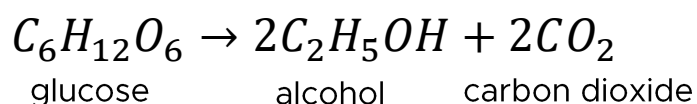


# Yeast Fermentation Science Inquiry Project

## Introduction

**Fermentation** is a process that has been used by humans for thousands of years. It involves converting sugars into other substances, like **alcohol** or **acids**, using microorganisms such as yeast or bacteria. This process is not only crucial for making many of the foods and drinks we enjoy, but it's also important in various industries, including energy production.

Fermentation begins with a simple **chemical reaction**. For example, when yeast ferments glucose, which is a type of **sugar**, it produces **alcohol** and **carbon dioxide**. The basic chemical equation for this process is:



Fermented products are everywhere in our daily lives. Bread, for instance, rises because of carbon dioxide produced by yeast during fermentation. Beer and wine are made through the fermentation of sugars in grains and grapes, respectively. Even foods like sauerkraut and kimchi are fermented using bacteria that produce acids, giving these foods their tangy taste.

Fermentation is also used to create various chemicals and medicines. For example, antibiotics like penicillin are produced using fermentation. The process helps in producing not only delicious foods and drinks but also important medicines.



Figure 1: Samples of fermented products – A.I. generated by DALL-E

# Yeast Fermentation Science Inquiry Project

## Introduction

Today, fermentation is not only used for food and drink but also in the **energy industry**. One major application is the production of biofuels. **Biofuels** are fuels made from biological materials, such as crops. Ethanol, a type of biofuel, is produced by fermenting sugars found in plants like corn. This ethanol can then be mixed with gasoline to create a cleaner-burning fuel that reduces emissions.

In addition to ethanol, scientists are also exploring other ways to use fermentation to produce energy. For example, some researchers are investigating how to use fermentation to produce hydrogen gas, which could be a clean alternative to fossil fuels.



Figure 2: A gas pump that dispenses biofuel – A.I. generated using DALL-E

For this project you can choose one variable to manipulate. You will be measuring the amount of yeast fermentation using a simple set up provided by your teacher. You will be able to choose which variables to measure or observe and to control. Some of the variables are:

**Amount of water, Amount of yeast, Amount of Water, Water Temperature, Duration (time), and Sugar Fuel (what your teacher has available -sucrose, glucose, etc.)**

The first thing you should do is to **research yeast fermentation**, to determine what aspects produces the most amount of **carbon dioxide**. Here are a few key phrases that will help begin your research:

**Yeast fermentation, how to measure yeast fermentation, factors affecting yeast fermentation**



# Yeast Fermentation Science Inquiry Project

## Step 1: Observing & Questioning

What did you find in your **research**?

What will be your **Inquiry Question**:

Draw a **labelled diagram** of your design or experimental set-up:



## Yeast Fermentation Science Inquiry Project

### Step 2: What will I change?

One variable I will change:



I will measure or observe this result:

What will I not change? (List all the variables that will stay the same):

## Yeast Fermentation Science Inquiry Project

### Step 3: What can I measure or observe?

What variable will be your **Independent Variable**? (think about what you are changing)

What variable will be your **Dependent Variable**? (think about what you are trying to measure)

What are some variables that could affect the what you're trying to measure or observe (**Controlled Variables**)?





# Yeast Fermentation Science Inquiry Project

## Step 5: Planning your experiment

How will you measure or observe your **Independent Variable**?

How will you measure or observe your **Dependent Variable**?

What materials do you need to conduct your experiment?



## Yeast Fermentation Science Inquiry Project

### Step 6: How will you do your experiment?

Write down a **procedure** for your experiment. This should be exactly what you will do so that someone else could perform the experiment the same way.

**Congratulations! At this point you should be ready to conduct your experiment. Please do so with teacher supervision and make sure to record any observations or measurements.**





# Yeast Fermentation Science Inquiry Project

## Step 7: Gathering Data

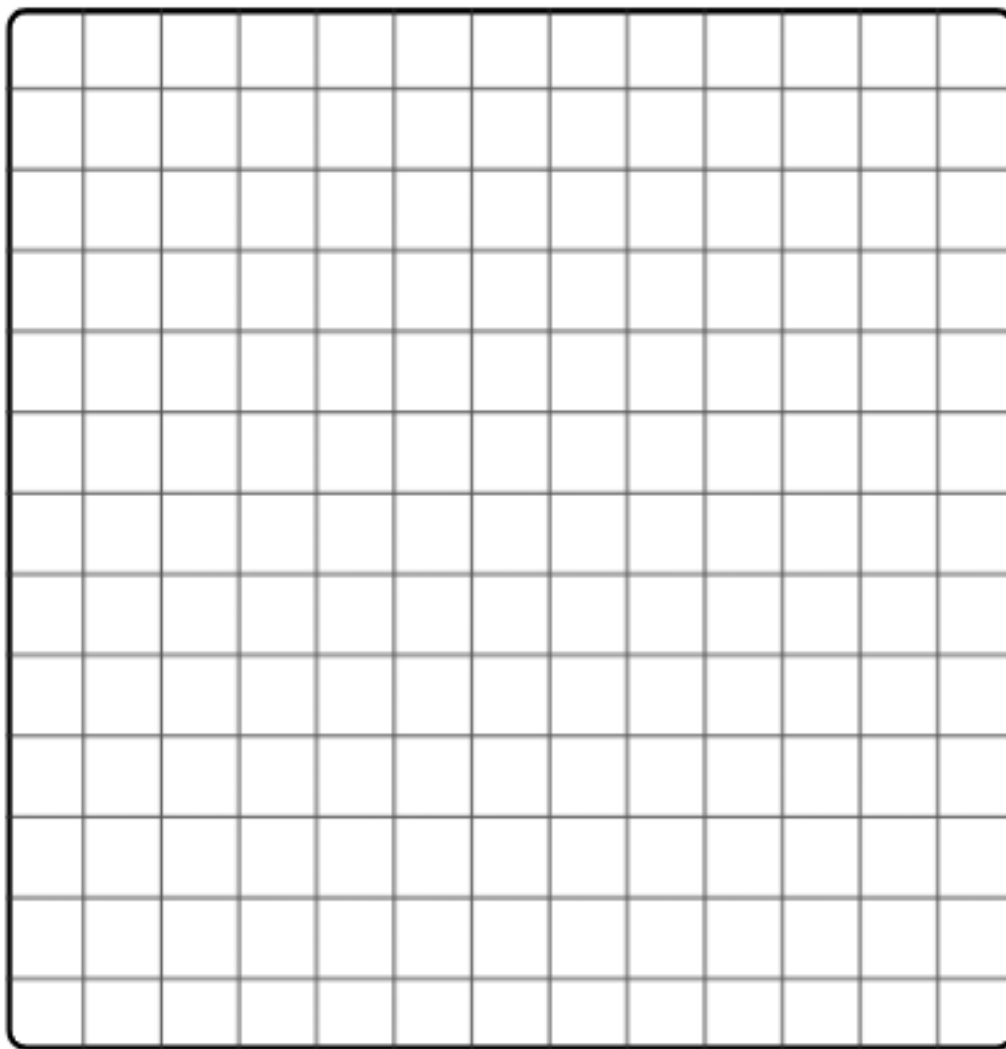
Gather your data and record it in a table format. Depending on what you chose to measure your data table may look different from other classmates.




## Yeast Fermentation Science Inquiry Project

### Step 8: Graphing your data

Use the graph paper below to graph your data. Make sure to use consistent spacing and pick an appropriate graph for your data (scatter plot graph, bar graph, etc.). Make sure to include a title and label your axis with units where applicable.



## Yeast Fermentation Science Inquiry Project

### Step 9: Analyzing your results

Looking at your data and graph, what do you notice about your results?

Was your hypothesis correct given your results? Why or why not??



## Yeast Fermentation Science Inquiry Project

### Step 10: Evaluating your results

What errors were made during your experiment? How could they have been corrected for?

If you were to conduct this experiment again, what would you change? Would you measure something different?

What implications does this experiment have?



## Yeast Fermentation Science Inquiry Project

### References

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