



Description

This activity is meant to extend your students' knowledge of the topics covered in the Make it Matter lab at The Tech. Through this activity, your students will practice their observational skills by classifying different items by their phase of matter and determine what kind of changes may result from heating or cooling.

Note: This is a demonstration for students to observe.

Grade Level 2	Student Outcomes Students will: <ul style="list-style-type: none"> Classify a set of materials as a solid, liquid, or gas. Experiment on how added heat or cold may change an object's phase. 	NGSS connections <ul style="list-style-type: none"> 2-PS1-4: Construct an argument with evidence that some changes caused by heating or cooling can be reversed and some cannot.
Duration 45-60 minutes		

Materials

<ul style="list-style-type: none"> Matter Samples: <ul style="list-style-type: none"> Approximately ½ cup of the following liquids in small clear cups: Juice (any flavor) Soda Olive oil or other vegetable oil 	<ul style="list-style-type: none"> 1 raw egg, beaten Butter (2-3 Tablespoons) Hot plate or microwave Freezer access Ice cube tray Observation sheet (see page 3)
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Vocabulary

Familiarity with these terms and concepts will enhance students' experience in the activity.

- Solid:** A state of matter that has its own defined shape, weight and volume. Examples: wood, metal, and plastic.
- Liquid:** A state of matter that does not have its own shape but takes the shape of the container it is in. It has its own defined weight and volume. Examples: water, milk, and juice.
- Gas:** A state of matter that does not have its own defined shape, mass, or volume. Examples: air, helium, and oxygen.
- Hypothesis:** An educated guess.
- Chemical change:** An irreversible change in the phase of matter being explored (raw egg to cooked egg).
- Physical change:** A reversible change in the phase of matter being explored (e.g., water to ice to water).

Introduction

By now, your students are very familiar with three phases of matter: solids, liquids, and gases. But can matter change phases? Matter is able to change phases, particularly when the temperature is changed by either applying heat or cold to the object. Sometimes, these changes are permanent (a chemical change) and other times they are reversible (physical change). Students will observe first hand how hot and cold temperatures affect a set of everyday edible matter!



Teaching Points

1. Review the phases of matter with students and have them provide examples of each. Students should be able to describe some basic properties of each phase:
 - a. Solid: Something hard, doesn't change shape on its own.
 - b. Liquid: Something that flows and takes the shape of the container it is in.
 - c. Gas: Something that we might not be able to see and does not take the shape of the container that it is in
2. Temperature can make big changes to matter, including changing its phase. Applying heat and cold can make these changes permanent or temporary.
 - a. Ask students if they can think of any examples of when something solid is turned into a liquid when heat is added or when something liquid is turned to solid when cold is added.
 - b. Some good examples are water to ice and vice versa or popsicles melting and refreezing.




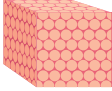












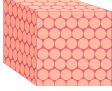












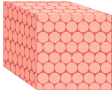












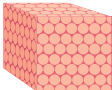












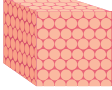











Procedure

The application of heat and cooling will be performed by the teacher only. This is a demo for students to observe.

1. Introduce your matter samples to your students. Have students record the current phases of matter (at room temperature) for each item on the observation sheet.
2. Each matter sample will soon be exposed to hot and cold temperatures to see the effects. Prior to temperature changes, have students make their hypotheses for what will happen to each sample with the given temperature change.
 - a. Students can do a think-pair-share to form their hypotheses.
 - b. Students should write their hypotheses on the observation sheet.
3. To expose the samples to cold temperatures, the matter samples will go in the freezer.
 - a. Pour a small amount of each sample into a well of the ice tray.
 - b. Label each sample if desired; put tray in freezer for minimum 1 hour.
 - c. *If classroom time is short, you can pre-freeze the samples to have them ready for students to observe instead of waiting for them to freeze.
 - d. Have the students make their observations on how the cold temperature has affected each matter sample. Students can think-pair-share or simply record observations on their sheet.
4. To expose the samples to hot temperatures, the matter samples will either be warmed on the hot plate or in the microwave.
 - a. Heat the remaining samples in the microwave or on the hotplate.
 - i. If using a hotplate, make sure samples are in a glass container or small pan. Please use caution!
 - ii. If using a microwave, only microwave for 30 - 45 seconds each. One minute may be necessary for the egg to cook completely.
 - b. Have the students make their observations on how the hot temperature has affected each matter sample. Students can think-pair-share or simply record observations on their sheet
5. Discuss whether or not the changes are physical or chemical. How could we test if the changes are physical or chemical?
 - a. Let the matter come back to room temperature!
 - b. Can we think of other examples of chemical and physical phase changes?



Observation Sheet

	 Room Temperature	 Heat	 Cold
Juice	   <p>SOLID LIQUID GAS</p>	   <p>SOLID LIQUID GAS</p> <hr/>   <p>Chemical Change Physical Change</p>	   <p>SOLID LIQUID GAS</p> <hr/>   <p>Chemical Change Physical Change</p>
Soda	   <p>SOLID LIQUID GAS</p>	   <p>SOLID LIQUID GAS</p> <hr/>   <p>Chemical Change Physical Change</p>	   <p>SOLID LIQUID GAS</p> <hr/>   <p>Chemical Change Physical Change</p>
Oil	   <p>SOLID LIQUID GAS</p>	   <p>SOLID LIQUID GAS</p> <hr/>   <p>Chemical Change Physical Change</p>	   <p>SOLID LIQUID GAS</p> <hr/>   <p>Chemical Change Physical Change</p>
Butter	   <p>SOLID LIQUID GAS</p>	   <p>SOLID LIQUID GAS</p> <hr/>   <p>Chemical Change Physical Change</p>	   <p>SOLID LIQUID GAS</p> <hr/>   <p>Chemical Change Physical Change</p>
Egg	   <p>SOLID LIQUID GAS</p>	   <p>SOLID LIQUID GAS</p> <hr/>   <p>Chemical Change Physical Change</p>	   <p>SOLID LIQUID GAS</p> <hr/>   <p>Chemical Change Physical Change</p>