

Activity 4.2

Dissolving a substance in different liquids

Does colored sugar dissolve equally well in water, vegetable oil, and alcohol?

In the introductory story on *Activity sheet 4.1*, the student added drink mix to different liquids. Many drink mixes are sugar, coloring, and flavoring. In this activity, students make colored sugar and add it to water, alcohol, and oil to discover some interesting differences in dissolving.

Materials needed for each group

Water	Zip-closing plastic bag, sandwich size
Vegetable oil	3 Clear plastic cups
Isopropyl rubbing alcohol, 70%	3 Popsicle sticks or stirrers
Sugar	1 Teaspoon
Food coloring	

Notes about the materials

- Be sure you and the students wear properly fitting goggles.
- When using isopropyl alcohol, read and follow all warnings on the label.

Preparing materials

- Place 1 tablespoon of sugar in a sandwich-sized zip-closing plastic bag.
- You may choose to add 1 drop of food coloring to the sugar in the bag, or distribute bottles of food coloring so that each group can add the food coloring to the sugar on their own.
- Use a permanent marker to label 3 clear plastic cups **water**, **alcohol**, and **vegetable oil**.
- Place 1 tablespoon of each liquid in its labeled cup.

Activity sheet



Copy *Activity sheet 4.2—Dissolving a substance in different liquids*, pp. 190–191, 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”.

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Dissolving a substance in different liquids

Question to investigate

Does colored sugar dissolve equally well in water, vegetable oil, and alcohol?

1. Introduce the activity.

Tell students that water, alcohol, and oil are all commonly used to dissolve different substances. Depending on what the substance is, it may dissolve better in one of these liquids than another. For example, vanilla can be dissolved in a type of alcohol to make vanilla extract, but it does not dissolve well in water. Some vitamins, like Vitamin C, dissolve best in water, while others, like Vitamin E, dissolve best in oil. One of the properties of a substance is how well it dissolves in a particular liquid.



Distribute *Activity sheet 4.2—Dissolving a substance in different liquids*. Tell students they will make colored sugar and see how well it dissolves in water, rubbing alcohol, and vegetable oil.

2. Show students how to make colored sugar.

Demonstrate how to make colored sugar before having your students do it.

Procedure

1. Add 1 drop of food coloring to 1 tablespoon of sugar in a sandwich-sized zip-closing plastic bag.
2. Leaving air in the bag, seal the bag securely.
3. Shake the bag vigorously until the sugar is thoroughly colored.



3. Discuss with students how to design an experiment to compare how well colored sugar dissolves in water, alcohol, and vegetable oil.

Ask students how they would design an experiment to see how well colored sugar dissolves in water, alcohol, and oil. Students should suggest using the same amount of the same colored sugar in the same amount of each liquid and that the liquids should all be at the same temperature. They should also suggest stirring each in the same way and for the same amount of time.

4. Have students mix colored sugar in water, alcohol, and oil and record their observations.

Procedure

1. Add 1 teaspoon of colored sugar to 1 tablespoon of water, alcohol, and vegetable oil.
2. Stir each with a clean popsicle stick.
3. Record your observations on *Activity sheet 4.2*.



5. Discuss student observations.

Ask students questions like the following:

- What do you observe in each cup?
- Does the color seem to dissolve more in one liquid than in another?
- Does the sugar seem to dissolve more in one liquid than in another?

Expected results:

Water—The color and the sugar dissolve completely in the water.

Alcohol—The color dissolves, but the sugar does not dissolve.

Oil—The color does not dissolve, and neither does the sugar.

Tell students that the amount of a substance that can dissolve in a liquid is called its *solubility*. Point out the similarity in the words *dissolve* and *solubility*.

6. Have students add to the class list about dissolving.

Ask students: What did you find out about dissolving from this activity? Students should realize that just because something dissolves in one liquid, doesn't necessarily mean that it will dissolve in another. They may also conclude that if a material is made of more than one substance, like colored sugar, one substance might dissolve while the other does not.