

Ms. Randall

Regents Chemistry

Lab activity: Calculating Moles, Grams and Atoms (*Adapted from Benign Chemistry*)

**Background:** A mole is a unit of measure in Chemistry used to quantify atoms or compounds. Avogadro's number was named in honor of the Italian scientist Amedeo Avogadro who helped clarify the difference between atoms and molecules. A mole is equal to  $6.02 \times 10^{23}$  particles. A particle can be an atom or a molecule.

$$\text{moles} = \frac{\text{mass}}{\text{GFM}}$$

We can use the formula:  $\text{moles} = \frac{\text{mass}}{\text{GFM}}$  to relate mass to Moles of atoms or molecules.

**Objective:**

- To understand the concept of a mole and to calculate mole / gram / atom/ molecules conversions.
- Measure out in grams of in various substances and calculate the amount of moles.
- Calculate the amount of atoms in various substances.

**Materials for each group**

- Electronic balance (one at each station)
- Three 600ml beakers labeled "NaCl", "water", and "ammonium sulfate" and filled with the corresponding substances. (One at each station)
- Spoons/spatulas labeled and put in the "NaCl", and "ammonium sulfate" beakers
- 2-3 plastic pipettes in the "water" container. (One at each station)
- Empty colorless/clear plastic cup, red plastic cup, and blue plastic cup - Label with you group number.

**Procedure:**

Take your lab sheet and proceed with the instructions on it. Remember that you must go up to the instructor's desk after each task to check for accuracy.

**Pre-lab:**

1. The sum of the atomic masses of the atoms in one molecule of  $\text{C}_3\text{H}_6\text{Br}_2$  is called the \_\_\_\_\_
2. What is the total number of atoms contained in a 1.00-mole sample of helium?

Complete task A through E, but you must go up to the instructor's desk after each test to check for accuracy. You will be awarded points based on your accuracy. Your group will be allowed one "do-over".

	<u>w/i 2%</u>	<u>w/i 5%</u>	<u>w/i 10%</u>	<u>you tried</u>
A. Measure out 1.35 moles of salt (NaCl) into a <b>clear</b> , dry cup. Show work:	4	3	2	1
B. Put $4.25 \times 10^{24}$ molecules of water into a <b>red</b> dry cup. Show work:	4	3	2	1
C. Obtain a sample of copper metal from your teacher. Determine how many moles it contains. Show your work and Then bring up to teacher to check for accuracy.  Show work:	4	3	2	1
D. Measure out and check for accuracy with your instructor 0.031 moles of aluminum. Show work:	4	3	2	1
E. Measure out 0.0427 moles of ammonium sulfate into a <b>blue</b> , dry cup. Show work:	4	3	2	1

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Lab Conclusion: Calculating Moles, Grams and Atoms

1. Write a paragraph summarizing what you have learned about the scientific concept of the lab from doing the lab. Back up your statement with details from your lab experience.
  
2. The gram-formula mass of  $\text{NO}_2$  is defined as the mass of
  - A) one mole of  $\text{NO}_2$
  - B) one molecule of  $\text{NO}_2$
  - C) two moles of  $\text{NO}$
  - D) two molecules of  $\text{NO}$
  
3. What is the gram formula mass of  $(\text{NH}_4)_2\text{SO}_4$ ?
  - A) 66.0 g
  - B) 94.0 g
  - C) 114 g
  - D) 132 g
  
4. Which quantity can correctly be represented by the symbol "He"?

A) 1 mole of atoms	B) 10 grams of atoms
C) $3 \times 10^{23}$ atoms	D) 11.2 liters of atoms
  
5. What is the total number of molecules of hydrogen in 0.25 mole of hydrogen?

A) $6.0 \times 10^{23}$	B) $4.5 \times 10^{23}$
C) $3.0 \times 10^{23}$	D) $1.5 \times 10^{23}$