

NAME:

HONORS CHEMISTRY

SECTION:

VOLUME OF A DROP

What is the volume of a single drop of water? In this experiment, you will use both direct and indirect measurement methods to find a very small volume. One example of direct measurement is measure the dimensions of a cube to calculate volume using the formula $V = l \times w \times h$. You could also determine the volume of the cube indirectly, by using water displacement or some other method. You will need to use geometric formulae and the rules of measuring with significant figures.

Problem

How can we determine the volume of a single drop of water?

Objectives

- Using metric rulers and graduated cylinders for precise measurements
- Applying rules of significant figures in measurements
- Applying rules of significant figures in calculations

Materials

Long stem beral pipet

Water

Glass plate

beaker

10 mL graduated cylinder

ruler

calculator

website: <http://mathforum.org/dr.math/faq/formulas/faq.sphere.html>

Roles Record the names—make sure this information is included in your lab report.

- Project Manager _____
Reads directions, keeps track of time, keeps group on task
- Quality Control Manager _____
Approves data table, checks data quality, checks calculations
- Materials Manager _____
Gets and returns materials, supervises sharing of materials

Procedure

1. Read through the entire procedure carefully.

Direct Measurement:

2. Fill the long stem beral pipet with water.
3. Holding the pipet in a vertical position, carefully place one drop of water on the glass plate.
4. Use the web site to select the most appropriate formula that describes the shape of the drop. Record the formula in your lab notebook.
5. Create a data table listing the variables you will need to measure directly in your lab notebook. As carefully as possible, measure the dimensions of the drop.
6. Calculate the volume of the drop.

Indirect Measurement:

7. Use the graduated cylinder to indirectly determine the volume of a drop of water. Make sure the pipet is in a vertical position. (Keep in mind that 10 mL graduated cylinders do not give reliable measurements unless the volume is greater than 1 mL.) Record your data in an appropriate table in your lab notebook.
8. Determine the volume of a single drop.

Analyze and Apply

Answer these questions in complete sentences!

1. Which method—direct or indirect—do you believe was more accurate in determining the volume of a drop? Explain your answer.
2. Which method do you believe was more precise? Explain your answer.
3. Calculate a percent error, using the method you believe is most accurate as your accepted value.
4. You were instructed to keep the pipet in a vertical position. How do you believe your results would have been different if the pipet was horizontal for this experiment?
5. Would a drop be a useful unit for measurement of liquid volumes?
6. Why is it important to use the correct number of significant figures when expressing measurements?

Remember to write an appropriate conclusion for this lab!

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