

## Yeast: A Helpful Fungus

**Yeast** is what causes bread to rise. Yeast is a **fungus** in the same major microbial group as mold, mildew and mushrooms. Sometimes fungi grow plant-like root systems and resemble plants, but they have no chlorophyll and cannot produce their own food. Yeast is found naturally in the air. Sugar can act as food for yeast, since the yeast can change it into alcohol, causing the release of carbon dioxide gas and energy. The bubbles in the experiment are carbon dioxide.

**Definitions:** Chlorophyll is a special substance that causes plants to have a green color. Chlorophyll lets plants make their own food.

### Materials for each group:

- 1 package of powdered yeast
- Clean empty liter soda bottle
- Balloon
- Plastic bowl
- Funnel
- Spoon
- 1 packet or 1 teaspoon of white sugar
- Warm water
- Measuring cup

### Procedure:

- 1) Pour half-cup of warm water into the bowl, add yeast and sugar and stir carefully.
- 2) Pour mixture into soda bottle. Add another half-cup of warm water.
- 3) Stretch the balloon over the top of the bottle and set in a warm, dark place for 3 to 4 days.
- 4) Predict what you think may happen to the balloon.
- 5) Draw or write observations each day.

### Questions:

1) What happened to the balloon? Why?

2) What did you notice happening inside the bottle?

### Extensions:

- Yeast (a fungus) makes bread rise. Other bacteria help us make cheese and vinegar, and break down dead plants and animals to fertilize the soil. These tiny living things can actually help us. Tell students that some medicines doctors prescribe come from good fungus. One example is penicillin.
- Yogurt is also full of good bacteria (acidophilus). Have the students research the process of making yogurt and other foods, such as cheeses, that use bacteria.
- If you have access to an oven or bread machine, you might want to try baking bread with the students. Recipes can be found in many cookbooks.
- Read the "*History of Yeast*".
- Research Louis Pasteur. What discoveries is he famous for. *Some possible answers: Louis Pasteur is one of the greatest benefactors of humanity. He solved the mysteries of rabies, anthrax, chicken cholera, and silkworm diseases, and contributed to the development of the first vaccines. He debunked the widely accepted myth of spontaneous generation, thereby setting the stage for modern biology and biochemistry. He described the scientific basis for fermentation, wine-making, and the brewing of beer. Pasteur's work gave birth to many branches of science, and he was singlehandedly responsible for some of the most important theoretical concepts and practical applications of modern science.*
- Yeast is not always the good guy. Pertaining to hygiene, yeast can be the cause of a vaginal infection for women. Small numbers of these tiny fungi (Candida) normally live on the skin and inside the vagina. An infection can occur when there is overgrowth of yeast in the vaginal environment. For more information about yeast infections, symptoms, and cures, check the following website: <http://familydoctor.org/206.xml>

### **Answer key:**

1) *The balloon should have begun to expand as if being blown up. This is caused by the action of the yeast and the sugar. As the yeast uses the sugar for food, carbon dioxide is released. The carbon dioxide causes the balloon to expand.*

2) *You should be able to see bubbles and lots of foam inside the bottle as the yeast and sugar interact.*

## ***History of Yeast***

Yeasts can be considered man's oldest industrial microorganism. It's likely that man used yeast before the development of a written language. Hieroglyphics suggest that that ancient Egyptians were using yeast and the process of fermentation to produce alcoholic beverages and to leaven bread over 5,000 years ago. The biochemical process of fermentation that is responsible for these actions was not understood and undoubtedly looked upon by early man as a mysterious and even magical phenomenon.



It is believed that these early fermentation systems for alcohol production and bread making were formed by natural microbial contaminants of flour, other milled grains and from fruit or other juices containing sugar. Such microbial flora would have included wild yeasts and lactic acid bacteria that are found associated with cultivated grains and fruits. Leaven, referred to in the Bible, was a soft dough-like medium. A small portion of this dough was used to start or leaven each new bread dough. Over the course of time, the use of these starter cultures helped to select for improved yeasts by saving a "good" batch of wine, beer or dough for inoculating the next batch. For hundreds of years, it was traditional for bakers to obtain the yeast to leaven their bread as by-products of brewing and wine making. As a result, these early bakers have also contributed to the selection of these important industrial microorganisms.



**Louis Pasteur**  
1822-1895

It was not until the invention of the microscope followed by the pioneering scientific work of Louis Pasteur in the late 1860's that yeast was identified as a living organism and the agent responsible for alcoholic fermentation and dough leavening. Shortly following these discoveries, it became possible to isolate yeast in pure culture form. With this new found knowledge that yeast was a living organism and the ability to isolate yeast strains in pure culture form, the stage was set for commercial production of baker's yeast that began around the turn of the 20th century. Since that time, bakers, scientists and yeast manufacturers have been working to find and produce pure strains of yeast that meet the exacting and specialized needs of the baking industry.

