

PROPERTY CHANGES

BIG IDEA 9: CHANGES OF MATTER

BENCHMARKS and TASK ANALYSES

SC.2.P.9.1 Investigate that materials can be altered to change some of their properties, but not all materials respond the same way to any one alteration.

The student:

- explores the way different materials react to the same change (squeeze paper and squeeze a sponge; twist clay and twist paper).
- compares and contrasts results.

SC.2.N.1.1 Raise questions about the natural world, investigate them in teams through free exploration and systematic observations, and generate appropriate explanations based on those explorations.

The student:

- raises questions about the natural world.
- investigates questions in teams through free exploration and systematic observations.
- generates appropriate explanations based on those explorations.

SC.2.N.1.3 Ask “how do you know?” in appropriate situations and attempt reasonable answers when asked the same question by others.

The student:

- asks “how do you know?” in appropriate situations.
- attempts reasonable answers when asked the same question by others.

SC.2.N.1.5 Distinguish between empirical observation (what you see, hear, feel, smell, or taste) and ideas or inferences (what you think).

KEY QUESTION

Do materials respond the same way to the same alteration?

TEACHER BACKGROUND INFORMATION

Matter is anything that takes up space and has mass. Matter on earth may exist in three states: solid, liquid and gas. Adding or reducing heat causes matter to change from one state to another. Matter can go through chemical and physical changes.

During physical changes, the state of the matter may change but not the chemical composition. Melting ice is a physical change since the matter (ice) changes form but the chemical composition remains the same (water). Physical changes in a substance or material result in changes in the appearance of the material. While the size, shape, texture, etc., may be changed, the substance is still the same. During a chemical change, the chemical composition of matter changes. Burning a match and rusting iron are both chemical changes. In each case, the bonds holding the molecules are broken and the atoms re-form into different molecules.

MATERIALS:

Per group

paper towels
reinforced packing tape

foil
wax paper
Ziploc bag
piece of chocolate
a graham cracker
small rock
dropper
balsa wood
piece of metal
sand paper
small rock
a piece of cloth
one sugar cube
one cup of water in a clear cup
vinegar in a clear cup
baking soda
plastic spoon

SAFETY

Instruct students never to taste or place in their mouths any substances used during a science lesson (unless directed to do so). Instruct students not to touch materials without specific instructions. Ask students to report all accidents immediately.

TEACHING TIPS

Have paper towels nearby in case of spills. Before beginning this activity, measure out the water and vinegar and put them into the clear plastic cups.

ENGAGE:

Tell the students that they are to use the paper towel, reinforced packing tape, Ziploc bag, cloth, foil and wax paper. Instruct them to sort them into two groups: those that can be torn and those that cannot be torn. Ask, *Did all of the groups put the same materials into the same sorting groups?* Discuss the properties of each of the items have in common. Have the student sort the items into two new groups: those that can absorb water and those that repel water (each group will need a dropper and a cup of water). Ask, *Did all of the groups put the same materials into the same sorting groups?* Discuss the properties of each of the items have in common.

EXPLORE:

1. Discuss the properties of the chocolate and graham cracker. Have the groups put the piece of chocolate and the graham cracker onto a plate and place outside in the sunlight. Have the students make predictions about what will happen. Ask, *How do you know?* Have them record their predictions and justifications in their science notebooks.
2. Discuss the properties of the rock and the sugar cube. Have the groups put the rock and the sugar cube on the plate. Have students predict what will happen when they put several drops of water onto the rock and the sugar cube. Ask, *How do you know?* Have them record their predictions and justifications in their science notebooks. Have the groups put several drops of water onto the rock and the sugar cube and write their observations in their notebooks.

3. Discuss the properties of the balsa wood and the piece of metal. Have the students predict what will happen when the wood and metal are rubbed with the sandpaper. Ask, *How do you know?* Have them record their predictions and justifications in their science notebooks. Have the groups put rub the sandpaper over the piece of balsa wood and the piece of metal and write their observations in their notebooks.
4. Have the students retrieve the plates with the chocolate pieces and graham crackers from the sun. Discuss what they observed happened to the chocolate and cracker in the heat of the sun and have them record their observations in their notebooks.
5. Discuss the properties of water and vinegar (each group should have half a cup of water in a plastic cup and a half cup of water in a plastic cup). Have students predict what will happen when they put a spoonful of baking soda into the cup of water and one spoonful of baking soda into the cup of vinegar. Ask, *How do you know?* Have them record their predictions and justifications in their science notebooks. Have the groups put the spoonful of baking soda into the water and then the spoonful of baking soda into vinegar. Have them record their observations in their science notebooks.

EXPLAIN

Ask:

Based on the results of your observations, what conclusions can you make?

Can you justify your conclusions?

EXTEND AND APPLY

As a class, create a double bubble map comparing and contrasting the properties of the materials used in one of the explorations (e.g., chocolate and graham cracker, sugar cube and rock).

ASSESSMENT

The teacher observes that:

- science notebooks contain predictions, observations and explanations.
- students were engaged in the activities and discussions.