A MATTER OF MIXING

BENCHMARK and TASK

SC.A.1.2.4 The student knows that different materials are made by physically combining substances and that different objects can be made by combining different materials.

- The student separates a mixture by sorting, sifting, filtering, and evaporating.

KEY QUESTION

How can mixtures be separated? (sifting)

BACKGROUND INFORMATION

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An **element** is the simplest form of matter. All matter is made up of **atoms.** Each **element** is made of atoms of the same type. Two or more elements that have combined chemically are called a **compound.** A compound can be separated only by chemical means. Table salt is an example of a compound.

A **mixture** is a combination of two or more substances that have not combined chemically. A mixture can contain elements, compounds, or both, and in any amounts. Because the substances in a mixture are not combined chemically, they keep their unique properties and can be separated by physical means. Mixtures can be separated using processes that depend on their different properties:
Sorting: To separate by arranging according to class, kind, or size
Evaporation: To convert or change into a vapor, usually leaving only the dry, solid portion of the mixture
Sifting: To separate fine particles from coarse particles
Filtering: To separate suspended matter in a liquid or gas

MATERIALS

Teacher

1 tray
1 vial (see Teaching Tips)
1 vial rim cap (see Teaching Tips)
1 fine mesh screen (see Teaching Tips)
1 coarse mesh screen (see Teaching Tips)
sand and paper clips or iron nuggets mixture (from the *What's the Matter?* activity)
1 magnet

Per student

hand lens

Per group

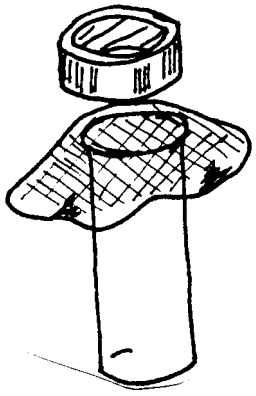
1 sheet of 8 1/2 x 11 inch dark construction paper cut into four pieces
1 tray
one 25 mm plastic vial of sifting mixture (see Teaching Tips)
1 vial cap rim (or rubber band)
1 fine mesh screen
1 coarse mesh screen
Sifting Mixtures worksheet
1 microscope and blank slides (optional)

TEACHING TIPS

1. Order the Sifting Mix or prepare your own: 1 cup of coarse sand, 1 cup of salt, 1 cup baking soda. Mix well and pour into small vials for each group. Set up trays with group materials.
2. You can purchase the following items from Delta Education (1-800-258-1302): Coarse Mesh Screen **(package of 40) #90-190-0821;** Fine Mesh Screen **(package of 40) #90-190-0953;** Sifting Mix **#90-130-2223;** Vials **(package of 10) # 90-220-0439; and** Vial Cap Rims **(package of 10) # 90-180-0369**

ENGAGE

1. Display the sand and iron nuggets mixture. Ask: *How did you separate this mixture in the last activity?*
   Demonstrate separating the mixture with the magnet.
2. Ask: *Is there another way we could separate the mixture?*
3. Show students the jar of sifting mixture but do not identify its contents by name. Tell students that each group will be given a vial of the mixture and tools with which to separate it into parts that have different properties.
4. The technique of using a vial, vial cap rim and mesh screen as a "saltshaker" can be demonstrated by placing the mesh screen over the vial of mixture and securing the mesh with the vial cap rim. When turned upside down, the vial can be used as a "salt shaker".



EXPLORE

1. Distribute a tray with all materials to each group.
2. Tell students that they will separate the contents of the mixture into parts by sifting. The mixture should be sifted onto the dark construction paper pieces. Point out that there are two different screens to use in the process. Encourage students to think carefully about how to use the screens. (Note: Students may discover that the order in which they use the screens is important; that they can use both screens together; or that they can fold a screen to create different thicknesses. Encourage groups to share their discoveries.)
3. Have students use a hand lens or a microscope to examine each substance after sifting and record properties of each on the *Sifting Mixture* worksheet.

EXPLAIN

How many substances were in the mixture?
How could you tell that there were that many substances?
How did you separate them?
What happened when you used the coarse screen first?
What happened when you used the fine screen first?
How were the individual substances alike?
How were the individual substances different?

EXTEND/APPLY

Ask the following questions:
Have you ever sifted anything?
What is the purpose of sifting? (to separate fine particles from coarse particles)
Why would a baker need to sift flour?

EXTENSION

Read about the California gold rush. Find out how people separated mixtures of water, sand, and rock to find gold.

ASSESSMENT

Show students a mixture containing coarse sand, baking soda, salt, and paper clips. Ask them to write about how they would separate the mixture. Encourage them to think about what they did in the last two activities: *What's the Matter?* and *A Matter of Mixing*.

Student Scientists _____

SIFTING MIXTURES

Assign a number to each of the substances that you sifted from the mixture. Use a hand lens and/or microscope to observe each substance. Record your observations about the color and texture of each substance.

Substance Number	**1**	**2**	**3**
Color **Is the substance very light, medium colored, or very dark?**			
Texture **Is the substance very fine, medium-textured, or very coarse?**			

Making Inferences:

What do you think substance #1 is? _____

What do you think substance #2 is? _____

What do you think substance #3 is? _____