

# FERMENTATION!

Grades 4-6 | 1 Class Period



## OVERVIEW

In this lesson, students will explore what fermentation is and why it occurs. They will learn how beneficial bacteria help preserve food and support gut health, and make a simple fermented cabbage recipe (sauerkraut). They will practice prediction as they observe changes over time in their fermentation jars.

## ESSENTIAL QUESTIONS

- What is fermentation?
- Why does fermentation occur?
- How do fermented foods help preserve food and support gut health?

## MA STATE FRAMEWORKS

### Nutrition and Balanced Eating [6.7.NE]

1. Demonstrate the importance of food to all people and how food is used to keep us healthy, return us to health, and connect us (e.g., soup when you are ill, comfort food, food after major events).
4. Articulate a health-promoting position on a nutrition-related topic and support the claim with accurate information.

## MATERIALS

- Sandor Katz and the Tiny Wild by Jacqueline Briggs Martin & June Jo Lee
- Materials Needed (for each small group or pair):
  - Handout: The Science of Fermentation
  - 1 small head of green cabbage
  - Large bowl
  - Sea salt (non-iodized, 1 TB per head of cabbage)
  - Food Safe Glass Jar (i.e. Mason Jar)
  - Measuring spoon
  - Clean hands and food-safe gloves
  - Optional: caraway seeds or shredded carrot
  - Marker and label sticker
  - Notebook or fermentation log sheet

## PROCEDURE

### Warm Up

Ask students if they have ever eaten sauerkraut or kimchi. If you are able, pass some around to taste. Ask students to describe the flavors. Explain to students that the main ingredient of sauerkraut and kimchi is cabbage. Show students a cabbage (green or purple or another type) and pass it around. How do they think cabbage turns into sauerkraut? What do they think happens when food 'ferments'?

# FERMENTATION!

Page 2



## PROCEDURE, Cont.

### Mini-Lesson: The Science of Fermentation

Explain to students that fermentation is when good bacteria break down sugars in food, creating new flavors and making the food last longer. Distribute the “Science of Fermentation” handout.

### Teach Key Concepts

- Lactic Acid Bacteria (LAB) are helpful microbes that live on vegetables and help with fermentation.
- When salt is added to cabbage, it pulls out water and helps LAB grow.
- LAB converts the sugars in cabbage into lactic acid, which preserves the cabbage and gives it a sour flavor.
- This is called lacto-fermentation.
- Fermentation is anaerobic (no oxygen needed).
- Lactic acid stops harmful bacteria from growing.

### Discuss the Health Benefits

Explain to students that:

- Fermented cabbage is full of probiotics (good bacteria for your gut).
- It helps with digestion and can support a healthy immune system.
- It's low in calories and full of vitamins (like C and K).

# FERMENTATION!

Page 3



## PROCEDURE, Cont.

### Hands-On Activity: Make Sauerkraut!

Steps for each group:

1. Ask students to carefully wash and dry their hands!
2. Place shredded cabbage in a bowl. Add salt (1 tablespoon per 2 cups cabbage).
3. Mix and squeeze the cabbage with clean hands until it becomes watery and soft (this should take 5–10 minutes).
4. Pack the cabbage tightly into the glass jar. Press down so that the liquid covers the cabbage.
5. Leave space at the top of the jar. Close the lid loosely or cover with a cloth/rubber band.
6. Label the jar with student names and the date.

Tell students that they will leave the jar at room temperature for 3–7 days to ferment.

### Wrap-Up

Discuss the following questions with the group:

- What surprised you about today's activity?
- Why is fermentation important for food preservation and health?
- Where else in the world do people ferment food?

## EXTENSIONS & VARIATIONS

An exciting way to launch this lesson is to read the engaging picture book, Sandor Katz and the Tiny Wild by Jacqueline Briggs Martin & June Jo Lee.

Book Summary: Sandor Katz's love of fermented food started with kosher dill pickles he ate as a New York City kid. As an adult, he left the busy city and moved to a queer community in the mountains of Tennessee. One day, when the cabbages were all ready to be harvested there were so many to use! Sandor tried to make sauerkraut. He kept experimenting, finding old recipes, combining old ideas to make something new. This exciting picture book tells the true food journey story of Sandor Katz who is the bestselling author of many books including, The Art of Fermentation, which won a James Beard Foundation Book Award in 2013.

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HANDOUT

## The Science of Fermentation



### Vocabulary

**Fermentation:** Fermentation is a metabolic process where microorganisms like bacteria, yeast, or fungi break down sugars (carbohydrates) into simpler compounds—such as acids, gases, or alcohol—in the absence of oxygen. This process is often used in food production (e.g., yogurt, bread, beer) and can also help preserve food.

**Lactic acid bacteria:** Lactic acid bacteria (LAB) are a group of beneficial bacteria that convert sugars into lactic acid. Common genera include Lactobacillus, Leuconostoc, Pediococcus, and Streptococcus. They are widely used in the fermentation of foods like yogurt, sauerkraut, and kimchi, and play a key role in food preservation and probiotic effects.

**Probiotics:** Probiotics are live microorganisms, usually beneficial bacteria or yeast, that when consumed in adequate amounts, provide health benefits to the host—especially for gut health. Many probiotics are strains of lactic acid bacteria or Bifidobacterium.

**Preservation:** Preservation refers to methods used to prevent food spoilage and extend shelf life. In fermentation, preservation occurs as acids (like lactic acid or acetic acid) or alcohol are produced, which inhibit the growth of harmful microbes.

**Anaerobic:** Anaerobic means "without oxygen." Anaerobic conditions are essential for many fermentation processes, as certain microbes (like lactic acid bacteria) thrive and carry out fermentation only when oxygen is absent.

### What Is Fermentation?

Fermentation is a natural process where tiny living things called bacteria turn sugars in food into acids or gases. This helps preserve the food, adds flavor, and sometimes even makes it healthier!

- In cabbage, the salt pulls out water, creating a salty brine. Lactic acid bacteria (already on the cabbage) grow and preserve it.
- It's anaerobic, meaning it happens without oxygen.
- Fermented cabbage is rich in probiotics, which help with digestion and gut health.
- Vitamin C & K — Help your body heal and stay strong.
- Long Shelf Life — Doesn't spoil quickly.
- Fermented cabbage is eaten all over the world!