Chapter 3- The Mole

The Mole

Vocabulary:

- Mole
- Avogadro's number
- Molar mass
- Molar volume
- Gram formula mass
- STP
- Gram←→mole problems
- Gram←→molecule problems
- Gram ←→volume problems
- Mole←→ representative particle problems

Review problems:

1. Find the number of moles in 264.5 g $Ca(OH)_2$

$$\frac{264.5\ g\ Ca(OH)_2}{1} \times \frac{1\ mole\ Ca(OH)_2}{74.09305\ g\ Ca(OH)_2} = 3.570\ moles\ Ca(OH)_2$$

2. Find the number of molecules in 67.6 g H_2O

$$\frac{67.6\ g\ H_2O}{1} \times \frac{1\ mole\ H_2O}{18.01505\ g\ H_2O} \times \frac{6.03\times10^{23}\ molecules\ H_2O}{1\ mole\ H_2O} = 2.26\times10^{24}\ molecules\ H_2O$$

3. Find the number of moles in 3.53×10^{24} molecules of NaCl

$$\frac{3.53\times10^{24}\ molecules\ NaCl}{1} \times \frac{1\ mole\ NaCl}{6.03\times10^{23}\ molecules\ NaCl} = 5.86\ moles\ NaCl$$

4. Find the number of grams in 6.45×10^{24} molecules of $Mg(NO_3)_2$

$$\frac{6.45\times10^{24}\ molecules\ Mg(NO_3)_2}{1} \times \frac{1\ mole\ Mg(NO_3)_2}{6.03\times10^{23}\ molecules\ Mg(NO_3)_2} \times \frac{148.3148\ g\ Mg(NO_3)_2}{1\ mole\ Mg(NO_3)_2} = 1590\ grams\ Mg(NO_3)_2$$

5. A room with a volume of 5500 L contains how many moles of air at STP?

$$\frac{5500\ L\ air}{1} \times \frac{1\ mole\ air}{22.4\ L\ air} = 250\ moles\ air$$

6. A student fills a 2.5L flask with CO_2 at standard temperature and pressure. How many atoms of Oxygen gas are in the flask?

$$\frac{2.5\ L\ CO_2}{1} \times \frac{1\ mole\ CO_2}{22.4\ L\ CO_2} \times \frac{6.03\times10^{23}\ molecules\ CO_2}{1\ mole\ CO_2} \times \frac{2\ atoms\ O}{1\ molecule\ CO_2} = 1.3\times10^{24}\ atoms\ O$$