Pre-Lab: Respiration in Saccharomyces cerevisiae

Introduction:
Yeast are singled celled, eukaryotic organisms. They are members of the kingdom Fungi and grow as single cells, clusters and chains.

Yeast *Saccharomyces cerevisiae* have the ability to conduct aerobic and anaerobic cellular respiration and are the main reason we have products such as beer, wine, and bread.

In the absence of oxygen, yeast conducts alcoholic fermentation (a form of anaerobic cellular respiration.) The waste products of this reaction are CO_2 and ethyl alcohol. It is this CO_2 gas that causes bread to rise and the ethyl alcohol that becomes the alcohol in beer and wine.

Yeast can only tolerate certain environmental conditions and die after the alcohol content of the liquid they are living in reaches 12-16%, which is why that is the highest alcohol content you will find in wine. Liquor with higher alcohol content, like tequila, vodka, etc., has been distilled to raise the alcohol content. Yeast can also not survive temperatures higher than 40^{o} C.

Aerobic or anaerobic cellular respiration? Think about the diagram below:

Do the following on a separate sheet of paper in preparation for next week's laboratory:

1. Using what you know about cellular respiration (both aerobic and anaerobic), describe what you will look for when observing and measuring the rate of fermentation? **(This will be part of your background Information, along with any other research you do on alcoholic fermentation)**

2. Draw and describe the experimental design / equipment setup that you could use to measure the rate of alcoholic fermentation of yeast. Make a quick sketch of the equipment on the front counter. Draw a more careful picture of the set up for your final report. Write a step by step procedure you and your group will follow to do this experiment. **(Procedure)**

3. Make a prediction about the rate of respiration using sucrose (a disaccharide) compared to a fructose (a monosaccharide) as the energy source (will it be faster, slower, the same). **Which do you predict will have a faster respiration rate** and **why do you think so**? **(Prediction)**

4. Create a data table that will allow you to collect your data - every 60 seconds, for 15 – 20 minutes, for two different sugars, at least two runs each. **(Data Table)**