

Measurement Lab

Name: _____ 40/1200

Objective: To learn to accurately measure lengths and volumes using the metric system; and to learn how to determine percent error, and to measure density.

Part 1. Measure the volume of the classroom door? (it's big and wood and we will assume it is solid even though it has a window). Volume of a solid object formula is $L \times W \times H$.

Part 2. Measure the volume of the blue chemistry textbook (please don't open it, it's full of dense facts that will scare you, and it's written by people who love chem and hate teenagers) We will measure the covers, and assume it is a solid object as well. Measure the book in centimeters, to the nearest 10th cm.

Part 3 Measure the density of lead. First mass the lead on the scale, and write ALL of the numbers down, they are all important. To measure the volume of 4 small hunks of lead, we can measure volume by the displacement method. That means getting a graduated cylinder and putting in about 50 mL of water into it. Now CAREFULLY measure that water volume to the nearest 10th mL. Slide the four pieces of metal into the water without splashing, and measure the NEW volume of water. The difference in these two volumes is the volume of the lead. Dry the lead off and return to the side of the room for others.

Part 4 Measure the density of bismuth. First mass the bismuth on the scale, and write ALL of the numbers down, they are all important. To measure the volume of 4 small hunks of bismuth we can measure volume by the displacement method. Measure the volume of the bismuth, then dry it off and return to the side of the room for others.

Part 5 Getting a good look at the Periodic Table. With your partner, open up your periodic table and also table S at the same time. Put your finger into box #5, which is a nonmetal element. What does that rhyme with? (haha) Follow that dark black staircase line diagonally across the table. Fill in the element names and symbols. Capital letters are especially important in chemical symbols. Copy them carefully.

element	Name and Symbol	metal or non metal?	element	Name and Symbol	metal or non metal?
13 (example)	Aluminum—Al	metal	8		
6			79		
17			26		
10			7		
47			30		

The elements on the left side of the stairs, including the two rows below, are all metals, except for atom #1. On the right side of the stairs are the non metals. Make a list of ALL the non metals in numeric order by filling in this chart. Name and symbol must match the atomic numbers in the corners. One is an example.

1 H Hydrogen	2	5	6	7	8	9	10
14	15	16	17	18	33	34	35
36	52	53	54	85	86	These are ALL of the non metals. All other elements are metals.	

Lab Questions to be done on separate paper. Make sure that you do them in order, and that you leave space between the questions so that you can get comments back, or corrections, if necessary.

- Show the math to calculate the volume of the classroom door.
- The door's actual volume is $91,930 \text{ cm}^3$. Calculate your % Error.
- Show the math to calculate the volume of the textbook.
- The text's actual volume is 2400 cm^3 . Calculate your % Error.
- Show the formula and math for your calculation for the density of the lead.
- The actual density of lead is listed in table S. Calculate your % Error.
- Show the formula and math for your calculation for the density of bismuth.
- The actual density of bismuth is listed in table S. Calculate your % Error.
- In one sentence, describe where the metals and nonmetals on the Periodic Table are located. In a second sentence, explain the position of Hydrogen on the table.
- The units for density for solids or liquids can be in g/mL or g/cm^3 . Explain why these two units are interchangeable.
- Calculate the volume of 622.5 g Lead. Use density formula, show your work.
- Calculate mass of 133.0 cm^3 of copper. Use density formula, show your work.
- skip this one, okay?
- If you had to come up with two rules about the letters of the symbols of the elements on the periodic table, what would be the first letter rule be, and what would be the second letter rule be. (not all elements have a second letter, but all elements with two letter symbols would follow that rule)
- Water has density of 1.00 g/mL or 1.00 g/cm^3 . Ice can float on water. Estimate the density of ice.

→ → → → → → → DO NOT GO ONTO THE INTERNET.

Lab Reports are really important in chemistry. You need to do them for a grade, and they make up 30% of your report card grade each quarter. Skipping even one is a big disaster. If you are absent, you will have extra time, but you are expected to do all of the labs during the year. After they are graded and you see them, do not take them home. The reports remain school property. I have to keep them organized, because the NYS Education Department can come to Vestal during any year and say to me that I need to prove that each kid taking the regents exam last year qualified with sufficient lab reports. You need to do a minimum of 1200 minutes to qualify to take the exam. If not, you earn a zero score.

Since at Vestal we have 5 scores: four quarterly report card grades plus the regents exam, which we sum and divide by five to calculate your final class grade, it's important. Failure to qualify earns you a regents score of zero, which is part of your average.

So, look at them, but hand them back to the completed lab report box. If I don't have them, they didn't happen, even if you get good grades on them. Paper talks, or you might cry.

Your lab reports need a cover for 2 points. A cover has the lab title, this one is Measurement Lab. You can include a fun sub title (smaller and not over powering). You can include a diagram or drawing. Your name and class period needs to be clearly on front too. Finally, a sentence or two describing the point of this lab experience.

The handout follows next, all filled in. No blanks ever. Call me up and ask me questions, or else it's going to be -1! ☹️

the lab questions are on white paper, without frills. No spiral paper is allowed, the frills end up on my kitchen floor and I am not interested in that at all. Leave space between the questions so I have room to put in comments, notes, and corrections as necessary.

The conclusion is the MOST IMPORTANT part. It's not written for me, it's written to illuminate some random person to what you did, what you measured, what you calculated and why you made mistakes. Finally, it connects the lab experience to chemistry. Avoid saying words like IT (a scary clown movie) or that and/or this one.

Say exactly what you mean to say. Use your numbers and measurements. Someone should be able to read your conclusion and decide to try the whole lab themselves, and make their own measurements to find out if you are super smart or a faker.

End every conclusion with the Arbuiso.com famous last saying: "I love chem, the end."

It's a good thing to do, and if you write it enough, you will begin to believe it. Some days chem is hard, but if you keep saying that, the hard days will be less hard, and the easy days will feel great!

Below is the grading rubric, or HOW TO SCORE THE MOST POINTS ON THIS LAB.

PAGES	INCLUDES THIS:	POINTS
Cover	A science title, (a smaller, funny title is optional), your name, class period, and a well worded complete sentence stating the objectives of this lab.	2
handout	This lab handout, fill in all blanks	4
white paper	14 questions above	14
more white paper	Conclusion: Start with the general plan of the lab: what was it that we were trying to learn about? Then, what did you do - what did you measure and what did you calculate? What were your percent errors and why did you get them? What did you learn? Then summarize the science in a few sentences A conclusion should summarize what you did, and show that you grasp the overall meaning of what you did.	5
This lab due date is: _____		25