**THE MOLE**

**Part I: Videos about the Mole**

Below are links to videos to teach you about the mole. The mole is a unit used by chemists to count particles (atoms, molecules, ions, etc.) After the videos you will see practice problems (Part II) for you to do. You may print the worksheet or just write your work on notebook paper.

The problems should be solved using dimensional analysis techniques (as in the videos). This means that you start the problem with the number you are given over the number one.  Then use conversion factors to change units to the unit you want. Sample problems are shown below. **1. Introduction to Moles:** [**https://www.youtube.com/watch?v=wI56mHUDJgQ&list=PL3hPm0ZdYhyxMcbHkcUgRlM4-w4gAgfRA&index=1**](https://www.youtube.com/watch?v=wI56mHUDJgQ&list=PL3hPm0ZdYhyxMcbHkcUgRlM4-w4gAgfRA&index=1) **2. Counting Atoms: Intro to Moles, part 2:** [**https://www.youtube.com/watch?v=hY7lzRBylSk&index=2&list=PL3hPm0ZdYhyxMcbHkcUgRlM4-w4gAgfRA**](https://www.youtube.com/watch?v=hY7lzRBylSk&index=2&list=PL3hPm0ZdYhyxMcbHkcUgRlM4-w4gAgfRA) **3. The Most Common Mistake with Moles!:** [**https://www.youtube.com/watch?v=wHwGm9oL-GA&index=7&list=PL3hPm0ZdYhyxMcbHkcUg5 x 106 eggs RlM4-w4gAgfRA**](https://www.youtube.com/watch?v=wHwGm9oL-GA&index=7&list=PL3hPm0ZdYhyxMcbHkcUgRlM4-w4gAgfRA) **4. Converting Between Moles, Atoms, and Molecules:** [**https://www.youtube.com/watch?v=HMAOrGpkTsQ**](https://www.youtube.com/watch?v=HMAOrGpkTsQ) **5. Converting Between Moles, Atoms, and Molecules (Part 2):** [**https://www.youtube.com/watch?v=kGNtnq0kGKk**](https://www.youtube.com/watch?v=kGNtnq0kGKk)

**6. How to Calculate Molar Mass Practice Problems:** [**https://www.youtube.com/watch?v=Qflq48Foh2w&index=6&list=PL3hPm0ZdYhyxMcbHkcUgRlM4-w4gAgfRA**](https://www.youtube.com/watch?v=Qflq48Foh2w&index=6&list=PL3hPm0ZdYhyxMcbHkcUgRlM4-w4gAgfRA)

**Sample problem 1**

How many molecules are in 2.6 g of water?

**2.6 g H2O x \_1 mole H2O\_ x 6.02 x 1023 molecules H2O = 8.7 x 1022 molecules H2O**

 1 **18.02 g H2O 1 mole H2O**

**Sample problem 2**

What is the mass of one atom of gold?

**1 atom Au x \_\_\_\_1 mole Au\_\_\_\_\_\_ x \_\_\_\_\_196.47 g\_\_\_\_ = 3.26 x 10-22 g Au**

 **1 6.02x1023 atoms Au 1 mole Au**

**Name\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Date\_\_\_\_\_\_\_\_Period\_\_\_\_\_\_\_**

Part II: Mole Conversions

1. How many eggs are in 38 dozen eggs?

2. How many dozen eggs is 5 x 106 eggs?

3. How many moles of magnesium is 3.01 x 1022 atoms of magnesium?

4. How many molecules are there in 4.00 moles of glucose, C6H12O6?

5. How many moles are 1.20 x 1025 atoms of phosphorous?

6. How many atoms are in 0.750 moles of zinc?

7. How many molecules are in 0.400 moles of dinitrogen pentoxide?

8. What is the mass of one mole of carbon atoms?

9. What is the mass of one mole of oxygen atoms?

10. What is the mass of 0.75 moles of aluminum atoms?

11. How many moles is 4.6 grams of magnesium? How many atoms is this?

**Name\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Date\_\_\_\_\_\_\_\_\_\_\_\_\_Period\_\_\_\_\_\_**

**Part III:**  **Mole Problems – Be sure you watch video #5 and study the sample problems above before you try these!**

***Directions: Solve the following problems showing ALL work and using unit analysis.***

1. What is the mass, in grams, of 1.5 x 1025 molecules of carbon dioxide? (1.1 x 103 g CO2)
2. How many moles is 4.6 grams of ammonia? (0.27 moles NH3)

3. How many molecules are in 3.5 moles of carbon tetrachloride? (2.1 x 1024 molecules)

4. A sample contains 1.3 x 1022 molecules of NO2.

* 1. How many nitrogen atoms are in this sample?

* 1. How many oxygen atoms are in this sample?

5. A 5.0 g sample of oxygen gas is in a container.

 a. How many molecules of oxygen are in the container?

b. How many atoms of oxygen are in the container?

6. What is the mass in grams of 3.25 moles of iron (III) sulfate. Be sure you have the correct formula before beginning any math! (1.30 x 103 g)