

A CLOSER LOOK

BENCHMARKS AND TASKS

SC.A.1.2.1 The student determines that the properties of materials (e.g., density and volume) can be compared and measured (e.g., using rulers, balances, and thermometers).

SC.A.1.2.3 The student knows that the weight of an object always equals the sum of its parts.

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 determines the properties of an object using qualitative observations and metric measurements that incorporate tools such as rulers, thermometers, balances, and graduated cylinders.
- The student compares the mass of an object to the sum of its parts.

KEY QUESTION

What are the properties of a seltzer tablet?

BACKGROUND INFORMATION

Physical changes in a substance or material result only in changes in the appearance of the material. While the size, shape, texture, etc., may be changed, the substance is still the same substance. **Chemical changes** result in a new substance being formed.

A crystal is a solid form of a substance in which the **atoms** are arranged in repeating patterns. A powder is a substance that has been ground or pulverized into finely dispersed, loose, solid particles.

MATERIALS

Per student

science journal
A Closer Look activity sheet
hand lens

Per group

1 or more seltzer tablets
1 snack-size plastic bag
1 tape measure
1 sheet of black construction paper
2-3 toothpicks
1 microscope
1 triple-beam balance or electronic balance
(The balance used must be sensitive enough to measure small amounts.)
chart paper
rock salt crystals

TEACHING TIPS

1. Do not open the seltzer tablets in advance as they absorb moisture.
2. Caution students against tasting substances.
3. If only one electronic or triple-beam balance is available, groups can rotate to a station to use it.

ENGAGE

1. Distribute several rock salt crystals to each student group. (Rock salt works well because of its size.)
2. After allowing sufficient time for students to observe the properties of the crystals, have them a sketch what they observed in their science journals.
3. Ask the students to describe the properties of the crystals. List these properties on the board. If students have difficulty describing properties, ask how they would tell another person about these crystals if that person had never seen them before.

EXPLORE

1. Tell students that they are going to investigate the properties of a seltzer tablet. Distribute materials to each group.
2. Give students time to observe the whole tablet using only the unaided eye. Have students draw what they see.
3. Have students again observe the whole tablet using a hand lens and then a microscope, each time drawing the details they are able to observe.
4. Encourage each group to observe as many properties as they can, observing such characteristics as color, size, shape, smell, texture, hardness, and flexibility.
5. Students should use the measuring tape to find the diameter of the tablet.
6. Have students place the tablet in a snack bag before placing it on the balance to find the mass. Students should record the mass of the whole tablet in the snack bag.
7. Next, tell students to keep the tablet in the sealed snack bag and crush it. Have students find the mass of the crushed tablet in the snack bag and compare it to the mass of the whole tablet in the snack bag. Students should record this measurement and compare it with that of the whole tablet. (The mass before and after crushing should be approximately the same. If it is not the same, encourage students to try to explain why. Perhaps they did not have the tablet in the snack bag when they found the mass before crushing, or they spilled some of the tablet from the bag after crushing.)
8. Tell students to empty the crushed tablet onto a piece of black construction paper and repeat their observations for the crushed tablet, using first the unaided eye, then the hand lens and finally the microscope to observe and describe what they see. (They should be observing a combination of powder and crystals. From the engage activity, they should be able to identify crystal shapes. Using the sense of touch is a good way to determine the texture of powders and crystals.)

EXPLAIN

After crushing the tablet, what properties were changed? (size, shape, and texture)

Was this a physical change or a chemical change? (Matter may be changed chemically or physically. Chemical changes cause new substances to form, while physical changes do not. Crushing the tablet is just a physical change because no new substance is formed.)

What two substances were found in the mixture? (The tablet is composed of powder and crystals.)

How did the mass of the crushed tablet and the mass of the whole tablet compare? (The tablets should have had approximately the same mass because the mass of an object always equals the sum of its parts.)

EXTEND/APPLY

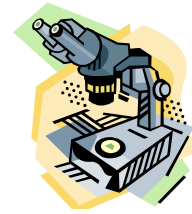
Have students think of other examples of physical changes, such as freezing, breaking glass, hammering wood together to build a playhouse, dipping bananas in chocolate, water evaporating from a pond, etc. List these on a Physical Changes/Chemical Changes Tree Map.

ASSESSMENT

Ask students to give an example of a physical change and tell why it is a physical change.



A CLOSER LOOK



Unaided Eye	Hand lens	Microscope

Record some of the properties of the seltzer tablet. _____

What is the diameter of the whole seltzer tablet? _____

What is the mass of the whole seltzer tablet? _____

What is the mass of the crushed seltzer tablet? _____

Unaided eye	Hand Lens	Microscope