Physical properties: properties of the material

- Example: boiling point, melting point, hardness, color, etc.

2 classes of physical properties:

1. Intensive: are independent of the amount of substance you have
    a. Property would be the same for an ounce or a pound of the substance
        i. Example: density melting point, hardness, ductility
2. Extensive: are dependent upon the amount of substance you have
        i. Example: mass, length, volume

Chemical properties: describe the ability of a substance to combine or react with other substances

- Example: rusting, baking

Energy: defined as the capacity to perform work or to transfer heat

- Unit of Energy: Joule (J)
- Defined in units of mass, length, time

Work=Force X Distance

N=Newton=Unit of Force

1NSM=kg m/s^2 *m =1kg m^2/s^2=1J=1 kgm^2 s^-2=mass *velocity^2

Force=mass*acceleration

Velocity=distance/time

Acceleration=distance/time^2 =m/s^2

Types of Energy: 2 basic forms:

1. Potential
    - Example: gravitational, electrical, chemical
    - P.E.(gravity)=mgh
2. Kinetic: energy of motion
    - K.E.=1/2 *mv^2

m=mass (kg)

g=gravitational constant (m/s^2)

h=height (m)

Like charges repel ←(+)(+)→

Opposite charged particles attract (+)→←(-)

Law of Conservation of Energy: energy cannot be created nor destroyed, just transformed from one form to another

- Only exception is E=mc^2 (only place where exception applies is on the sun, or nuclear weapons)

3 States of Matter:

1. Gas (highest energy)
2. Solid (slowest energy)
3. Liquid (medium energy)

Matter does not change composition in different states, but what changes is the amount of energy in motion

Z=Atomic #

Atomic #= # of protons in nucleus

Algebra Rules:

1. Cannot "lose" variables or constants
2. Whatever you do to one side you have to do to the other side

For Example:

PV=nRT (ideal gas law)

How do we solve for R?

PV/nT=nRT/nT (Divide nT by both sides)

You will see that the nT cancels so you will get PV/nT=R

n^0=1

Math Nomenclatures:

When a number has units, always leave a space between the value and its units

Dimentional Analysis:

Units can be multiplied or divided. Units need not to match. When adding or subtracting the units need to be the same. Your final answer has to match the expected unit.

Converting days to hours:

2 days*24 hrs/1 day= 48 hrs

Converting days to seconds:

2 days*24 hrs/1 day*60 min/1 hr*60 s/1 min=172800 s=1.72800*10^5 s

Converting miles to inches:

2.500 mi*5280 ft/1 mi*12 in/1ft=158400 in=1.584*10^5 in

Conversions:

2.54 cm =1 in

1 m= 39.37 in

1 yd= 36 in

16 oz=1 pound

12 in =1 ft

Exponential Notation:

2,000, 000, 000 =2.0*10^9

1/x^n=x^-n

Exponential Forms:

X^a*X^b=X^(a+b)