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 need 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 five compounds in jars. Your job is to figure out how many moles of each compound are present in each jar.

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

Part 3 Measure some nails, an Oreo cookie, a bunch of drops of water, and some aluminum foil.

Part 4 Do the lab questions. Lots of math!

JARS	Compound names	Mass jar + compound	Subtract mass of just the jar	Net mass just compound	Compound formulas
1	sodium oxalate		-	=	
2	nickel (II) sulfate		-	=	
3	copper (II) sulfate pentahydrate		-	=	
4	potassium dichromate		-	=	
5	copper (II) acetate		-	=	

Container	Total mass of Jar + Element	(minus) Mass of just the Jar	(equals) Molar Mass of the ELEMENT	Element Symbol with that molar mass
A		22.80 g		
B		23.25 g		
C		26.83 g		
D		31.06 g		
E		18.16 g		
F		26.45 g		
G		22.90 g		
H		26.09 g		

Data Collection

Nails	Mass of one iron nail				grams
	Mass of three aluminum nails				grams
	We will assume the nails are 100% iron and 100% aluminum				
Oreo	Mass of the whole Oreo cookie				grams
	Mass of just the chocolate cracker part				grams
	Mass of the sucrose (sugar) you ate				grams
Water	Mass 5 drops of water on the scale, ZERO OUT THE SCALE and mass 5 more drops. Do this five times in a row.				
	Mass of 5 drops	Mass of 5 drops	Mass of 5 drops	Mass of 5 drops	Mass of 5 drops
	gm	gm	gm	gm	gm
	Average for 5 drops grams			Average for ONE drop grams	
Aluminum	Mass the one small sheet of aluminum foil grams				
	The dimensions of this foil are cm X cm				

Mole Lab - Questions

Do all your work in order, on white paper. Put your answers into rectangles. There is no need for little notes like "over" or "more on next page". It better be there when I turn the page. Less ink or pencil is MORE. Significant figures and units count. Number each question, one column on the page, spread it out.

1	How many iron atoms are in your 2 iron nails?
2	How many aluminum atoms are in your 3 aluminum nails?
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	Using average mass of one drop of water, calculate how many molecules of water are in that drop?
6	Calculate the number of atoms in the sheet of aluminum foil.
7	Using the density formula, what is the volume of the aluminum foil sheet?
8	An aluminum seltzer can is 15.23 grams. Calculate how many atoms it takes to make one can.
9	A small container contains exactly 8.46×10^{19} molecules of carbon dioxide gas at STP. How many moles of carbon dioxide does that equal?
10	What is the volume of this CO_2 gas in cm^3?
11	How many moles are in compound jar 1? *(round to 2 SF please)*
12	How many moles are in compound jar 2? *(round to 2 SF please)*
13	There is no question thirteen, take a deep breath and relax, you are almost done.
14	How many moles are in compound jar 3? *(round to 2 SF please)*
15	How many moles are in compound jar 4? *(round to 2 SF please)*
16	How many moles are in compound jar 5? *(round to 2 SF please)*

This mole was drawn by Natalie in the fall 2018.

This lab requires:	This information	POINTS
Cover Page	Science title, and one perfect sentence stating why we did this lab. Your name and class period too.	1
Compounds Part 1	Page one data and math filled in (work on white paper, attached)	5
Elements Part 2	Element symbols for the 8 unknown elements in the data table	8
Questions	The 15 Mole Lab Questions; the SF and the units count	30
Conclusion	You will have to use 2 full sides of one sheet of paper. On one side draw a full-sized mole island "map" complete with the conversion equalities (tolls). Be neat and draw a scary shark. On the other side, write <u>and</u> solve a 2-step mole math problem. Be neat, units and SF count. Be happy.	3 + 3
Lab Report due on		50 total!