs in a series of complex steps, but the overall process can be summarized by the following equation:

\[
\text{C}_6\text{H}_{12}\text{O}_6 + 6 \text{ O}_2 \rightarrow 6 \text{ CO}_2 + 6 \text{ H}_2\text{O} + \text{ energy} \\
\text{sugar} + \text{oxygen} \rightarrow \text{carbon dioxide} + \text{water} + \text{energy}
\]

**Hypothesis:** Make a prediction about which treatment (yeast+water, yeast+glucose, or yeast+sweetener) will produce the most carbon dioxide (CO₂) from cellular respiration.

**Materials:** Empty water bottles (3), glucose, artificial sweetener, warm water (~40°C), live yeast, balloon, balance, weighing dishes, tape, graduated cylinder, markers, string, ruler, beakers, paper towels

**Procedures:**
1. Label one of your water bottles “WATER,” one “GLUCOSE,” and one “SWEETENER.”
2. Measure 10 grams of glucose and carefully pour that amount into the “GLUCOSE” bottle.
3. Measure 10 grams of artificial sweetener and carefully pour that amount into the “SWEETENER” bottle.
4. Measure 7 grams of yeast and carefully pour that amount into each bottle.
5. Using a graduated cylinder, measure 200 mL of warm water and pour into each of your water bottles.
6. Swirl the bottle to mix everything together, and then quickly stretch a balloon over the mouth of each water bottle.
7. After 15 minutes, measure the circumference of each balloon by looping the string around the widest part of the balloon and measuring the length of the string. Record these measurements in **Table 1**.
Data & Observations:

**TABLE 1**

<table>
<thead>
<tr>
<th>Circumference of balloon (cm)</th>
<th>WATER</th>
<th>GLUCOSE</th>
<th>SWEETENER</th>
</tr>
</thead>
</table>

Make a bar graph of the results in **Table 1**.

Analysis Questions:

1. Did your experiment provide evidence to support your hypothesis?

2. Which variable did you manipulate in this experiment? This is called the independent variable.

3. Which variable did you measure that responded to the change that you made? This is called the dependent variable.

4. What was the control in your experiment?

5. Provide a biological explanation for what happened in the water bottles.

6. What other variables (besides what you tested) might result in increased carbon dioxide (CO₂) production by the yeast?