**CHEM 152 WORKSHOP I**

Scientific Notation - a number written in scientific notation has two parts.

1. **A coefficient part**: a number that is between 1 and 10.
2. **An exponential part**: 10 raised to an exponent, n.

Significant Figures

1. **nonzero** digits **are significant.**
   * 125 = 3 sig. Figs.
2. **Interior zeros** (zeros between two numbers) **are significant.**
   * 2005 = 4 sig. figs.
3. **Trailing zeros** (zeros to the right of a nonzero number) that fall after a decimal point **are significant.**
   * 1.25000 = 6 sig. figs.
4. **Trailing zeros** that fall before a decimal point **are significant.**
   * 12000. = 5 sig. figs.
5. **Leading zeros** (zeros to the left of the first nonzero number) **are NOT significant.** They serve only to locate the decimal point.
   * 0.0000025 = 2 sig. figs.
6. **Trailing zeros at the end** of a number, but before an implied decimal point, **are ambiguous** and should be avoided.
   * 25000 = ambiguous (this should be written with scientific notation)

Calculations with Significant Figures

* Addition and subtraction – to the least number of decimal places.
* Multiplication and division – to the least number of significant figures
* If both Addition/Subtraction & Multiplication/Division - operations are performed and both rules are applied at the end of the calculation. Keep track of sig. fig. at each step and round at the end.

Dimensional Analysis

1. Identify the starting point (the ***given*** information).
2. Identify the end point (what you must ***find***).
3. Devise a way to get from the starting point to the end point using what is given as well as what you already know or can look up.
4. **Strategize**. Create a solution map—the series of steps that will get you from the given information to the information you are trying to find.
5. **Solve**. Carry out mathematical operations (paying attention to the rules for significant figures in calculations) and cancel units as needed.
6. **Check**. Does this answer make physical sense? Are the units correct?

**Problems:**

1. **How many significant figures in the following measurements:**
   1. 125
   2. 2005
   3. 0.00005600
   4. 0.00022
   5. 2.00 x 10-4
   6. 1.25 x 1025
   7. 2.152
2. **Calculate the following to the correct number of significant figures**
   1. 4.25 g + 4.100 g + 125 g
   2. 487 ft x 1.2000 ft x 0.457 ft
   3. (1.245 g – 0.115 g)/ 1.2400 mL
   4. 324.55 g – (6104.5 g2/22.3 g)
3. **Answer the following**
   1. how many liters are found in 245 ft3 given that 12 in = 1ft and 1 inch = 2.54 cm
   2. The density of sulfuric acid is 1.84 g/mL. What volume of this acid would weigh 125 kg?
   3. In the US land is measured in acres. There are 4.356 x 104 ft2 in each acre. How many km2 are in 1.25 acres?
   4. A 35.0 mL sample of ethyl alcohol (density = 0.789 g/mL) is added to a graduated cylinder that has a mass of 49.28 g. What will be the mass of the cylinder plus the alcohol?