

## Chemistry is

fluorine 9 <b>F</b> 18.998032	uranium 92 <b>U</b> 238.02891	nitrogen 7 <b>N</b> 14.0067
--	--	--------------------------------------

There are three stations in this lab. Visit each one, get the data you need, combine it with data on this sheet and the boards, and the reference tables, to create graphs, make tables, use formulas, and explain all of your thoughts.

### Part 1 - Density of Nickels - graphing and using slope math.

Measure the mass of 5 sets of dry nickels. Do not round the mass ever! Then and measure their corresponding volumes using the displacement method (no splashing). You must measure volume to the nearest 10th mL.

Data table for nickels - Part 2		Volume of water to start _____ mL
# of nickels	mass of the nickels grams	volume to nearest 10th of an mL
10		
15		
20		
25		
30		

### Part 2. Density of Deionized water, slope math.

Using the smaller graduated cylinders, an electronic balance, an eyedropper and deionized water, measure the proper amounts of water, and measure mass.

Deionized water is PURE WATER, with a density of 1.00 g/mL.

Part 2. Data table for deionized water	
volume of deionized water	mass in grams of <u>JUST the water</u>
3.0 mL	
5.0 mL	
6.0 mL	
7.0 mL	
8.0 mL	
9.0 mL	
10.0 mL	

Both graphs must be drawn Mass as a function of Volume. That makes slope mass over volume, or density.

That means Mass is on the Y (up and down axis) And Volume is on the X (left to right axis).

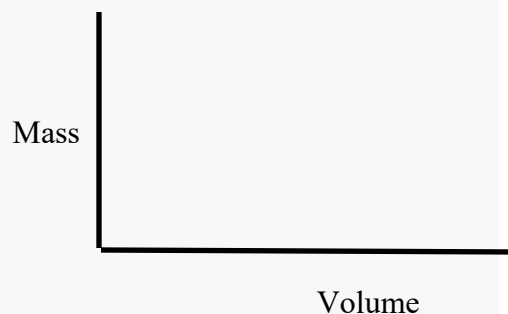
Graph titles must be descriptive, not “water graph”. It must say what you are measuring exactly.

Axis labels must have name and include units.

Scales must be even, and you must start your best fit line at the 0,0 point. No breaks in the scales either.

Your two points **MUST** be on the line you draw, they might not include any of your measurements.

That’s okay, the line is your “eyeball” average of your data.



---

### Part 3. Properties of Metals vs. Properties of Non-Metals

Examine the 4 different elements in this lab. Read the 4 sheets that are with the elements! Fill in the chart on the next page about their properties, comparing and contrasting them. Use a pencil so you can make adjustments as needed. Leave NO BLANKS.

The Periodic Table is organized so that it is helpful to you to figure out important facts about the elements. The table has up and down GROUPS which contain elements with similar chemical and physical properties. They bond alike, and they are similar physically too. There are 18 groups. The rows going across (7 of these) are called periods. The only similarity any atoms have that are in the same period is that they have the same number of electron orbitals.

1. Starting with Boron (rhymes with...) find that dark staircase line. It separates the metals from the nonmetals (except for the weirdo hydrogen). Metals are on the left side of the staircase, while the non metals are on the right side.
2. Metals have properties that are completely different from nonmetals. Metals make only positive cations—by losing electrons. They conduct heat and electricity, they are malleable which means you can pound them flat, they are ductile which means you can squish them into a wire shape. They have luster, which means they shine when light is reflected on them. They have higher melting points and higher boiling points than nonmetals. All of them are solids at room temperature except for that really amazing metal called mercury - which is a liquid.
3. Nonmetals only form anions - by gaining electrons. They do not conduct either heat or electricity, they are brittle, which means they crack when you smash them. They tend to be dull and unreflective to light, and usually melt and boil at lower temperatures than metals do. Most are gases, so the idea of malleable or ductile is silly.
4. All elements are Metals or Nonmetals. In addition, 7 elements along the staircase are ALSO called metalloids, which means that they have some properties from the other team. Al + Po make up the “AlPo” dog food exception, they are both metals. (Think Italian-Americans!)
5. The nonmetal metalloids (B, Si, As, Te, and At) have SOME metallic properties. The metal metalloids (Ge and Sb) have SOME nonmetallic properties. Al and Po, Aluminum and Polonium, touch this “staircase” but are pure metals, they are not metalloids. They are exceptions to the rule. (the dog-food exception to help you remember!)

Elements	sulfur	titanium	silicon	silver
Check ALL that apply	<input type="checkbox"/> metal <input type="checkbox"/> nonmetal <input type="checkbox"/> metalloid	<input type="checkbox"/> metal <input type="checkbox"/> nonmetal <input type="checkbox"/> metalloid	<input type="checkbox"/> metal <input type="checkbox"/> nonmetal <input type="checkbox"/> metalloid	<input type="checkbox"/> metal <input type="checkbox"/> nonmetal <input type="checkbox"/> metalloid
What is its chemical symbol?				
List ALL of the ions each element makes. (ex: $\text{Na}^+$ )			None in our class	
Convert its MELTING POINT into $^{\circ}\text{C}$ ?	$^{\circ}\text{C}$	$^{\circ}\text{C}$	$^{\circ}\text{C}$	$^{\circ}\text{C}$
Is it lustrous? or Dull?	Lustrous or Dull	Lustrous or Dull	Lustrous or Dull	Lustrous or Dul
Would this element conduct heat? Yes or No?				
Is it malleable + ductile, or is it <u>BRITTLE</u> ?  Circle one	Malleable + Ductile  Brittle	Malleable + Ductile  Brittle	Malleable + Ductile  Brittle	Malleable + Ductile  Brittle
Can it conduct electricity? Yes or No?				
What is its ground state electron configuration?				
Write a possible excited state $e^-$ configuration				
# of $p^+$ =				
# of $n^0$ =				
# of $e^-$ =				

Part 4. PUT ALL QUESTIONS ONTO LOOSE LEAF PAPER

- Calculate the volume of a nickel coin using the  $V = \pi r^2 \cdot h$  formula. U.S. nickels have these dimensions: diameter 21.2 mm, height 1.9 mm. Convert the mm into cm before doing the calculation or it won't work out!
- You can calculate the actual density for the nickel coins by doing math this way: (now do it on looseleaf)
   
Ni  $(8.902 \text{ g/cm}^3)(.250) =$ 
  
Cu  $(8.960 \text{ g/cm}^3)(.750) = +$  \_\_\_\_\_  $\longrightarrow$  \_\_\_\_\_  $\text{g/cm}^3$  (round to 3 SF)
- State the measured density of your nickel coins. Hint, it's the SAME thing as the slope, with units!
- What is your % error for the density of nickels?
- Explain why you did not use the density of the element nickel from Table S.
- On website is the one sentence called the Periodic Law. Copy it neatly, then explain what it means. Use the search box, search for Periodic Law. One article will come up and you can read it.
- State the measured density deionized water. Hint, it's the same thing as the slope, with units!
- What was your % Error for density of the deionized water?
- Define metalloid. Make a list of the symbols and names of the 7 members of this group of elements. What does the "AlPo - dog-food" exception mean?
- Define luster, define malleable and define ductile. Look in this lab report! Stay off of the internet!

GRAPHING...

Draw a straight, best fit line for your data points. Do the slope math for this line ON THE GRAPHS. The slope gives you your measured density for the coins. Make sure you CIRCLE the 2 points on your line to used for the slope math. Your graph MUST go through 0,0 (or else the Universe is broken!)

Do the same for the water graph. Do the slope math on the graph please.

this lab	requires this info	for these points
cover	title + intro sentence	1 + 1 = 2
element data table	all element data	7
10 lab questions	In complete sentences. Show all the math you're asked to do, write all of the formulas, and do it neatly	10
nickel graph	Title, best fit straight line, units and axis labels, slope math	3
water graph	Title, best fit straight line, units and axis labels, slope math	3
this lab due on: _____		25