

DENSITY OF PENNIES LAB

Before 1982, pennies were made of a copper alloy. Since then, they have been made with an outside coating of copper and an inner core of a different metal. In this experiment, you will use a graph to determine the density of post-1983 pennies. Then, you will use known density values to identify the metal used in the core of these pennies.

AVAILABLE MATERIALS

- post-1983 pennies
- 100-mL graduated cylinder
- triple-beam balance
- ruler

PROCEDURE

1. Design a procedure to determine the density post-1983 pennies using the graphing method (see Analysis). Make sure you have at least four data points for the line. Your procedure must be recorded in the team secretary's lab notebook.
2. Obtain teacher approval before beginning your procedure.

DATA

Prepare a data table to display your measurements. The data table should be recorded in each member's lab notebook. Record the appropriate number of sig figs for each measurement.

ANALYSIS

1. Construct a graph of your results so that the slope of the line equals density. Plot the data for the post-1983 pennies and draw a best-fit straight line that goes through the point (0,0). Remember to follow the *Graphing Guidelines*.
2. Calculate the slope of the line. Indicate on the graph which points you are using and show your calculations. Use the appropriate number of significant figures in your answer.

CONCLUSIONS

Write a conclusion that answers the following questions. In your discussion of precision and accuracy, make it clear that you understand the difference between these two terms.

- Based on your calculated density and the table to the right, which metal do you think is used in the core of post-1983 pennies? Explain your choice. State both values for comparison.
- Examine your graph and discuss the precision of your measurements. Clearly explain how your graph demonstrates precision.
- Find the percent error of your calculated density and discuss your degree of accuracy (show calculation). The accepted value for the density of post-1983 pennies is 7.05 g/cm^3 .

Metal	Density (g/cm^3)
magnesium	1.74
aluminum	2.70
zinc	7.00
copper	8.92
silver	10.50
lead	11.35