

# Activity 4.1

## Defining dissolving

### How can you tell when a substance is dissolved?

In this introductory activity, students see that sugar and food coloring dissolve in water but neither dissolves in oil. Based on their observations, students can conclude that both solids and liquids can dissolve but, they don't necessarily dissolve in all liquids. Through this activity and the rest of *Investigation 4*, students will refine their definition of *dissolve* and extend it to include solids, liquids, and gases.

### Materials needed for each group

Water	4 Clear plastic cups
Vegetable oil	1 Tablespoon
Sugar	1 Teaspoon
Food coloring	
2 Small cups	

### Notes about the materials

- **Be sure you and the students wear properly fitting goggles.**
- You may distribute tap water in a source cup or bottle with a squirt-top for each group.
- Each group will need its own small bottle of food coloring. Any color will do.
- Students may use 2 clear plastic cups instead of 4 in this activity. After comparing how well sugar and food coloring dissolve in water, students can empty, rinse, and dry the cups. Students can then use the same cups to compare how well sugar and food coloring dissolve in oil.

### Preparing materials

- Use a permanent marker to label 2 small cups **sugar** and **vegetable oil**.
- Place 2 teaspoons of sugar in its labeled cup.
- Place 2 tablespoons of vegetable oil in its labeled cup.

### Activity sheet



Copy *Activity sheet 4.1—Defining dissolving*, pp. 183–186, and distribute one per student when specified in the activity.

### Assessment

An assessment rubric for evaluating student progress during this activity is on pp. 218–219. For this formative assessment, check a box beside each aspect of the activity to indicate the level of student progress. Evaluate overall progress for the activity by circling either “Good”, “Satisfactory”, or “Needs Improvement”.

# Activity 4.1

## Defining dissolving

### Question to investigate

## How can you tell when a substance is dissolved?

### Take a closer look

1. Have students read the introductory story on *Activity sheet 4.1* and see that both sugar and food coloring dissolve in water.



Distribute *Activity sheet 4.1—Defining dissolving*. As students read about the student who adds drink mix to different liquids, distribute the sugar, food coloring, and water. Then have students add sugar and food coloring to water as described in the procedure below.

### *Procedure*

#### *Sugar*

1. Place about 1 tablespoon of room-temperature water in each of 2 clear plastic cups.
2. Add 1 teaspoon of sugar to one cup and swirl for about 10 seconds. Observe.
3. Swirl for another 10 seconds and observe. Swirl for a final 10 seconds and observe.



#### *Food Coloring*

1. Gently place 1 drop of food coloring in the other cup of water. Observe.
2. Gently swirl for a few seconds. Swirl again for a few more seconds.



***Expected results:*** After swirling, very little to no sugar is visible in the water. The food coloring combines quickly and colors the water evenly.

As students do the *Take a closer look* activity and answer the questions, circulate to make sure students are considering aspects of dissolving.

- The sugar is present even though you can't see it.
- The sugar and food coloring are evenly distributed throughout the water.

When students have completed the activity, ask them to share their ideas about dissolving. Point out that sugar, which is a solid, and food coloring, which is a liquid, both mixed evenly throughout the liquid. So, both solids and liquids can dissolve.

## Try this!

### 2. Have students add sugar and food coloring to oil and record their observations.

Distribute vegetable oil to each student group.

#### *Procedure*

##### *Sugar*

1. Place 1 tablespoon of vegetable oil in each of 2 clear plastic cups.
2. Add 1 teaspoon of sugar to one cup and swirl for about 10 seconds. Observe.
3. Swirl for another 10 seconds and observe. Swirl for a final 10 seconds and observe.



##### *Food Coloring*

1. Gently place 1 drop of food coloring in the other cup of oil. Observe.
2. Gently swirl for a few seconds. Swirl again for a few seconds.



***Expected results:*** After swirling, most or all of the sugar is visible in the oil. Initially, the drop of food coloring sinks to the bottom of the cup. After swirling, small drops of color are visible in the oil.

As students do the *Try this!* activity and answer the questions, circulate to make sure they recognize that neither sugar nor food coloring dissolves in oil. Ask students: If certain substances dissolve in a particular liquid, will they necessarily dissolve in another liquid?

## What's next?

### 3. Discuss students' ideas about dissolving.

As a whole class, write a list of characteristics about dissolving and post it in the classroom. Based on this activity, some characteristics you might include are:

- Evenly mixed
- So well-mixed you can't see pieces, or drops
- May "disappear" but the substance is still there
- Solids and liquids can dissolve
- Even though a solid or liquid may dissolve in one liquid, it may not necessarily dissolve in another

You and your students should revisit this list and add to it as students explore different aspects of dissolving in each of the other activities in this investigation.