

The Mole Lab

Name: _____

80/1200

Objective: Students will calculate all types of mole math problems, including: using molar mass to determine unknown elements, calculate numbers of particles, volumes of gases, and masses, all from mole measurements.

You will be expected to use the “Mole Island” map to guide you through the math in this lab.

For your safety: **DO NOT OPEN ANY CONTAINERS.**
No goggles required.

Part 1: There are named compounds in 5 jars.
Your job is to figure out how many moles of each compound are in each of them.

Part 2: There are elements in 8 jars, each contains exactly **ONE MOLE** of an unknown element.
Your job is to figure out which element is in each.

Part 3: Measure some nails, an Oreo cookie (one per kid), a bunch of drops of water, and some aluminum foil.

Part 4: Do the lab questions.



	Compound Names	Compound Formulas	Mass of Jar + Compound	Mass of just the Jar	Mass of JUST the compound
1	Sodium oxalate			22.30 g	
2	Nickel (II) sulfate			22.30 g	
3	Copper (II) sulfate penthydrate			22.30 g	
4	Potassium dichromate			22.30 g	
5	Copper (II) acetate			22.30 g	

Container	Total mass of Jar + Element	<input type="text"/>	Mass of just the Jar	<input type="text"/>	Mass of JUST the ELEMENT (molar mass)	Element Symbol
Ex	29.74 g	<input type="text"/>	22.80 g	<input type="text"/>	6.94 g	Li
B		<input type="text"/>	23.25 g	<input type="text"/>		
C		<input type="text"/>	26.83 g	<input type="text"/>		
D		<input type="text"/>	31.06 g	<input type="text"/>		
E		<input type="text"/>	18.16 g	<input type="text"/>		
F		<input type="text"/>	26.45 g	<input type="text"/>		
G		<input type="text"/>	22.90 g	<input type="text"/>		
H		<input type="text"/>	26.09 g	<input type="text"/>		

Data Collection Page

◆ Mass of an Iron Nail _____ grams

◆ Mass of an Aluminum Nail _____ grams

We will assume the nails are 100% iron and 100% aluminum.

◆ Mass of a whole OREO Cookie _____ grams

Mass of just the chocolate cracker part _____ grams

Zero out a paper towel on the scale. Mass your whole cookie. Eat the sugary inside, use your tongue to get all of that good stuff into your mouth. Mass the empty cookie crackers again.

We will assume all of the white stuff is pure sucrose, with this formula: $C_{12}H_{22}O_{11}$

◆ Mass of FIVE drops of water, do this five times. Mass of 5 drops: _____ g

_____ g

_____ g

_____ g

_____ g

Zero out a small beaker on the scale. Add 5 drops of water to the beaker, write mass on first dash above. Zero out the scale again. Mass 5 more drops, write the mass again. Repeat 5X.

◆ Mass a small sheet of aluminum foil

Mass of foil sheet provided _____ grams

This foil is exactly _____ cm X _____ cm



This mole was
drawn by Natalie
in the fall 2018.

Mole Lab - Questions

Put your answers in boxes on the next page. Put ALL work on white paper. Include that with lab report! Make sure that your work is clearly labeled so it can be checked.

1. What is the number of iron atoms in the iron nail?
2. What is the number of aluminum atoms in the aluminum nail?
3. Calculate the molar mass of sucrose: $C_{12}H_{22}O_{11}$
4. How many molecules of sucrose were in the middle of your Oreo cookie?
5. What is the average mass for five drops of water?
6. What is the mass for just ONE DROP of water?
7. Calculate how many molecules of water are in one drop of water?
8. Calculate the number of atoms in the sheet of aluminum foil.
9. What is the volume of the aluminum foil sheet? Hint: use density formula to calculate this.
10. The average Tesla car body is 190.0 kilograms of aluminum. How many moles is that?
11. A small container contains exactly 8.46×10^{19} molecules of carbon dioxide gas at STP. How many moles of gas is that?
12. What is the volume of this CO_2 gas in cm^3 ?
13. There is no question thirteen, take a deep breath and relax, you are almost done.
14. How many moles are in compound jar 1? (*round to 2 SF please*)
15. How many moles are in compound jar 2? (*round to 2 SF please*)
16. How many moles are in compound jar 3? (*round to 2 SF please*)
17. How many moles are in compound jar 4? (*round to 2 SF please*)
18. How many moles are in compound jar 5? (*round to 2 SF please*)

1	
2	
3	
4	
5	Five drops
6	One drop
7	
8	
9	

10	
11	
12	
13	
14	
15	
16	
17	
18	

This lab requires:	This information	POINTS
Cover Page	Science title, and one perfect sentence stating why we did this lab.	1
Compounds Part 1	Five Compound Formulas into the data table	5
Elements Part 2	Element symbols for the 7 unknown elements in the data table	7
Questions	The 17 Mole Lab Questions; the SF and the units count	34
Conclusion	<p>You will have to use 2 full sides of one sheet of paper.</p> <p>On one side draw a full sized mole island “map” complete with the conversion equalities (tolls). Be neat, and draw a scary shark too.</p> <p>On the other side write out <u>and</u> solve a two-step mole math problem. Be neat, units and SF count.</p> <p>This is much shorter than usual because there are way more questions than usual. Be happy.</p>	3
Lab Report due on: _____		50 total!