

Density of Pennies

MATERIALS

- balance
- 100 mL graduated cylinder
- 40 pennies dated before 1982
- 40 pennies dated after 1982
- water



Always wear safety goggles and a lab apron to protect your eyes and clothing. If you get a chemical in your eyes, immediately flush the chemical out at the eyewash station while calling to your teacher. Know the locations of the emergency lab shower and the eyewash station and the procedures for using them.

PROCEDURE

1. Using the balance, determine the mass of the 40 pennies minted prior to 1982. Repeat this measurement two more times. Average the results of the three trials to determine the average mass of the pennies.
2. Repeat step 1 with the 40 pennies minted after 1982.
3. Pour about 50 mL of water into the 100 mL graduated cylinder. Record the exact volume of the water. Add the 40 pennies minted before 1982. **CAUTION:** Add the pennies carefully so that no water is splashed out of the cylinder. Record the exact volume of the water and pennies. Repeat this process two more times. Determine the volume of the pennies for each trial. Average the results of those trials to determine the average volume of the pennies.
4. Repeat step 3 with the 40 pennies minted after 1982.
5. Review your data for any large differences between trials that could increase the error of your results. Repeat those measurements.
6. Use the average volume and average mass to calculate the average density for each group of pennies.
7. Compare the calculated average densities with the density of the copper listed in **Table 4** on page 38 of the textbook.

DISCUSSION

1. Why is it best to use the results of three trials rather than a single trial for determining the density?

Density of Pennies *continued*

- 2.** How did the densities of the two groups of pennies compare? How do you account for any difference?

- 3.** Use the results of this investigation to formulate a hypothesis about the composition of the two groups of pennies. How could you test your hypothesis?

Quick Lab

DATASHEET FOR IN-TEXT LAB

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4. Repeat step 3 with the 40 pennies minted after 1982.
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6. Use the average volume and average mass to calculate the average density for each group of pennies.
7. Compare the calculated average densities with the density of the copper listed in **Table 4** on page 38 of the textbook.

DISCUSSION

1. Why is it best to use the results of three trials rather than a single trial for determining the density?

The amount by which the result will be affected by a measurement error is

decreased.

Name _____ Class _____ Date _____

Density of Pennies *continued*

2. How did the densities of the two groups of pennies compare? How do you account for any difference?

The post-1982 pennies have a lower density. The composition of the pre- and post-1982 pennies differs, resulting in differing masses.

3. Use the results of this investigation to formulate a hypothesis about the composition of the two groups of pennies. How could you test your hypothesis?

Hypotheses will vary. Students should know that pennies contain copper.

Research should show that they also contain zinc. Students could find the densities of copper and zinc and conclude that the less dense pennies contain more zinc and less copper because zinc is less dense than copper.
