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Name:_____

Mole Lab

Introduction

Avogadro was an Italian scientist in the 1800's who found the number of particles in a mole. He called this Avogadro's Number, which is:

6.02 x 10^23

A mole is a unit to measure the amount of atoms in a substance.

1 mole = 6.02 x 10^23 particles

In this lab, we will learn:

- How to calculate molar mass
- How to calculate the number of moles in a substance

How Moles Relate to Chemistry:

Balancing Equations:

Example: $Mg + O_2 \rightarrow MgO$

To balance this equation, you need to have the same number of atoms for each element on each side of the yield sign (arrow). To do this we use coefficients, which are the big numbers that go in front of an element or compound. The coefficient basically multiplies the number of atoms by whatever number you choose.

$\underline{2}Mg + O_2 \rightarrow \underline{2}MgO$

Now this is balanced because the number of atoms is the same on each side

Practice:

1. ____Fe + ____Cl_2 -------> ____$FeCl_3$

2. ____Fe + ____O_2 --------> ____Fe_2O_3

How Coefficients Relate To Moles:

Coefficients are Numbers in front of compounds to specify how many elements and compounds are in a chemical reaction. For example in the Balanced Equation:

$$2Mg + O_2 \rightarrow 2MgO$$

There are 2 moles of Magnesium, 1 mole of Oxygen, and it produces 2 moles of Magnesium Oxide.

The Coefficient is equal to 6.02x10^23 number of particles. In the equation:

$$2Mg + O_2 \rightarrow 2MgO$$

There is 6.02x10^23 number of O_2.

How to Calculate Moles:

To calculate the molar mass (g/mol) all you do is add up all of the atomic masses in each element of your compound.

For example in the chemical

$$SO_4$$

S (Sulfur) has an atomic mass of 32 O (Oxygen) has an atomic number of 16 since there are four atoms of Oxygen in the compound we multiply 16 By 4 to find the molar mass.

$$SO_4$$

$$32+(16*4) = 96$$

$$96 \text{ g/mol}$$

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Calculate the Molar Masses of the following Chemicals:

1. Cl_2

2. KOH

To find moles from grams, you will have to use conversion. In the problem: 30g of H_3PO_4

You first find the molar mass of H_3PO_4 like you did above. This would give you: 3 + 64 + 31 = 98g.

Then, you would put this number under 1 mol of H_3PO_4. This would look like:

$$\frac{1 \text{ mol } H_3PO_4}{98 \text{ g}}$$

After dividing, you would then multiply your answer by the number of grams in the beginning of the problem. In this case, it would be 30. Your final answer would be approximately:

$$0.31 \text{ mol } H_3PO_4$$

Practice: Calculate the Moles from Grams

1. 25 g of HF

2. 1.1 g of $FeCl_3$

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Our Lab

Materials:

- Bubblegum (any kind)
- Scale
- Plastic Cup

Procedure:

1. Find the mass of the empty plastic cup and record this data.
2. Place unchewed gum into the plastic cup and find the mass. Remember to subtract the mass of the cup!
3. Chew the gum for approximately 5 minutes
4. Place the chewed gum into the plastic cup and record the mass of the gum. Remember to subtract the mass of the cup!
5. Calculate the change in mass between the two different pieces of gum
6. Dispose of the gum.

Mass of Empty Cup (g)	
Mass of gum prior (g)	
Mass of gum after (g)	
Change in Mass	

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Post Lab Questions

1. Why was there a change in mass?

2. The sugar has a chemical formula of $C_6H_{12}O_6$. Calculate the molar mass (g/mol).

3. Calculate the number of moles of sugar you consumed while chewing the gum

4. Calculate the number of molecules of sugar you consumed while chewing the
gum.