

# How Do Liquids and Solids Change When We Mix Them?



**Focus:** Students explore the ways in which familiar liquids and solids can change when they are mixed with one another.

## Specific Curriculum Outcomes

**Students will be expected to:**

- 25.0 investigate changes that result from the interaction of materials and describe how their characteristics have changed [GCO 1/3]
- 16.0 use appropriate tools [GCO 2]

## Performance Indicators

**Students who achieve these outcomes will be able to:**

- describe some ways that liquids and solids can change characteristics when they are mixed together
- identify mixtures as reversible or irreversible

## NOTES:

## Attitude Outcome Statements

### Encourage students to:

- consider their observations and their own ideas when drawing a conclusion [GCO 4]

## Cross-Curricular Connections

### Art

#### Students will be expected to:

- explore a range of art materials, processes, and vocabulary to develop art making skills [1.3.4]

### English Language Arts

#### Students will be expected to:

- communicate information and ideas effectively and clearly, and to respond personally and critically [GCO 2]
- interpret, select, and combine information using a variety of strategies, resources, and technologies [GCO 5]

## Getting Organized

| Components                                                                                                                                                                                                             | Materials                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Before You Begin                                                                                                                                                | Vocabulary                                                                                                               |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"> <li>• Science Card 7</li> </ul> <p><b>Literacy Place:</b></p> <ul style="list-style-type: none"> <li>• <i>3-2-1 Blast Off!</i> (Shared Reading—Sequencing Strategy Unit)</li> </ul> | <ul style="list-style-type: none"> <li>• glass of water</li> <li>• bottle of food colouring</li> <li>• various mixing tools</li> <li>• sticky notes</li> <li>• safety goggles for all students</li> <li>• small cups (30)</li> <li>• three pitchers of water</li> <li>• small quantities of bubble bath liquid, cooking oil, instant coffee, drink mix, baking powder, vitamin C tablets, compressed soil discs, and various other liquids and solids (e.g., bar of soap, crackers, tissue, dried fruit, salt, sugar, sand, kitty litter, honey, glue, chocolate syrup)</li> <li>• digital camera (optional)</li> <li>• students' Science Folders</li> <li>• aprons for all students</li> <li>• plastic table coverings and/or paper towels</li> <li>• large box of cornstarch</li> <li>• water</li> <li>• 1 large bowl</li> <li>• 1 small bowl</li> <li>• measuring cups and spoons</li> <li>• empty, clear plastic water or soda bottles (one per group)</li> <li>• uninflated balloons (one per group)</li> <li>• small funnels or spouted containers (one per group)</li> <li>• white vinegar</li> <li>• baking soda</li> </ul> | <ul style="list-style-type: none"> <li>• Set up three mixology areas, each stocked with 10 small cups, a pitcher of water, and various mixing tools.</li> </ul> | <ul style="list-style-type: none"> <li>• mix</li> <li>• mixture</li> <li>• reversible</li> <li>• irreversible</li> </ul> |

## Safety

- Remind students not to taste any of the substances they are mixing.
- You may choose to have students wear safety goggles, aprons, and/or gloves while they are combining liquids and solids.

## Science Background

- A mixture is the combination of two or more substances that results in a reversible or irreversible change to the substances. Some substances combine so evenly that you can't tell them apart (e.g., salt water). Other substances stay separate, even when you combine them (e.g., gravel in water). Some substances, such as oil and vinegar, look like they are evenly combined when they are first mixed, but eventually become separated.

## ACTIVATE

### Water Colours

Tell students that you are going to show them how the coloured water in the previous teaching plan's sensory bottles was made. First, show students a glass of water and a bottle of food colouring. Ask them to describe some of the properties of each, including colour and viscosity. Then, add a drop of food colouring to the glass of water, but do not mix it yet. Ask students to observe what happens when the water and food colouring are simply combined. Then, stir the water gently and have students describe how the food colouring and the water change when they are mixed (the original colour of the food colouring becomes less intense). Have students predict what will happen if you mix in a few more drops of food colouring (the water's colour will become deeper), and then proceed with the addition of more drops to support or reject their prediction.

### Let's Make a Volcano

Have students use various resources to research how to make a volcano out of papier mâché, using baking soda and vinegar (or another combination) to simulate an eruption. Choose a set of instructions from their research, gather the necessary materials, and build a volcano as a class. Discuss how the liquids and solids were combined to create the papier mâché. Then ask:

- **How did the liquid and solid change when they were combined inside the volcano?**

## CONNECT



### Mad Mixology

Display Science Card 7. Ask students to take turns identifying a mixture and predicting what two liquids or solids were mixed together (water and bubble bath liquid; water and an effervescent tablet, such as vitamin C; water and oil; water and instant coffee; water and soil; water and drink mix; lettuce and other vegetables). Note their predictions on sticky notes and affix them to the card. Ask:

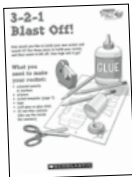
- **How do you think the liquids and solids changed after they were mixed?**

Tell students that they are going to experiment with different liquids and solids to test their predictions and to investigate other mixtures.

Have students form three groups. Provide each group with safety goggles, small cups, a pitcher of water, and mixing tools. Then provide one group with small quantities of bubble bath liquid, cooking oil, and various other liquids (e.g., honey, glue, chocolate syrup). Provide a second group with small quantities of instant coffee, drink mix, baking powder, and various other granular and powdered solids (e.g., salt, sugar, sand, kitty litter). Provide a third group with small quantities of vitamin C tablets, compressed soil discs, and various other liquids and solids (e.g., bar of soap, crackers, tissue, dried fruit).

Have each group decide on a method for recording the mixtures they create and how each substance changed after it was mixed. For example, groups can use any combination of notes, drawings, and digital photos, noting their observations before, during, and after each mixture. They can also create their own version of *BLM Results Table* (see page 38). Have students store their completed notes, drawings, photos, and/or tables in their Science Folders.

Remind students that they should mix each of their materials with water and record the changes that result. Once a group has supported or rejected a prediction posted on Science Card 7, students can either add a check mark to the sticky note or correct the prediction. Invite students to add any questions they may have to the I Wonder Wall.

[illegible]

**Literacy Place Connection:**

**Literacy Place Connection:**  
Revisit or read 3-2-1 *Blast Off!* to find out how the combination of water and a seltzer tablet can power a rocket! Challenge students to create and launch their rockets. Ask:

- What was the result of combining this liquid and solid?
- How did the materials change when they were mixed?

The combination of the seltzer tablet and vinegar creates carbon dioxide. The pressure which builds up as this carbon dioxide gas is produced “fuels” the rocket.

# CONSOLIDATE

## Stay or Stray

Have students do a Stay or Stray activity to share their results with other groups, i.e., have one student from each group “stray” to another group and explain how each of their mixtures changed the characteristics of the materials involved; the other students in each group “stay” and explain their results to “straying” students.

Bring students back together and discuss whether any of their mixtures are reversible, or could be “un-mixed.” Help students to realize that once mixed, some combinations of liquids and solids cannot be returned to their original state—they are irreversible or not reversible.

### **Slime!**

Assist students in making “slime” with cornstarch, water, and food colouring. They will need approximately 2 parts cornstarch to 1 part water.

Students should wear aprons during this activity, and cover their mixing area with plastic or paper towels. First, have students add a few drops of food colouring to a small bowl of water and stir gently. Then, have them pour about half of the coloured water into a large bowl containing the cornstarch and mix the two with a spoon. More water can be added as needed, a little at a time, as students continue mixing. If too much water is added, more cornstarch can be added. The goal is to create a substance that flows easily but that can also be formed into a ball when pressure is applied. Once students have created their slime, invite them to decide if it is a liquid or a solid, and to explain their reasoning.

**Note:** This activity may require a volunteer to provide supervision and assistance as needed.

## **EXPLORE MORE**

### **Fizzy Balloons**

Use this activity to reinforce students’ understanding of the baking soda–vinegar reaction that made the papier mâché volcano “erupt.” Give each small group of students an empty, clear plastic water or soda bottle and an uninflated balloon. (All students should wear safety goggles during this activity.) Have each group use a small funnel or spouted container to pour  $\frac{1}{3}$  cup of vinegar into their bottle. Then ask one student in each group to stretch open the mouth of the balloon while another student adds 1 teaspoon of baking soda into it. Students should make sure all the baking soda goes into the main part of the balloon, and that none remains near the balloon’s mouth. Students can then carefully attach the mouth of the balloon to their bottle, making sure none of the baking soda spills inside.

When all groups have reached this stage, ask one student in each group to hold the mouth of the balloon securely on top of the bottle, while another student tips the balloon up, allowing the baking soda to pour into the bottle. Students will see their balloons inflate because of the reaction between the baking soda and the vinegar.