



## Which foods do yeast like best?

### Objective:

To investigate whether an artificial sweetener or sugar will allow yeast to produce carbon dioxide more effectively.

### Introduction:

Yeast is a small microorganism that is used to make some types of food. Its scientific name is *Saccharomyces cerevisiae*. Each cell of the yeast is about the size of a red blood cell.

This experiment will be carried out in a closed system with a balloon or in a zip-top bag to measure yeast fermentation of sugar to produce gas.

### Materials:

Three empty 8 oz. water bottles and three 5-inch balloons (or quart sized zip-top bags - freezer type work best)

Baker's yeast

Sugar

Artificial sweetener such as Stevia preferably with no added dextrose

Warm water (100 - 110°F)

Measuring spoons and measuring cup

Funnels

### Protocol: (for bottles and balloons)

1. Get 3 empty 8 oz. water bottles. Mark them A, B and C.
2. Blow up the balloons once to stretch them out so that they will inflate more easily.
3. To each bottle add  $\frac{1}{4}$  cup of warm water.
4. Add no sugar to the bottle A (the negative control).
5. Add 1 tablespoon of sugar to bottle B.
6. Add 1 tablespoon of Stevia to bottle C.
7. Add 1 tablespoon of yeast to each bottle.

8. Put on the caps and mix well until the sugar and the yeast are dissolved.
9. Remove the cap and put a balloon on the top of each open bottle.
10. Let the bottles sit for 15 to 30 minutes undisturbed.
11. Tabulate the results. Which balloon has inflated the most?

**Protocol:** (for 1 quart zip-top bags)

1. Get 3 zip-top bags. Mark them A, B and C.
2. To each bag add 1/2 cup of warm water.
3. Add no sugar to bag A (the negative control).
4. Add 1 tablespoon of sugar to bag B.
5. Add 1 tablespoon Stevia to bag C.
6. Add 1 tablespoon of yeast to each bag.
7. Carefully zip the bag closed getting rid of as much air as possible.
8. Gently shake the bags until the sugar and yeast are dissolved.
9. Let the bags sit for 15 to 30 minutes undisturbed.
10. Tabulate the results. Which bag has inflated the most?

This experiment can be made more involved by using multiple different sugars, having the children taste the sugars and hypothesize which sugar will allow the yeast to make more gas or by varying the amount of the same sugar in different bottles. For a more involved explanation with references and study questions please go to this web page:

<https://www.asm.org/images/Education/K-12/WhichFoodYeastFINAL.pdf> Student handouts:

### **Why use yeast to make bread?**

In bread recipes, we often add yeast. Yeast allows the bread to rise, giving the bread a softer, spongier texture. Without yeast, bread would be flat and tough. Rising bread dough means that the dough gets bigger. The dough gets bigger because the yeast grows and produces carbon dioxide gas (just like us – that’s what we breathe out). The gas causes little pockets in the dough, sort of like blowing up a balloon, or like a roll of bubble wrap, making the dough lighter and larger before we bake it.

### **What do we add to our bread recipes to make the yeast grow?**

Most recipes add table sugar (white sugar; its scientific name is sucrose). A few recipes add honey, agave nectar, or other food containing sugar. The sugar in the bread recipe allows the yeast to grow. Yeast cannot use the other ingredients of bread, like flour, to grow. The question is can yeast use an artificial sweetener like stevia to grow?