

Main Course

- Activities will introduce participants to the consequences of genetic modification using classical breeding techniques and recombinant DNA technology.
- Three activities are offered in this lesson; two are optional. There is also an activity associated with Dessert.
- In these activities participants will find out how genetic modification has been accomplished in the past and what new tools are used today to study and modify DNA.

ACTIVITY 5.1 Balloons, Bottles and Bread

In this activity we will see the process of yeast producing carbon dioxide after being fed sugar – the same activity that occurs when making bread.

WHAT TO DO AHEAD OF TIME?

- Purchase yeast, sugar and a large rubber balloon.
- Find an empty, heavy glass/plastic beverage bottle.
- Make copy of **Handout 5.1** for each participant.

WHAT IS NEEDED?

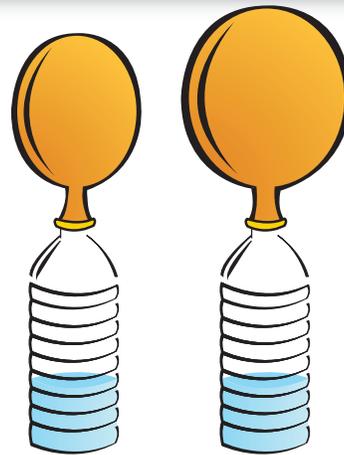
- One package of rapid active dry yeast.
- 1 cup very warm water (105° F to 115° F).
- Two tablespoons of sugar.
- Copy of **Handout 5.1** for each participant.

HOW MUCH TIME IS NEEDED?

20 - 25 minutes.

Directions

1. Before beginning the activity, stretch the balloon out by blowing it up several times and then releasing the air.
2. Add entire packet of yeast and sugar to cup of warm water and stir until sugar is dissolved.
3. Pour mixture into bottle.
4. Attach balloon to top of bottle, making sure bottle is sealed tightly.
5. After several minutes, observe the balloon. If nothing happens right away, wait longer.



Discussion

Nearly 10,000 years ago, humans began using one-celled organisms to make bread. In bread-making the organisms, yeast, are provided with sugars which they can break down. As they consume the sugar, they produce alcohol, which contributes to the aroma of baking bread, and carbon dioxide, which makes the dough rise and form a honeycomb texture.

In this activity the yeast feeds on sugar and produces carbon dioxide. With no place to go but up, this gas slowly fills the balloon. A very similar process happens as bread rises. Carbon dioxide made by the yeast has no place to go and expands the network made by the proteins in the wheat flour to form thousands of balloon-like bubbles. Bubbles gives the bread its "holey" texture texture.

- What do you think would happen if we substituted salt for the sugar?
- Describe what might happen if you used cold water instead of warm water.

When participants finish discussion, ask them to complete **Handout 5.1**.