Physical and Chemical Changes and Pennies

Summary

A fun and engaging lesson where students learn about physical and chemical changes by using pennies and various substances. Students will get to see exciting changes before their eyes and also by waiting until the next day. Properties of chemical changes such as color, gas and reactions of substances will be learned.

Time Frame

2 class periods of 45 minutes each

Group Size

Small Groups

Life Skills

Thinking & Reasoning, Communication

Materials

- Rolls of Pennies (50 in a roll) enough so each student gets a few. Pennies should be 1983 (because there is zinc in the center) and newer, have students separate them!
- Paper Towels
- Plates (paper or real ones)
- Vinegar
- Salt
- Paper Clips
- Markers
- Masking Tape
- Toilet Bowl Cleaner
- Glass Beakers (two per group)
- Sand Paper
- Measuring spoons
- Trash Bags (full size)
- Scissors
- Toilet Bowl cleaner containing HCL (There's a brand called 'The Works'
- A lab worksheet (attached) or journal

WARNING: Do not let students handle the toilet bowl cleaner!

Background for Teachers

- Teachers should review lab safety and if goggles are available, students should wear them.
- Teachers may want to give some light demonstration on how to use the sand paper properly.
- Teachers should pre-measure the toilet bowl cleaner and not have students handle the bottle

Student Prior Knowledge

Students should know the basic differences between chemical and physical changes and that chemical changes are not reversible. (For elementary school purposes). Students should understand how to find the year on a penny or coin.

Intended Learning Outcomes

1. Use Science Process and Thinking Skills
    a. Observe simple objects, patterns, and events and report their observations.
    d. Compare things, processes, and events.
    i. Use data to construct a reasonable explanation.
    3. Understand Science Concepts and Principles
    a. Know and explain science information specified for the grade level.
    4. Communicate Effectively Using Science Language and Reasoning
    b. Describe or explain observations carefully and report with pictures, sentences, and models.

Instructional Procedures

Students will run the experiment on two separate days.
Part 1:
Have students gather a paper towel, plate, 1 penny, and vinegar.
Folding the paper towel so it is thick and placing it on a plate with the penny, have students record any observations they like about the current penny situation. They should also hypothesize about what could happen to their penny. (such as "nothing" or "it might explode!") Students then can pour a small amount of vinegar onto the penny and use the masking tape and markers to label this part of their experiment (Part 1). Students can then record new observations and what type of change has occurred.

Part 2:
Students gather penny, 1 teaspoon of salt, small cup, 1 teaspoon of vinegar, paper towel. Students should put some salt into the cup and put a penny in it and record any observations. Adding the vinegar, then record more observations. Remove the penny to another paper towel and also label it. (Part 2).

Part 3:
Materials:
    1 paper clip
    the same cup with salt and vinegar from PART 2
Place a paper clip into the Salt and Vinegar solution. Put your name on the cup of your group Let your paper clip and salt and vinegar sit overnight. Students should record their observation of the paper clip the next day and note what happened and what kind of change it was. Have students handle the paper clip and see if the coating stays on or off.

Part 4:
Materials:
    Two glass beakers
    vinegar
    markers for labeling
    toilet bowl cleaner
    2 pennies
Students will understand they need to measure properly! They will have to put a trash bag over a table so it doesn't get damaged. Students should Find two glass beakers. Fill one with 35 ml of vinegar and label it (vinegar) Fill one with 35 ml of toilet bowl cleaner and label it (cleaner) Scrape two (1983 or newer) so you expose the zinc inside. Scrape either with sand paper or use a metal file. The students like using the sand paper so they can do it themselves. Place one penny in the vinegar and one penny in the cleaner. Have students record what happens right away and what happens the next day, noting what kind of changes occurred.

Extensions

Students can identify additional changes, such as the type of change that occurs when sandpapering the pennies.
Students can also use different types of substances to clean the pennies and observe changes and be creative about it, such as apple juice or ketchup (things you might find at school).
Students could also try the experiment using different coins such as a nickel to see if there is a difference or a quarter. Suggest trying that in advance with a teacher if using the HCL or toilet bowl cleaner.
Students could draw pictures of what happened or write a story about what use chemical changes might be.

Assessment Plan

There are two worksheets attached which can be used to go over together or individually and then together to review changes and apply what they saw in the experiment to real questions.

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