



## Mole Lab #2

**Background:** One mole of something consists of  $6.02 \times 10^{23}$  units of that substance. A sample of any element that has a mass equal to the average atomic mass expressed in grams of that element contains 1 mole of that element. The periodic table shows the average atomic mass of 1 mole of each element. The units for molar mass are (g/mole).

In this lab you will find the mass of one mole of 4 metal samples and identifying the metal by its molar mass. The metal samples are labeled A, B, C and D. Then you will calculate the number of moles in a sample of Ammonium Chloride ( $\text{NH}_4\text{Cl}$ ), Sodium Chloride ( $\text{NaCl}$ ), and Sucrose ( $\text{C}_{12}\text{H}_{22}\text{O}_{11}$ ).

**Purpose:** The purpose of this lab is to gain a better understanding of the mole.

### Procedure Part I: Metal Samples

1. Find and record the mass of each 1 mole metal sample.
2. Write a brief qualitative description of each metal sample.

### Procedure Part II: Solid Compounds

1. Find and record the mass of the empty sample container.
2. Find and record the mass of each sample provided.



**Data Tables:** For this lab, you will need to make your own data tables. Read the introduction and the procedure to determine what information you will need to record. Give each data table a descriptive title, column headings with units. Use a ruler to box the table and to make columns and rows.

### Analysis Part I

1. Using your periodic table, your observation, the mass of each sample, and the fact that each sample is one mole, determine the identity of each metal sample. Make a table to compare the mass from your data with the molar mass of the element from the periodic table.
2. Explain why your lab values were not exactly the same as the value from the periodic table. Give at least 3 reasons.
3. How many atoms of each metal are present in a mole sample of that metal?
4. Why was the mass of each metal sample different even though each sample was one mole?
5. What is the mass of a 1.00 mole sample of gold?
6. What is the mass of a 3.00 mole sample of Mercury?
7. What is the mass of a 0.500 mole sample of lead?

### Analysis and Calculations Part II

1. Calculate the mass of each sample. (Show calculations!)
2. Calculate the molar mass of each substance using the periodic table. Use the formulas for the solid compounds given in the lab background information.
3. Calculate the number of moles of each substance using the mass and the molar mass of each sample.
4. Calculate the number of units (molecules or formula units) of each substance using Avogadro's number.
5. Why does a similar mass of substance not necessarily mean a similar number of moles of a substance?
6. Why do you think chemist use the mole instead of referring to the number of molecules, atoms or units of a substance?

**Conclusion:** Write one sentence that refers back to your stated purpose.

**Data:**

Mole Lab Data Table: Part I

Sample	Mass (g)	Qualitative observations
A		
B		
C		
D		

**Data:**

Mole Lab Data Table: Part II

Sample	Item	Mass (g)
0	Empty container	
1	Container + Ammonium Chloride	
2	Container + Sodium Chloride	
3	Container + Sucrose	

