POPPY SCHOLARS · CHEMISTRY IN THE EARTH SYSTEM

Home lab 1 · Unit 1 · about 40 minutes

Is density a property of a substance, and can a graph of mass against volume identify one?

Name _____ Date _____

MATERIALS

You supply everything. Tick each item as you gather it.

- ☐ A kitchen scale that reads to the nearest gram
- ☐ A measuring cup or cylinder marked in milliliters, and a small cup or jar
- ☐ Tap water and cooking oil (vegetable or canola), about 250 mL of each
- ☐ Graph paper or a spreadsheet, a ruler and a calculator

SAFETY

Use only water and cooking oil. Wipe up spills at once, because oil on a floor is slippery. Do not heat the oil. Wash the equipment with dish soap afterward.

PROCEDURE

1. Put the empty cup on the scale and zero the scale (tare), or write down the mass of the empty cup.
2. Pour in 25 mL of water. Read the volume at the bottom of the curved surface with your eye level to the liquid. Record the mass of the water alone.
3. Add water to make 50 mL, 75 mL and 100 mL in turn, recording the total mass each time.
4. Dry the cup and repeat the whole series with cooking oil.
5. Graph mass (vertical) against volume (horizontal) for both liquids on the same axes and draw the best straight line through each set of points.
6. Find the slope of each line (rise over run, in grams per milliliter). Compare each slope with the accepted density: 1.00 g/mL for water and about 0.92 g/mL for cooking oil.

RECORD YOUR DATA

Volume (mL)	Mass of water (g)	Mass of oil (g)
25		
50		
75		
100		

Also write down the slope of each line and your percent error against the accepted value.

LAB REPORT

Write a report that gives your table and graph, shows how you found each slope, and calculates the percent error of each against the accepted density. Explain why the slope, and not any single mass, is the property that identifies a liquid, and say how the smallest division of your scale and your measuring cup limits how many significant figures you may claim.

Report the numbers you actually got, even when they disagree with the lesson. Write on the lines, or type your report on the website and send it to a teacher there.

Question and hypothesis *State the question in your own words, what you expect to happen, and why you expect it.*

Method *What you changed, what you measured, what you kept the same, and how many trials you ran.*

Observations *Describe what you saw, including anything unexpected. Your data tables are added to the report automatically.*

Calculations *Show each calculation step by step, with units.*

Claim and reasoning *Answer the question using your numbers, then explain why, using the science from the unit.*

Limits and next step *What could have affected your results, and one change you would make next time.*