Chapter 1 Sections 1.4-1.6

Units of Measurement

SI units: Système International d'Unités (System of International Units)

How it works: Base units (like meter, second, mole, gram, etc)

And prefixes that indicate a multiplicative factor for the unit.

kilo= 1000 or 10^3

milli=1/1000 or 10^{-3}

The prefixes are something that you will have to memorize. Daily practice with practice problems will help!

*n.b. The SI base unit for mass is not gram, but kilogram

Temperature scale: Kelvin scale is the SI unit for temperature. Absolute Zero (coldest attainable temperature) is 273.15 C

K=C+273.15

Freezing pt of water is 0 C and the boiling point is 100 C

C= 5/9(F-32) F = (C 9/5) +32

Derived Units: when we multiply or divide SI base units to obtain a new unit.
Examples include volume (length x width x height) m^3), and density (mass/volume kg/m^3 usually expressed as g/cm^3 or g/mL) 1 cm^3 = 1 mL

Uncertainty:

Uncertainty *always* exists in *any* measured quantity. An important part of the language of chemistry is expressing that finite precision when we report our numbers.

Precision vs. Accuracy

Precision: Measure of how closely individual measurements are to each other. How well do they agree?

Accuracy: A measure of how closely individual measurements are the the true value.

Dart board

Significant Figures

There are rules. I recommend that you practice the rules rather than simply memorize them.

1. Zeros between nonzero digits are always significant
2. Zeros at the beginning of a number are never significant
3. Zeros at the end of a number are significant if the number contains a decimal point

4. Addition and subtraction, the results has the same number of decimal places as the measurement with the fewest decimal places
5. Multiplication and division the results contains the same number of significant figures as the measurement with the fewest significant figures.

Dimensional Analysis *We will begin with this topic on Monday!*

An approach to help us keep track of units.

How to: Express conversion factors as fractions.

Example:

1 kg= 2.2046 lb

becomes:

$\frac{1\ kg}{2.2046\ lb}$ or $\frac{2.2046\ lb}{1\ kg}$

Exact vs Inexact numbers. 1 kg in conversion factor is exact, 2.2046 is inexact.

Suggested practice problems

1.13, 1.15, 1.23, 1.29, 1.39, 1.47, 1.60

*note Dimensional Analysis (necessary for 1.47) will be discussed on Monday.