**Moles of Chalk and Crayon Lab**

Information:

\*A mole of any substance contains \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ particles.

\*A mole of lead will be **heavier or lighter** than a mole of oxygen because \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

\*The mass of a mole of a substance can be found using the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of the substance.

\*The units of molar mass are \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

**Goals**

• Visualize the concept of the mole

• Gain experience in calculating grams and moles

**The Activity**

In this activity, you will visualize the concept of the mole using a mole of chalk as a model. You will practice calculations of moles and grams, and end up with a better understanding of what a mole is and how chemists use it.

**Materials:**

Piece of chalk

Piece of crayon

Electronic Scale

**Procedure**:

1. Obtain a piece of chalk.

2. Measure and record the mass of your chalk in the data table below.

3. Write your full name.

4. Again, measure and record the mass of your chalk in the data table below.

5. Obtain a piece of crayon.

6. Measure and record the mass of your crayon in the data table below.

7. Write your full name like you wrote your name in chalk as similarly as you can.

8. Again, measure and record the mass of your crayon in the data table below.

**Data:**

|  |  |  |
| --- | --- | --- |
| **A** | Mass of chalk before writing your name (g) |  |
| **B** | Mass of chalk after writing your name (g) |  |
| **C** | Grams of chalk required to write your name (g) (**A – B)** |  |

|  |  |  |
| --- | --- | --- |
| **A** | Mass of crayon before writing your name (g) |  |
| **B** | Mass of crayon after writing your name (g) |  |
| **C** | Grams of crayon required to write your name (g) (**A – B)** |  |

1. Chalk is comprised primarily of calcium carbonate. The formula for calcium carbonate is CaCO3.

How many of which atoms comprise CaCO3?

2. Use your periodic table to calculate the molar mass of calcium carbonate. Use the table below to help.

|  |  |  |  |
| --- | --- | --- | --- |
| **Element** | **Number of****Atoms in Compound** | **Atomic Mass** | **Number of Atoms x Atomic Mass** |
| Ca |  |  |  |
| C |  |  |  |
| O |  |  |  |
| **Molar Mass:** g/mole |

a. How many **moles of chalk** were in your name?

b. How many **particles of chalk** were in your name?

c. Using the same method you used in a, find the **molar mass** of the crayon. (made of wax- C25H52)

d. How many **moles of wax** were in your name?

e. How many **molecules of wax** were in your name?

**Analysis**

You should have used approximately the same mass of crayon and chalk when writing your name. Why might there be a difference in the moleculesof chalk used than crayon?

Based on the amount of chalk you used, it was (circle the correct answer):

1. less than a mole

2. equal to a mole

3. more than a mole

Define a mole, and explain its importance: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

8. Using your data, calculate:

a. How many moles of chalk did you use? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

b. How many molecules of chalk did you use?\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

c. How many atoms of calcium did you use? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

d. How many atoms of carbon did you use? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

e. How many atoms of oxygen did you use? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Notes:**

If using crayons, use the 0.01 balance because the mass difference for a crayon is too small to be detected on a 0.1 balance.