

Clean Pennies

Science Standard

I

Objectives

2 & 3

Connections

Science Standard I:

Students will understand that chemical and physical changes occur in matter.

Objective 2:

Evaluate evidence that indicates a physical change has occurred.

Objective 3:

Investigate evidence for changes in matter that occur during a chemical reaction.

Intended Learning Outcome:

1. Use Science Process and Thinking Skills

Content Connections:

Language Arts VIII-I, 6

Background Information

Each student needs a penny that is no longer shiny. If the pennies you have are too clean, oxidize the surface in the following manner. Place all the pennies into a cup and pour vinegar over the top. After coating them with vinegar, spread the pennies out on a paper towel to dry overnight. By the time they are dry you will see a green-colored substance called malachite.

When the salt and vinegar are combined, they form a very small amount of hydrochloric acid. This acid removes oxidation from pennies. Removing the copper oxide is a chemical change. The copper molecules in the vinegar and salt solution settle on paper clips after a period of time, but wipe off easily. This is not a chemical change. If the cleaned pennies are allowed to sit without rinsing them off, more malachite forms.

Invitation to Learn

Today we are going to do an activity with money and chemicals. The chemicals are sodium chloride and acetic acid (or salt and vinegar).

Instructional Procedures

1. Give each student a dirty penny. Observe pennies. Stress the importance of using all the senses, except for taste. Students record observations on the *Clean Pennies* data sheet (p. 4-17).
2. Pass out goggles. Students should keep the goggles on until the cups are put away in step six. Give each pair of students a cup with a small amount of salt in the bottom. Students place the pennies in the cup. Allow students to rotate cups. Ask what changes to the penny they see. (none)
3. Add a small amount of vinegar to each of the cups. Allow students to rotate cups and observe changes.
4. Pennies will become bright pink and copper colored. All the discoloration may not be removed, but most pennies will show a dramatic difference.
5. Remove pennies and place them on a paper towel to dry. Continue observations.
6. Place a paper clip in each cup of vinegar and salt solution. Leave the paper clip in the solution overnight. After cups are put away, remove goggles.
7. Observe paper clips next day. Wear safety goggles to avoid splash danger. Allow students to remove the paper clip from solution and handle it. The copper coating will rub off easily. Ask students if the paper clip's change to copper-colored was a chemical or physical change. (It was a physical change. No new substance was formed. The copper was there all the time-dissolved in the solution.)

Materials

- Dirty pennies
- Clean Pennies* data sheet
- Safety goggles
- Cups
- Salt
- Vinegar
- Paper towel
- Paper clips

Possible Extensions/Adaptations/Integration

- Allow students with special needs to list or draw examples of chemical change instead of writing a paragraph.
- Make a list of *Important Science Words* to use in the assigned paragraph.
- Allow students with special needs to dictate their paragraph to another student, an aide, or the teacher.
- To introduce the idea of physical properties, have each student bring an object from home. Each student describes a number of physical properties, such as color, shape, texture, etc. Other students take turns guessing the identity of the item.

Assessment Suggestions

- Create a rubric to score the paragraph including attributes such as, science content, organization, presentation, conventions, and use of science language.
- Make a T-chart with *Physical Changes* on one side and *Chemical Changes* on the other side. Give students a list of changes to categorize. Include examples of change from daily life.

Additional Resources

Books

Writers Express: A handbook/or young writers, thinkers, and learners, by David Kemper, et.al.; ISBN 0669471658

Kitchen Science with over 50 Fantastic Experiments, by Chris Maynard (DK Publishing); ISBN 0-7894-6972-3

Web site

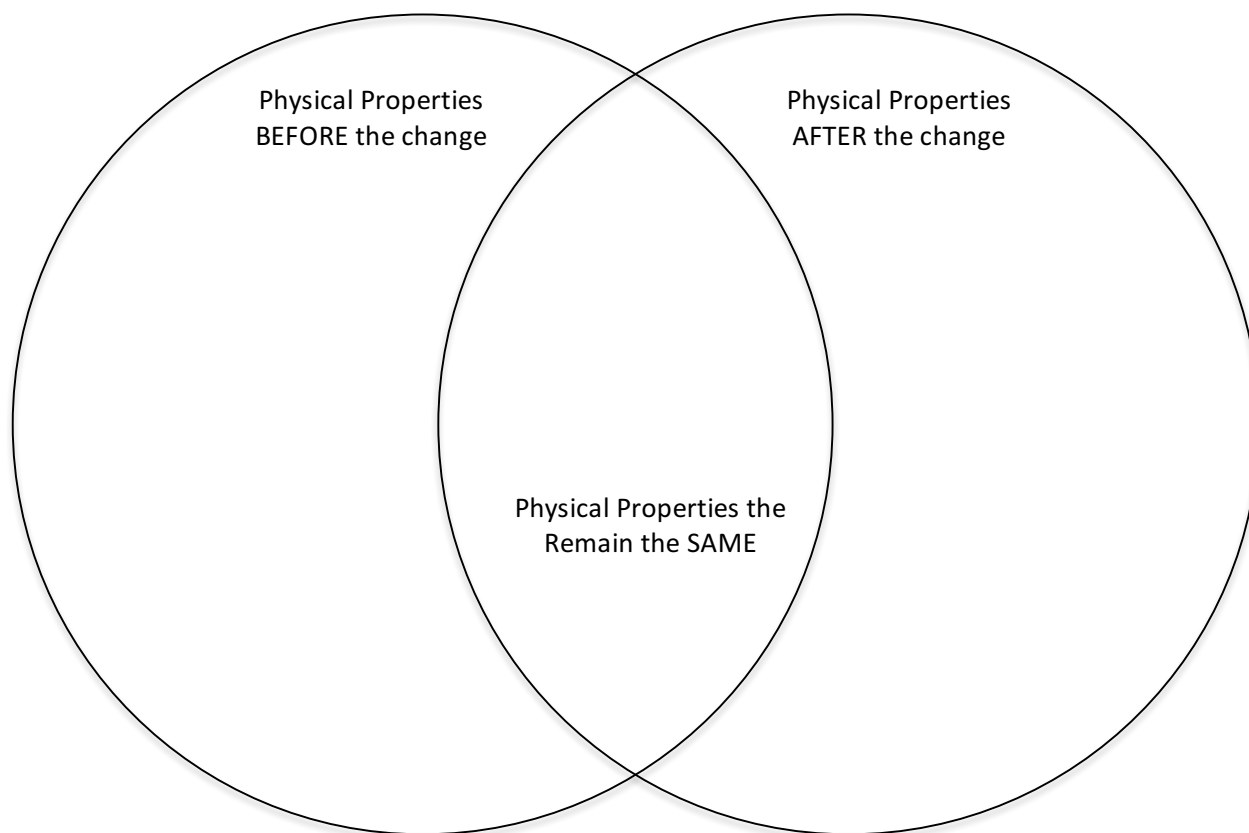
Some good ideas on the USOE science site for ELL students
<http://www.usoe.k12.ut.us/curr/science/core/5th/lep/matter/default.htm>

Family Connections

- Have a mold race! Moisten a slice of bread with a few drops of water and place it into a Ziploc sandwich bag. Place it in a warm, dark place. Keep the bag zipped shut after the mold grows-many people are allergic to mold. Observe the bread once a day and keep a log of the changes that occur. Many of the changes are chemical changes. Design an experiment to investigate questions like: Does white bread or whole wheat bread mold faster? Does homemade bread or store-bought bread mold faster? Does bread get moldy faster in a warm environment or cold environment? Does bread mold faster in sunlight or dark?
- Have students repeat the *Clean Pennies* activity at home with one variation -after removing the pennies from the solution, place a steel screw in the solution instead of a paper clip. They should see bubbles rising from the thread of the screw, which is another indicator of chemical change.

Name _____

Clean Pennies



Write a paragraph using the information from the Venn Diagram above. Discuss the physical properties of the penny before and after the change. Provide evidence that a chemical change took place.
