

Yeast Fermentation of Sugar

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<http://www.yorku.ca/plants>

Background information:

All cells require energy to maintain their complex structures and to grow and reproduce. Cells obtain the energy they need by breaking complex foods (organic molecules) into simpler molecules. Some cells completely degrade food molecules like sugars into CO_2 and H_2O by a process called aerobic respiration. Some cells can only partially degrade sugars using a process called fermentation. Yeast are unicellular fungi that can perform aerobic respiration when oxygen is plentiful, but they can also obtain energy by the anaerobic process of fermentation when it is not. When yeast cells carry out fermentation, they convert sugar molecules into ethyl alcohol ($\text{C}_2\text{H}_5\text{OH}$) and CO_2 . Ethanol is another name for ethyl alcohol. The conditions used in this experiment provide only a small surface area exposed to air where oxygen is available to these cells. Because the volume of liquid below the surface quickly becomes anaerobic, fermentation is the predominant process that yeast will be using to obtain energy.

Yeast are unicellular fungi that are versatile laboratory microorganisms. They grow rapidly and have simple nutritional requirements. When yeast degrade nutrients in the absence of oxygen they use the process of glycolysis to produce energy in the form of ATP.

Yeast are of great economic importance. Their ability to carry out fermentation to produce ethyl alcohol is used in the production of alcoholic beverages such as beer and wine. In the production of bread, the carbon dioxide that yeast produce generates the gas bubbles that cause dough to rise.

Most of the yeast found in the supermarket are sold in a dry, inactive form. When warm water is added to the yeast, they become active and will begin to grow and to carry out fermentation if they are given sugar as a food source. It takes about 2 hours for the yeast to become activated, so your TA has prepared several suspensions of yeast feeding on sucrose or succinate.