

Unit 1:

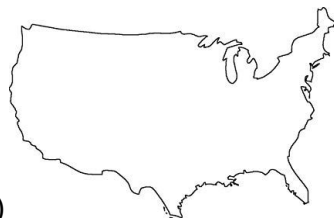
Accuracy: How close results are to an accepted answer

Precision: How close results are to one another

\*High Precision measurements contain a greater number of sig figs

Exact Numbers: a whole number; counted quantities with an infinite number of sig figs

Inexact Numbers: not whole numbers; counted quantities with an infinite number of sig figs



**Pacific** (decimal present)

**Atlantic** (decimal absent)

When there is a decimal, you start on the pacific side (left) and when there isn't, you start on the atlantic side (right).

Significant Figures: the measurement of precision. Precise measurements have more sig figs

Examples: 4567 - 4 sig figs

2090 - 3 sig figs

3.201 - 4 sig figs

Density and Volume:

$$\text{Density} = \frac{\text{mass}}{\text{volume}}$$

$$\text{Mass} = \text{density} \times \text{volume}$$

$$\text{Volume} = \frac{\text{mass}}{\text{density}}$$

Rules for scientific notation:

To be in proper scientific notation, the number must be written within a number between 1 and 10 and multiplied by a power of 10

Examples:

$$2.13 \times 10^3 = 2130$$

$$7.5 \times 10^{-4} = 0.00075$$

$$9.8 \times 10^6 = 9800000$$

$$5.67 \times 10^{-8} = 0.0000000567$$

What is chemistry?

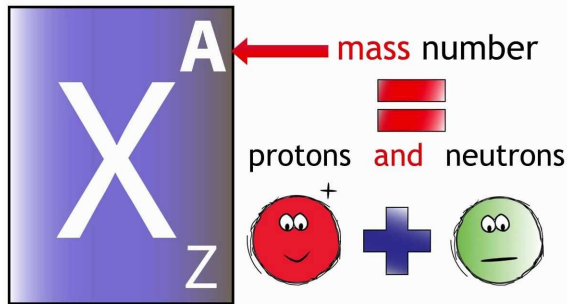
1. What subatomic particles make up an atom?
2. What is the charge and mass of each particle?
3. Where is each particle located in the atom?

Chemistry is the study of matter and energy. Inside atoms, there are three types of subatomic particles:

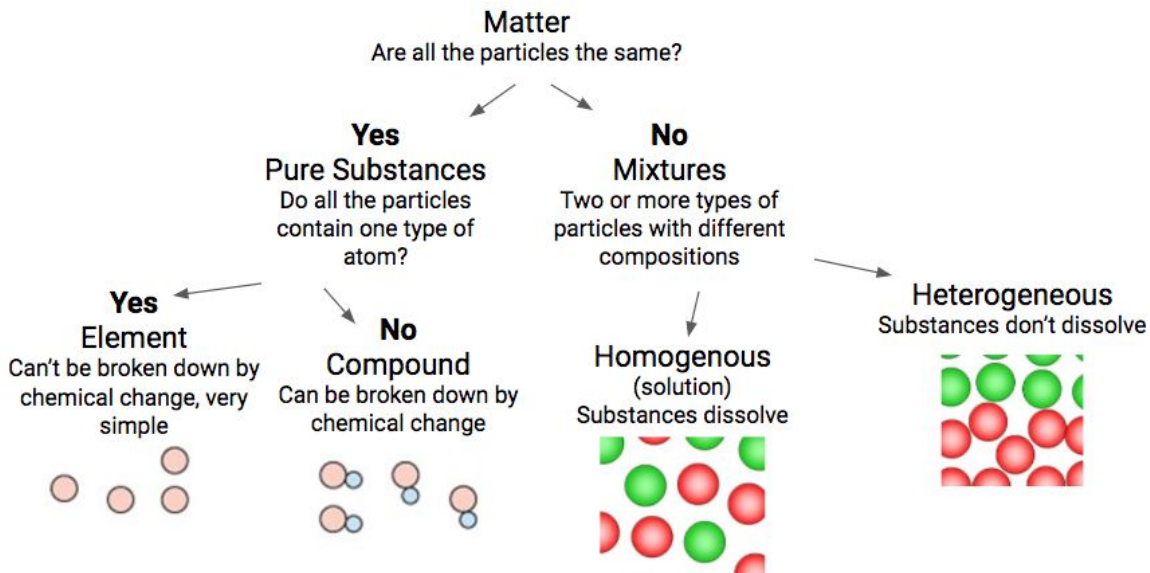
Subatomic Particles (makeup an atom)	Charge	Mass	Location in the atom
Protons	Positive (+1)	1 <sub>u</sub> u = atomic mass unit	nucleus
Neutrons	Neutral (no charge)	1 <sub>u</sub>	nucleus
Electrons	Negative (-1)	Negligible ~ 1/1836 Ignored because it's so small	"Electron cloud" (principle energy levels, shells outside the nucleus, orbitals)

Mass number - atomic number = number of neutrons

Mass number - the mass of an atom



Chemis"tree" of matter:



What are the characteristics of solids, liquids, and gases?

Phases	Shape	Volume	Particle Arrangement	Particle Movement
Solids (low kinetic potential energy)	Definite shape	Definite	Crystal structure arranged in a fixed geometric pattern, very close together	Vibrational movement in place
Liquids	Indefinite	Definite	Particles are slightly more apart than solids	Independent movement
Gases (high kinetic potential energy)	Indefinite	Indefinite	Very far apart	Fast independent movement

Distillation: the method of separating substances in a mixture based on boiling point

Fractional distillation: separates substances based on crude oil

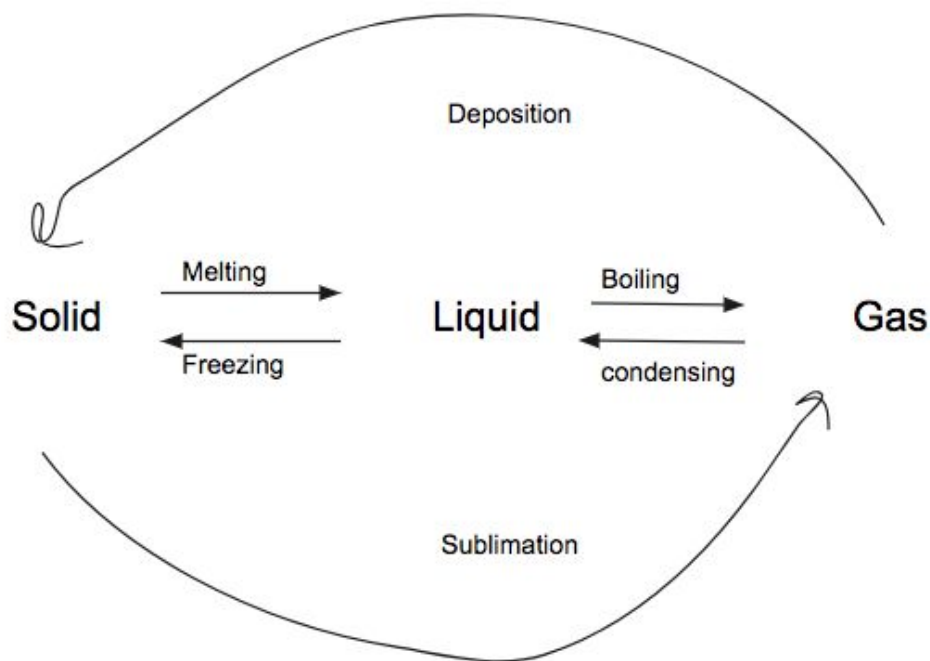
Using a magnet/magnetism: the method of separating substances is a mixture based on whether it's magnetic

Filtration: separates solids from liquids (or aqueous solutions)

Chromatography: separating substances based on adhesive forces to water

Centrifugation: (using a centrifuge) separates substances based on density

Physical change: the chemical composition doesn't change, the phase changes



Chemical change: the chemical composition changes, reactant bonds break, and product bonds form.