

FINELY FILTERED

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 a mixture be separated? (filtering)

BACKGROUND INFORMATION

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

125 mL water mixed with 1 Tbsp. of cornstarch (in plastic jar)

Per group

paper towels

1 tray

2 plastic cups

1 funnel

5 coffee filters (cone filters would work and reduce the need for folding)

hand lenses

small container of cornstarch

small container of water

1 graduated cylinder

1 tablespoon

TEACHING TIP

Remind students NOT to taste any substance.

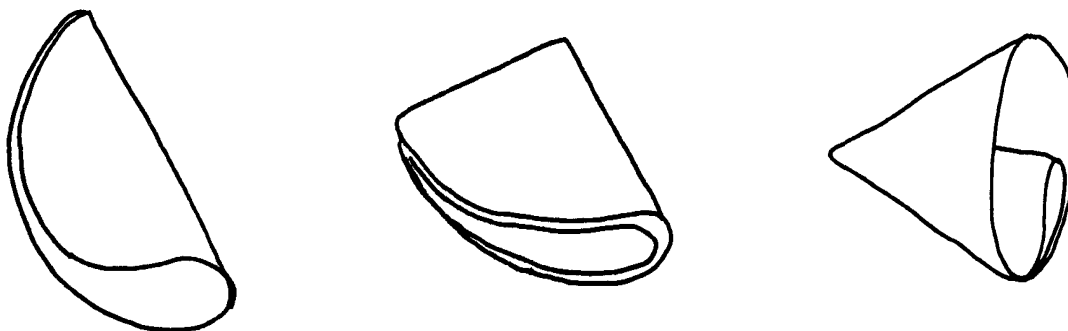
ENGAGE

1. Display the jar of corn starch/water mixture. (Make sure it is thoroughly mixed.)

- Ask: *What does this solution look like?* (It should resemble milk.)
- Let the mixture set for a few minutes and ask students what they observe. (Students should start to see the substances in the mixture separate.)
 - Explain that the mixture contains two substances, water and corn starch. The cornstarch is in suspension. (That means the cornstarch is distributed throughout the water.)
 - Ask: *Can we separate this mixture another way?*

EXPLORE

- Give each group a set of materials. Ask students to mix 1 Tbsp. of cornstarch with 125 mL water in one of the plastic cups.
- Show students how to fold a coffee filter in half, in half again, and then pull it out to form a cone as shown in the illustration. (If using a cone coffee filter, this step can be skipped.)



- Have students place the cone filter in the funnel, and then place the funnel in one of the plastic cups. One group member should pour the cornstarch/water mixture into the funnel.
- After the mixture has been filtered, tell students to unfold the filter, place it on a paper towel and label the paper towel #1. Ask students to observe the residue on the filter. Have students rinse and dry the first cup which held the mixture.
- Students should prepare another filter and place it in the funnel. The liquid should now be filtered a second time. Remind students to unfold the filter afterwards, place it on a paper towel labeled #2, and observe the residue. Again, students must rinse and dry the cup.
- Have students repeat the filtering process until they have filtered the liquid five times.

EXPLAIN

Do all of the filters look the same?

What is the residue on the filter? (cornstarch that was suspended in the water)

Which filtering trial took the longest? (trial #1)

Why did the first trial take so long?

How would you describe the mixture after five trials?

How does filter #1 compare with filter #5?

How does the liquid look now compared to the way it looked before you started filtering? (Use some of the mixture from the Engage activity for this comparison.)

EXTEND/APPLY

- Ask students to think of some things that are filtered. Make a list as they respond.

(coffee, tea, drinking water, pool water, and air are a few examples that students may suggest.)

2. Discuss how water is filtered for drinking.
3. Take two samples of pond water. Save one sample for comparison purposes and perform the filtering process on the other sample. Have students compare the filtered water with the original pond water sample.

ASSESSMENT

Ask students to compare four ways of separating mixtures: sorting, evaporation, sifting, and filtering