SMALL-SCALE LAB: Now What Do I Do?

LABORATORY RECORDSHEET

PURPOSE

To solve problems by making accurate measurements and applying mathematics.

MATERIALS

- pencil
- paper
- water
- balance
- graduated cylinder
- calculator
- small-scale pipet
- plastic cup
- pre- and a post-1982 pennies

PROCEDURE

1. Determine the mass, in grams, of one drop of water. To do this, measure the mass of an empty cup. Add 50 drops of water from a small-scale pipet to the cup and measure its mass again. Subtract the mass of the empty cup from the mass of the cup with water in it. To determine the average mass in grams of a single drop, divide the mass of the water by the number of drops (50). Repeat this experiment until your results are consistent.

2. Calculate the density of water.

3. Determine the density of a pre-1982 penny and a post-1982 penny.

ANALYSIS

Using your experimental data, record the answers to the following questions.

1. What is the average mass of a single drop of water in milligrams?
(1g = 1000 mg)

2. The density of water is 1.00 g/cm^3. Calculate the volume of a single drop in cm^3 and mL. (1 mL = 1 cm^3) What is the volume of a drop in microliters (μL)?
(1000μL = 1 mL)

3. What is the density of water in units of mg /cm^3 and mg /mL
(1 g = 1000 mg)

4. Pennies made before 1982 consist of 95.0% copper and 5.0% zinc. Calculate the mass of copper and the mass of zinc in the pre-1982 penny.

5. Pennies made after 1982 are made of zinc with a thin copper coating. They are 97.6% zinc and 2.4% copper. Calculate the mass of copper and the mass of zinc in the newer penny.

6. Why does one penny have less mass than the other?

7. Calculate the accuracy and precision for the density of water.

8. Calculate the accuracy and precision for the density of a pre and post penny.