



# NAME THAT CHANGE!

## BENCHMARKS and TASKS

**SC.A.1.2.2** The student knows that common materials (e.g., water) can be changed from one state to another by heating and cooling.

**SC.A.1.2.4** The student knows that different materials are made by physically combining substances and that different objects can be made by combining different materials.

**SC.A. 1.2.5** The student knows that materials made by chemically combining two substances may have properties that differ from the original materials.

- The student physically combines materials to create mixtures.
- The student demonstrates that physical changes in the states of matter can be produced by heating and cooling.
- The student observes the original materials and compares their properties to the properties of the new material produced in a chemical reaction.

## KEY QUESTION

How do you know whether various changes in matter are chemical or physical?

## BACKGROUND INFORMATION

**Matter** goes through **chemical and physical changes**. During physical changes, the state of the matter may change but not the chemical composition. Melting ice is a physical change since the matter (ice) changes form but the chemical composition remains the same (water). During a chemical change, the chemical composition of the matter changes. Burning a match and rusting iron are both chemical changes. In each case the bonds holding the molecules are broken and the **atoms** reform into different molecules.

## MATERIALS

### Per class (materials for all stations)

5 transparent plastic cups

strands of steel wool

tongs

2 containers of vinegar

paper towels

2 plastic spoons

1 empty 35 mm film canister

cubes in ice bucket or some other container that will keep them from melting

baking soda

1 plastic knife

small apples

safety goggles

matches

1 balance and mass set

salt

1 graduated cylinder

2 containers of water

1 candle anchored in clay on aluminum foil

### Per student

*Name That Change* activity sheet

## **TEACHING TIPS**

1. **Ask an adult volunteer to facilitate Station #5.** Make sure all safety precautions are strictly followed when using an open flame. All loose clothing and hair should be secured. Students should wear safety goggles. Water should be available at the station.
2. Make a sign for each station as follows:

Station #1 Procedure: Observe an ice cube in a plastic cup for a few minutes. Clean up before leaving the station.

Station #2 Procedure: Label a paper towel with the names of the students in your group. Use tongs to dip a small piece of steel wool into a cup of vinegar. Place the steel wool on a paper towel and observe. Since this change takes several hours to occur, you will leave the paper towel containing the steel wool to view later today.

**Note:** Steel wool can be purchased in a hardware store. It is used in refinishing furniture. Do not use the soap pads you find for sale in the grocery store. (This change takes several hours to occur. You may want to prepare a sample the night before to have at this station for students to view.)

Station #3 Procedure: Place a spoonful of baking soda into a plastic cup. Fill the film canister with vinegar and pour it into the cup with the baking soda. Observe what happens. Clean up the materials before leaving the station.

Station #4 Procedure: Cut a wedge from the apple and place it in the plastic cup. Observe it for a few minutes. Clean up before leaving.

Station #5 Procedure: Caution! Be very careful with the open flame. Observe all safety precautions!! Use clay to secure the candle to the aluminum foil. Light the candle. Observe for a few minutes. Blow out the candle.

Station #6 Procedure: Place 2 grams of salt in a plastic cup. Add 10 mL of water and stir. Observe. Empty and rinse the cup before leaving the station.

3. The materials to be placed at each station are as follows:

Station 1: ice cubes in ice bucket, plastic cup

Station 2: steel wool pieces, plastic cup with vinegar, tongs, paper towels

Station 3: plastic spoon, plastic cup, empty film canister, baking soda, vinegar, paper towels

Station 4: apple, plastic knife, plastic cup

Station 5: matches, candle, clay, aluminum foil, container of water, safety goggles

Station 6: salt, container of water, plastic cup, spoon or stirrer

## **ENGAGE**

Ask: *What is the difference between a chemical and a physical change?* (A chemical change produces a new product that has different chemical properties from the original substances while a physical change does not produce a new product. In a physical change the chemical properties of the original substance remain unchanged.)

*Give some examples of physical changes.* (freezing water to form ice, tearing paper)

*Give some examples of chemical changes.* (baking a cake, burning a match)

*Can you think of a situation where a substance might change both physically and chemically?*  
(Students may not have any ideas to discuss. This is a good place to tell them to think about this question as they move through the stations.)

### **EXPLORE**

1. Divide students into six groups and give each student a data sheet.
2. Explain to students that they will be moving through six different stations. At each station they should follow the procedure on the station card, observe any changes that occur and record on their data sheet if the change was physical, chemical, or both. Tell students to make sure they also write a reason for their choice.
3. Tell each group where to start and explain how students are to move as a group through the stations when you give the signal to move. Make sure students know that they will be given a three-minute warning before rotating so they should immediately begin to clean up when they hear the warning.
4. Watch students as they work at the stations and decide how to time the station rotations. After students have moved through all of the stations, you may want to clean up before going on to the Explain part of the lesson.

### **EXPLAIN**

1. Draw a Venn diagram on the board. Label one circle physical and the other chemical.
2. Give each group a large piece of chart paper or a white board. Tell students to copy the Venn diagram onto their chart.
3. Instruct students to decide as a group where each change (Station 1-6) should be placed on the Venn diagram. Give students several minutes to do this.
4. Conduct a class discussion having each group share where they placed the changes on the Venn diagram and why.
  - Physical changes include ice melting and mixing salt and water.
  - Chemical changes include the steel wool reacting with the vinegar to form rust and the production of a gas when vinegar and baking soda are combined.
  - The slicing of an apple is both physical and chemical. When the apple is sliced, a physical change occurs and when it is exposed to air and turns brown, a chemical change occurs.
  - The burning candle is also both physical and chemical. The melted wax is a physical change. The burning wick and wax is a chemical change.
5. If students have a problem coming up with the same results, have them describe the problems they had in determining whether changes at the stations were physical or chemical. Make sure you discuss how both a physical and a chemical change can occur.

### **EXTEND/APPLY**

Ask students where these changes would be placed on their Venn diagrams:

Cutting hair (physical)

Toasting a piece of bread (chemical, new substance is formed)

Dissolving a seltzer table in water (chemical, gas bubbles are produced)

Breaking rocks with a hammer (physical)

Melting ice cream (physical)

## **ASSESSMENT**

*If you were to crack an egg and stir it, would this be a physical or chemical change? Explain.*

*If you were to cook that egg, would that be a chemical or physical change? Explain.*

The choices that students make as to physical or chemical change are not as important as the explanation that goes along with those choices. If students call a change physical, they should explain that the substance changes shape, size, or state but is still the same stuff. Students should explain that chemical changes form new substances and evidence that physical changes have occurred might be gas bubbles, a change in color, or a change in temperature.

Student Scientist: \_\_\_\_\_

## NAME THAT CHANGE!

Station	Physical	Chemical	Both	Why?
#1 Ice Cube				
#2 Steel Wool in Vinegar				
#3 Baking Soda and Vinegar				
#4 Apple Slice				
#5 Burning Candle				
#6 Salt and Water				

