

FEEDING FUNGI

Watch what happens when you feed sugar to billions of tiny living fungi called yeast.

MATERIALS

You will need:

- Warm water (about 37°C /100°F)
- Plastic bottle (about 500 mL)
- 1 tablespoon of sugar
- 2 packets of dry yeast
- Large balloon
- Large bowl
- Camera (optional)



YEAST

A small packet of yeast contains billions of tiny living fungi. Like us, yeast eat to get energy. What happens when we feed these tiny fungi?

INSTRUCTIONS

Fill a medium (about 500 mL or 16 fl oz) bottle to a depth of about 5 centimeters (2 inches) with warm tap water (about 37°C or 100°F).

Carefully pour the sugar and yeast into the bottle (it may help to make a paper funnel). Then, immediately stretch a balloon over the opening. Give the bottle a gentle swirl to mix the yeast, sugar, and water. Place the bottle in a bowl with warm water to keep the yeast warm. Observe the bottle every 5 minutes for at least 15 minutes and record what happens.

Rinse the bottle and clean up when you're done. To avoid pressure buildup, never cap the bottle with the yeast mixture inside.





RESULTS:

7

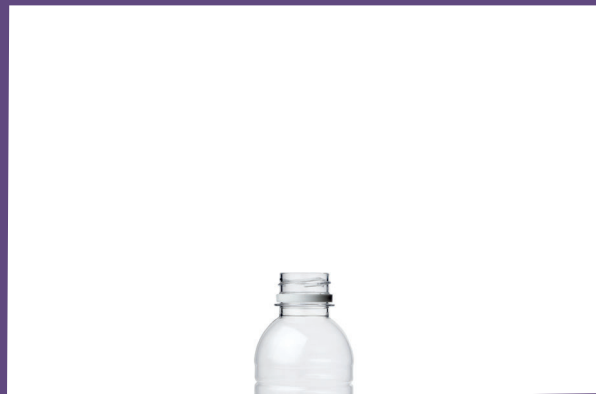
Sketch what the balloon looks like at each of the times below. Add notes to describe anything interesting or surprising that happened. If available, use a camera to take a photo at each of the times, or even a time-lapse video.

SKETCHES

Start (0 mins)



5 mins



10 mins



15 mins



NOTES: _____



DISCUSSION:

8

If things went well, the balloon should have inflated at least a little. What are some possible explanations for why the balloon filled up?

FERMENTATION

All living things on Earth produce gas.

Yeast eat sugar and release carbon dioxide gas in a process called **fermentation**. This is what was happening inside the bottle on the previous pages. In bread making, the gas forms the bubbles in dough that become the pockets in baked bread.

Yeast don't play an important role in the production of gases in the atmosphere, but other lifeforms changed Earth's atmosphere forever.



PRACTICE:

Answer the questions below about the demonstration on pages 150-151.

9 What do you think will change if you use less yeast? Explain.

10 What do you think will change if you don't add sugar? Explain.

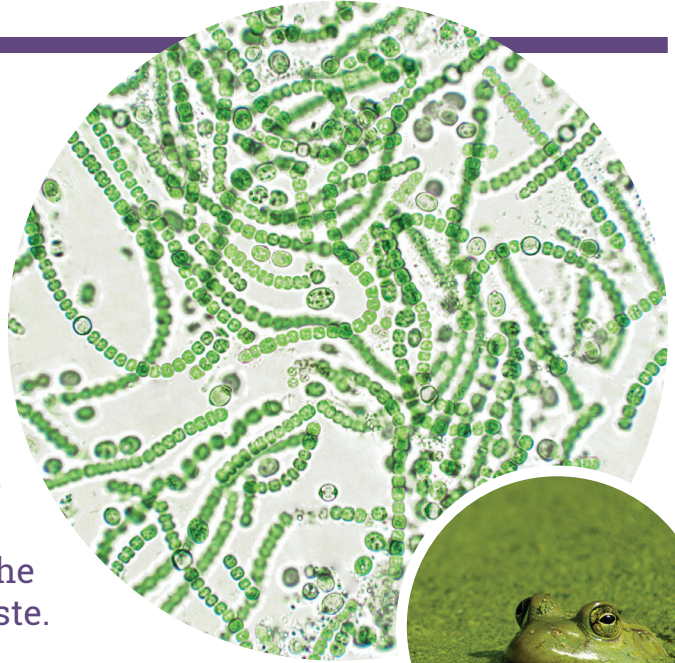
11 Look at the ingredients in fruit juice. Do you think that mixing yeast with warm fruit juice will create similar results? Explain.

PHOTOSYNTHESIS

We're not sure how Earth's very first lifeforms got their energy, but there is evidence that around 3 billion years ago, some bacteria began to do something very special.

These bacteria could use sunlight, water (H_2O), and carbon dioxide (CO_2) in a process called **photosynthesis** to make sugar ($C_6H_{12}O_6$) and oxygen (O_2), which they could then use for energy. Most of the oxygen in this process is released as waste.

Similar bacteria still live in most oceans, lakes, and ponds today.



12 Do you think ocean-dwelling bacteria that use photosynthesis live deep underwater or near the surface? Explain.

13 Besides sunlight, what two ingredients are needed for photosynthesis? What two things are produced by photosynthesis?

Ingredients	Products

14 What three types of atoms (see pages 138-139) are part of the ingredients and products in the process of photosynthesis?

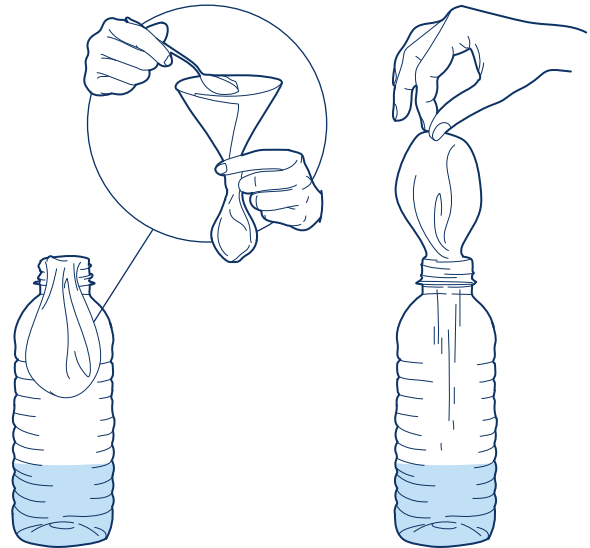
CHEMICAL REACTIONS

When two substances combine and change into something different, it's called a **chemical reaction**. Some chemical reactions are safe and easy to create.

Fill a medium (about 500 mL or 16 fl oz) bottle to a depth of about 5 centimeters (2 inches) with vinegar.

Carefully pour at least 1 small spoonful (5 or more grams) of baking soda into an empty balloon. You may need to make a paper funnel to get it all into the balloon.

Stretch the balloon over the top of the bottle, being careful not to spill the powder into the vinegar until the balloon is secure. Then, lift the balloon to dump the baking soda into the vinegar and watch what happens.



- 15 What was similar and different about what happened with this baking soda and vinegar mixture compared to the yeast, sugar, and water mixture on page 150?

- 16 What happens if you use less baking soda? Guess, then try it and describe your results.

Why did it do that?

Unlike the yeast mixture we made on page 150, nothing in the baking soda and vinegar mixture is alive. What you're seeing is a chemical

reaction where combining two substances creates new substances. In this case, the chemical reaction between baking soda and vinegar

creates water, carbon dioxide gas, and a type of salt. The carbon dioxide gas is what fills the balloon. Respiration, fermentation, and photosynthesis all involve multiple chemical reactions.