

KITCHEN SCIENCE: GINGER ALE

INTRODUCTION

This activity gives an example of chemical change—yeast transforming sugar into carbon dioxide. The other ingredients are involved in physical changes.

In the 1940s, sodas were not considered unhealthy as they are today. Many were semi-medical concoctions designed like pharmaceuticals. Coca-Cola originally had cocaine in it, and lithium was the active ingredient in 7-Up. Plant roots (like ginger, sassafras, and birch) were used in other sodas.

Mixing up the materials for ginger ale will take about half an hour, but it will not be ready to sample for 12 to 24 hours. Always use plastic bottles—pressure building up in glass jars could be dangerous. Do not put the bottles in the sun, as they may warm up and speed up the process.

This is a great opportunity to use science notebooks. The development of the concept of chemical change is complex, and will require many revisions—recording and revising is what science notebooks are for.

MATERIALS

- + 1 tbsp sugar
- + 1/4 tsp yeast
- + 1 tsp grated fresh ginger
- + 2 tsp lemon juice
- + 16 oz bottle of water
- + A disposable dropper

You will also need pitchers for the students to empty their bottles of water. They will use that water to make the ginger ale after they add the other ingredients to their bottle.

STANDARDS

NGSS 5 PS1-3

Make observations and measurements to identify materials based on their properties.

NGSS 5 PS1-4

Conduct an investigation to determine whether the mixing of two or more substances results in new substances.

NGSS MS PS1-2

Analyze and interpret data on the properties of substances before and after the substances interact to determine if a chemical reaction has occurred.

NGSS MS PS1-3

Gather and make sense of information to describe that synthetic materials come from natural resources and impact society.

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In upper elementary and into middle grades, students are developing their concepts of matter and how matter changes and reacts. This activity examines a chemical change occurs. It also considers how food scientists design substances to have necessary properties by controlling the proportions in a mixture. Some of the results of this combination of substances result in chemical changes (yeast turning sugar into CO₂), and others are not (sugar dissolving in water). It engages students in the Science and Engineering Practices of Defining Problems and Asking Questions, Designing Solutions and Constructing Explanations, but only if you make sure the discussion includes designing a material with desired properties AND consideration of whether or not this represents a chemical reaction or creation of a mixture.

You could also take a completely different direction, and use this activity to investigate metabolism of cells, or the carbon cycle in a very small model.

NAME:

DATE:

KITCHEN SCIENCE: GINGER ALE

You will need:

- + 1 tbsp sugar
- + 1/4 tsp yeast
- + 1 tsp grated fresh ginger
- + 2 tsp lemon juice
- + 16 oz bottle of water

Empty your water bottle into a pitcher or some other container. Add the other ingredients to your bottle; then refill it with water. Cap tightly and shake vigorously. Leave the bottle on the counter or in some other place in your classroom that is out of the sun. Before you leave it, squeeze the bottle to feel its firmness. After 12 to 24 hours, check it again.

What are the characteristics of chemical change? In other words, how can you tell if a change is a chemical change?

Which of the two things you made involved chemical change, and which involved physical change? What reacted in the chemical change? What kind of physical change occurred? Answer below and make your reasoning clear:

Physical Change:

Chemical Change: