Advanced Chemistry
Notes: Measurements

Qualitative measurements: give results in a descriptive, nonnumeric form.

Quantitative measurements give results in a definite form, usually as number units

Scientific notation: a number written as the product of two numbers:

A coefficient and 10 raised to a power

Accuracy: A measure of how close a measurement comes to the actual or true value of whatever is measured.

Precision: A measure of how close a series of measurements are to one another.

Accepted value: The correct value based on a reliable reference

Experimental value: The value measured in the lab

Error: The difference between the accepted value and the experimental value.

Error = accepted value - experimental value

Percent error is the absolute value of the error divided by the accepted value, multiplied by 100%

Significant figures: All the digits that are known, plus a last digit that is estimated.

*An answer cannot be more precise than the least precise measurement from which it was calculated.

Internal System of units (SI) another name for the metric system.

Length: Linear measurement

- Meter (m)

Volume: The space occupied by any sample of matter

- Liter (L) is the volume of a cube that is 10 centimeters along each edge.

Mass: Amount of matter in an object.

- Gram (g) 1/1000 of a kilogram

Weight: Measurement that accounts for the effects of gravity

- Newton (N): $kg \times m/s^2$

Density is the ratio of the mass of an object to its volume.

Density = mass/volume

- **Specific gravity** is the comparison of the density of a substance with the density of a reference substance, usually at the same temperature.
  Specific gravity = density of substance (g/cm^3)/density of water (g/cm^3)

- **Hydrometer** measures the specific gravity of a liquid

Temperature: Measure of the average kinetic Energy of an object.
Determines the direction of heat transfer
Almost all substances expand with an increase in temperature and contract as the temperature decreases.

Celsius scale: Named after Anders Celsius and sets the freezing point of water at 0^oC and the boiling point of water at 100^oC.
Kelvin scale: Named after Lord Kelvin and sets the the freezing point of water at 273

Kelvin and the boiling point 373 K.
Absolute zero: The O point on the Kelvin scale 0 K (-273ºC)