

All Mixed Up

Organizing Topic Investigating the Structure and States of Matter

Overview Students observe a variety of mixtures and solutions and compare and contrast them.

Related Standards of Learning 5.1e, h; 5.4b

Objectives

The students should be able to compare and contrast mixtures and solutions.

Materials needed

Clear plastic cups
Powdered drink mix
Water
Pepper
Mixed fruit salad
Marbles
Sand
Yogurt with fruit mixed in
Milk
Chocolate powder
Salt
Copies of attached worksheet and Venn diagram
Overhead projector (optional)

Instructional activity

Content/Teacher Notes

In this investigation, students will rotate among different centers, observing various mixtures and solutions in clear plastic cups. See the attached worksheet for examples.

Before beginning this investigation, be sure to introduce students to the idea that a *mixture* is a combination of at least two or more different substances that do not lose their identifying characteristics when combined — for example, mud and water, or milk and cereal. Many mixtures can be easily separated.

When two substances mixed together *cannot* be easily separated because one substance *dissolves* in the others, the mixture is a *solution*. It is possible to separate the two substances, but not very easily. An example of a solution is sugar dissolved in tea: the sugar is still there, but it is dissolved, and in order to separate it out, you would need to evaporate the liquid.

Students should understand at the end of the activity that all solutions are mixtures, but not all mixtures are solutions.

Introduction

1. Tell students that in their everyday lives, they frequently encounter mixtures and solutions, and give them a chance to name some mixtures and solutions and tell you what they already know about them.
2. Give students the definitions of *mixture* and *solution*, and have them record the definitions for future reference. Have the students add to their list of mixtures and solutions in light of knowing these definitions.
3. Tell the students that they are going to make observations to determine whether various liquids they examine have formed mixtures or solutions. If necessary, review the use of Venn diagrams.

Procedure

1. Use the attached worksheet to prepare the designated mixtures and solutions, or prepare a similar worksheet to use with other mixtures and solutions of your choice.
2. Set the prepared cups at different stations around the room. Be sure to label each cup clearly with its contents.
3. Write the definitions of *mixture* and *solution* on the board for reference. Have students work individually or in pairs to fill out the worksheet as they move from center to center. Remind students that it may be possible to check both the mixture and solution box but that they need to explain why they chose both.
4. When students have completed their observations and formed a conclusion, hand out the attached Venn diagram to each student. Have each student fill out the areas of the diagram, listing the various mixtures and solution they have identified. Place a copy of the diagram on the overhead, or make a large version on the board, and have the students fill it in during a class discussion based on their observations.

Observations and Conclusions

1. As the class discusses their results, lead the students to explain the similarities and differences between mixtures and solutions. Be sure they grasp the concept that all solutions are mixtures, but not all mixtures are solutions.

Sample assessment

Use the completed worksheets for immediate assessment.

Give students different mixtures and solutions to identify, using the same kind of data sheet. Evaluate the reasoning behind their answers.

Follow-up/extension

Take this a step further by investigating suspensions: give the students vegetable oil and water to observe and assess without telling them whether it is a mixture or solution.

Comparing and Contrasting Mixtures and Solutions

Name: _____ Date: _____

Closely observe the contents of each cup, and decide whether its contents is a **mixture** and/or a **solution**. Explain the reason for your decision.

Substances	Mixture (✓)	Solution (✓)	Reason
Powdered drink & water			
Water & pepper			
Mixed fruit salad			
Marbles & sand			
Sand & water			
Fruit & yogurt			
Chocolate powder & milk			
Water & salt			

Form a conclusion based on your observations, and write your conclusion below:

Comparing Mixtures and Solutions in a Venn Diagram

Name: _____

Date: _____

