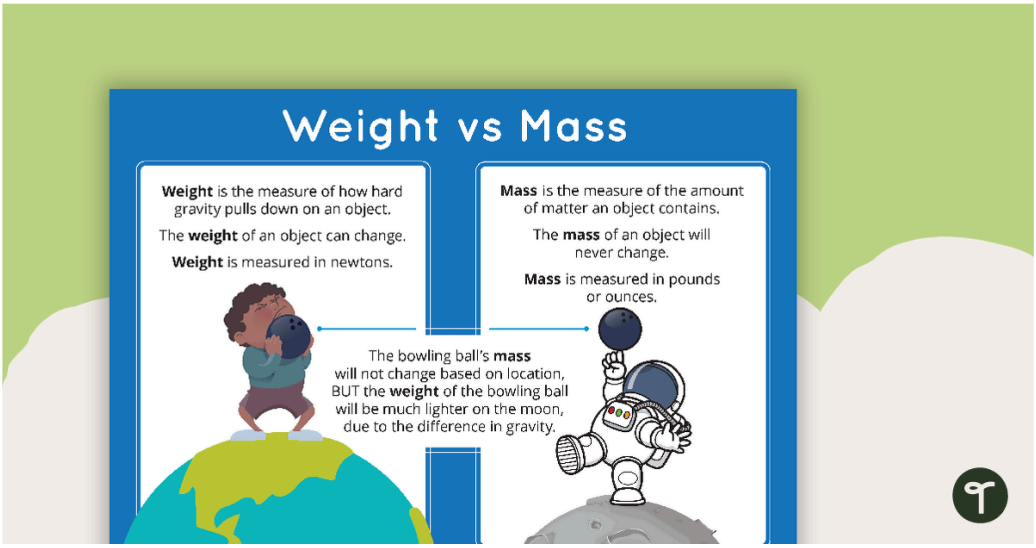
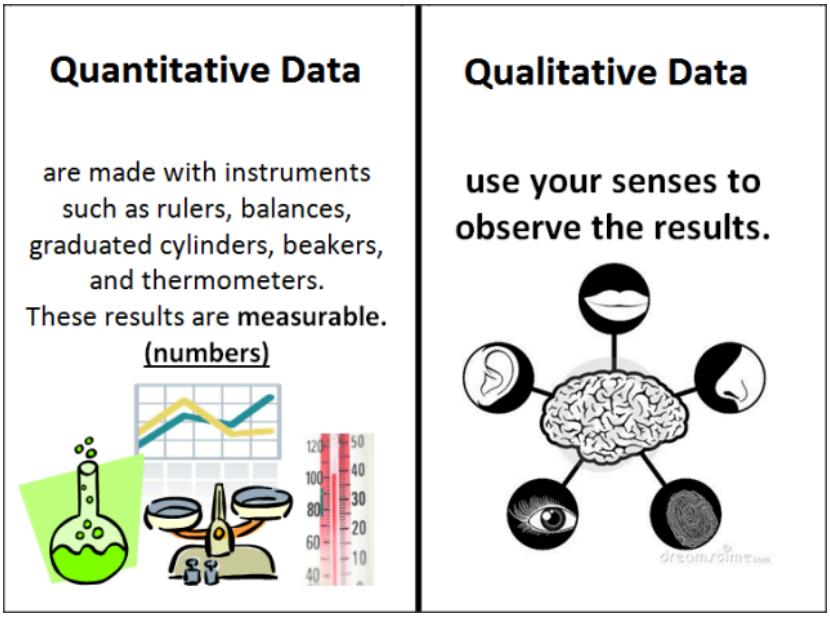
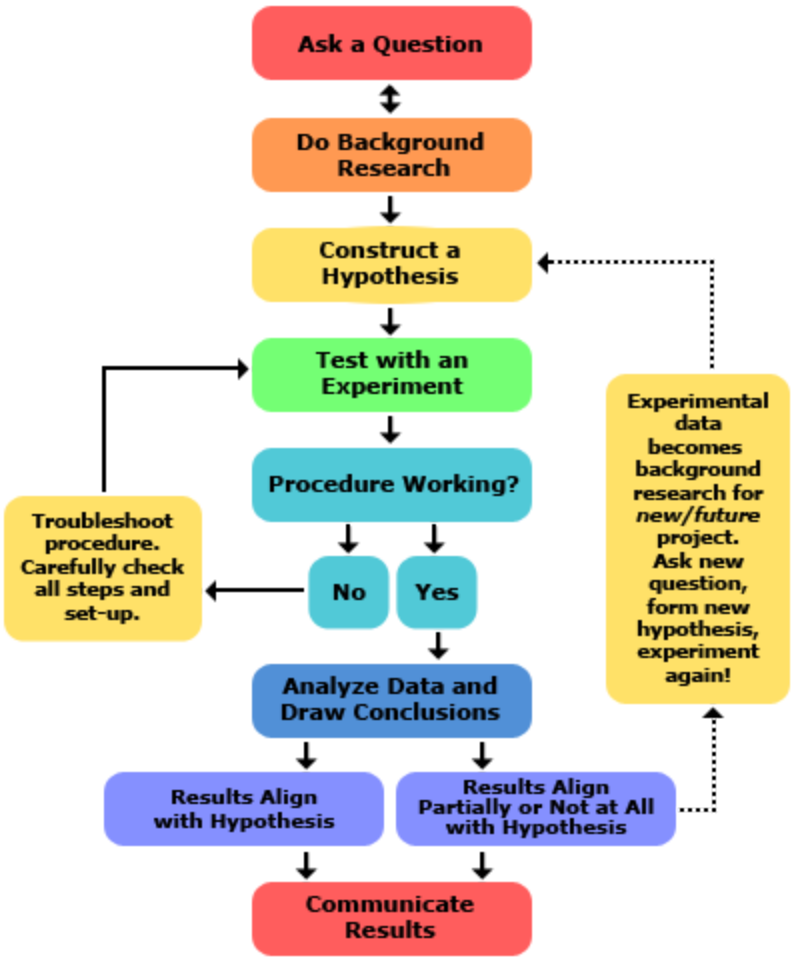
Chemistry: Unit 1 Notes (Ch. 1-3)

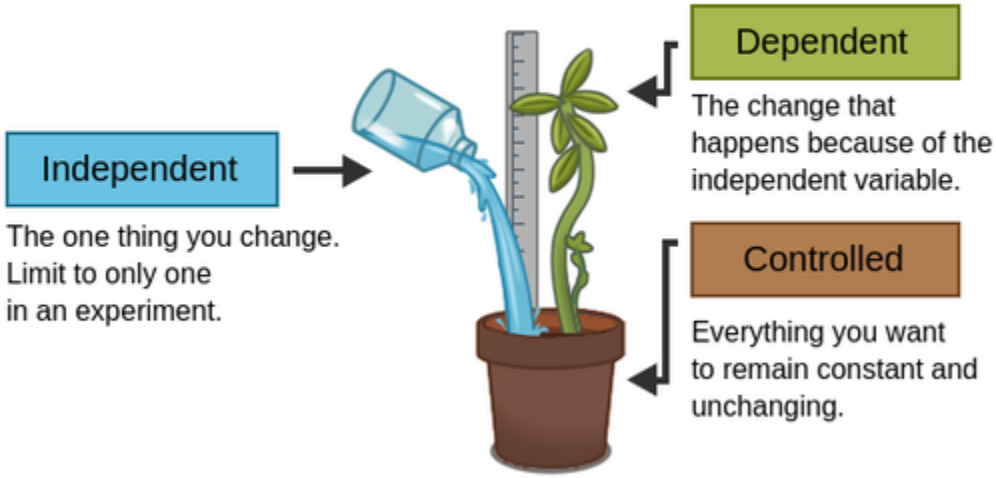
Chemistry: the study of matter
Substance: another name for chemical
Model: representation of different phenomena in the world

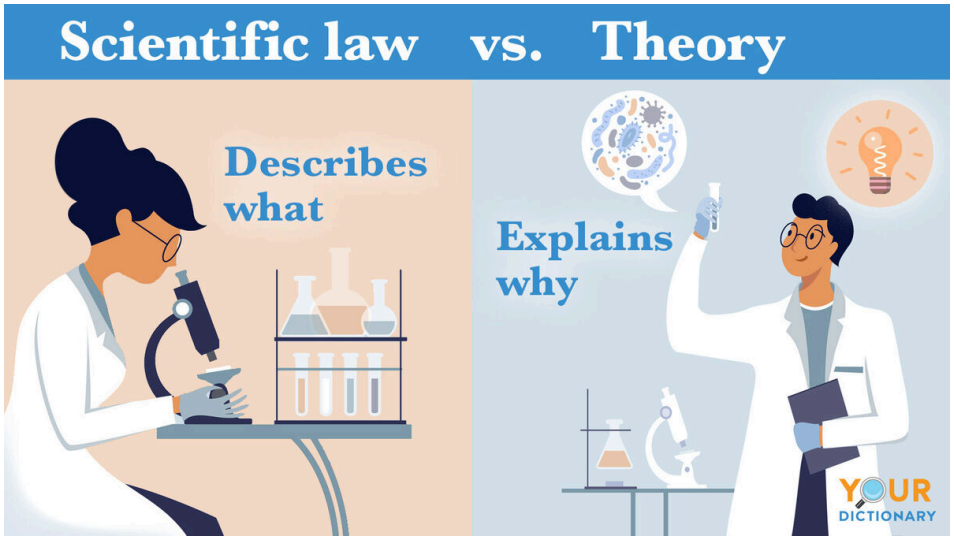






Types of variables :





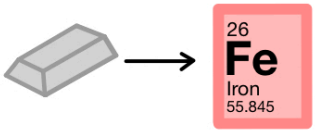
Pure vs Applied Chemistry

Pure Chemistry

Studying or learning material for the sake of knowledge (for your own benefit)

Example:

A scientist discovers a new element and identifies it as Iron



Applied Chemistry

Studying or learning material for an intended purpose (for the benefits of others)

Example:

A scientist realizes that they can crush up iron, purify it, and use it to give to people that lack a normal amount of iron in their bloodstream

Chapter 2 Notes: Analyzing Data

_____ _____: a defined unit in a system of measurement that is based on an object or event in the physical world.

SI Base Units

Quantity	Base Unit	Based on what?
	Second (s)	Frequency of radiation given off by a cesium-133 atom
	Meter (m)	Distance that light travels in a vacuum in 1/299,792,458 of a second
	Kilogram (kg)	A platinum and iridium cylinder kept in France stored in a vacuum under a triple bell jar
	Kelvin (K)	Fahrenheit scale- water freezes at 32 degrees and boils at 212 degrees Celsius scale: Freezing point 0 degrees, boiling point 100 degrees Zero Kelvin is where are all particles are in lowest possible energy state, water freezes at 272.15 K and boils at 373.15 K K = C + 273
Amount of a substance	Mole (mol)	
Electric current	Ampere (A)	
Luminous intensity	Candela (cd)	

SI Prefixes

Prefix	Symbol	Numerical Value in Base Units	Power of 10 Equivalent
Giga		1,000,000,0001	10^9
Mega		1,000,000	10^6
Kilo		1000	10^3
-	-	1	10^0
Deci		0.1	10^-1
Centi		0.01	10^-2
Milli		0.001	10^-3
Micro		0.000001	10^-6
Nano		0.000000001	10^-9
Pico		0.000000000001	10^-12

Derived Units

a unit that is defined by a combination of _____

Quantity	**Derived Unit**
Volume- space occupied by an object	m^3 or L
Density- physical property of matter that is amount of mass per unit volume	g/cm^3 Density = mass/volume

Scientific Notation

can be used to express any number as a number between 1 and 10 (known as the coefficient) multiplied by _____ raised to a power (known as the exponent)

Number	Scientific Notation
460,000,000,000,000,000,000,000	4.6 x 10^23
0.00000000000000000002	2 x 10^-23

Dimensional Analysis

a systematic approach to problem solving that uses conversion factors to move, or convert, from one unit to another

_____- a ratio of equivalent values having different units

Example: 1 km/1000 m or 1000m/1 km

Analyzing Data

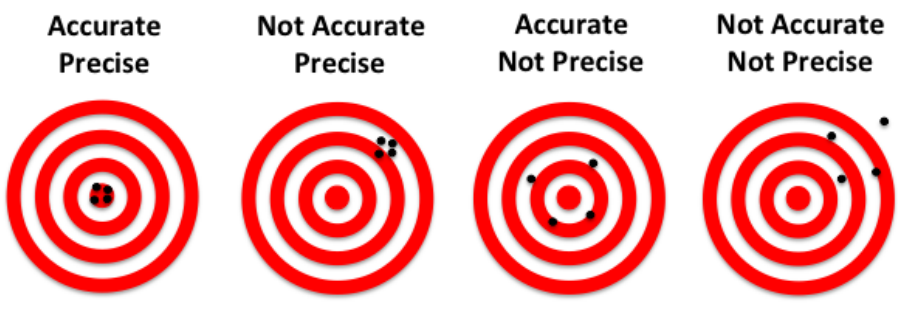
_____- how close a measured value is to an accepted value

_____- difference between an experimental value and an accepted value

Error = experimental value - accepted value

_____ = error/accepted value x 100

_____-how close a series of measurements are to one another



Significant Figures

all known digits plus one estimated digit

Rules	Example
1. Nonzero numbers are always significant	72.3 g has 3
2. All final zeros to the right of the decimal are significant	6.20 g has 3
3. Any zero between significant figures is significant	60.5 g has 3
4. Placeholder zeroes are not significant. To remove placeholder zeros, rewrite the number in scientific notation	0.0253 g and 4320 g (each has 3)
5. Counting numbers and defined constants have infinite number of significant figures	6 molecules

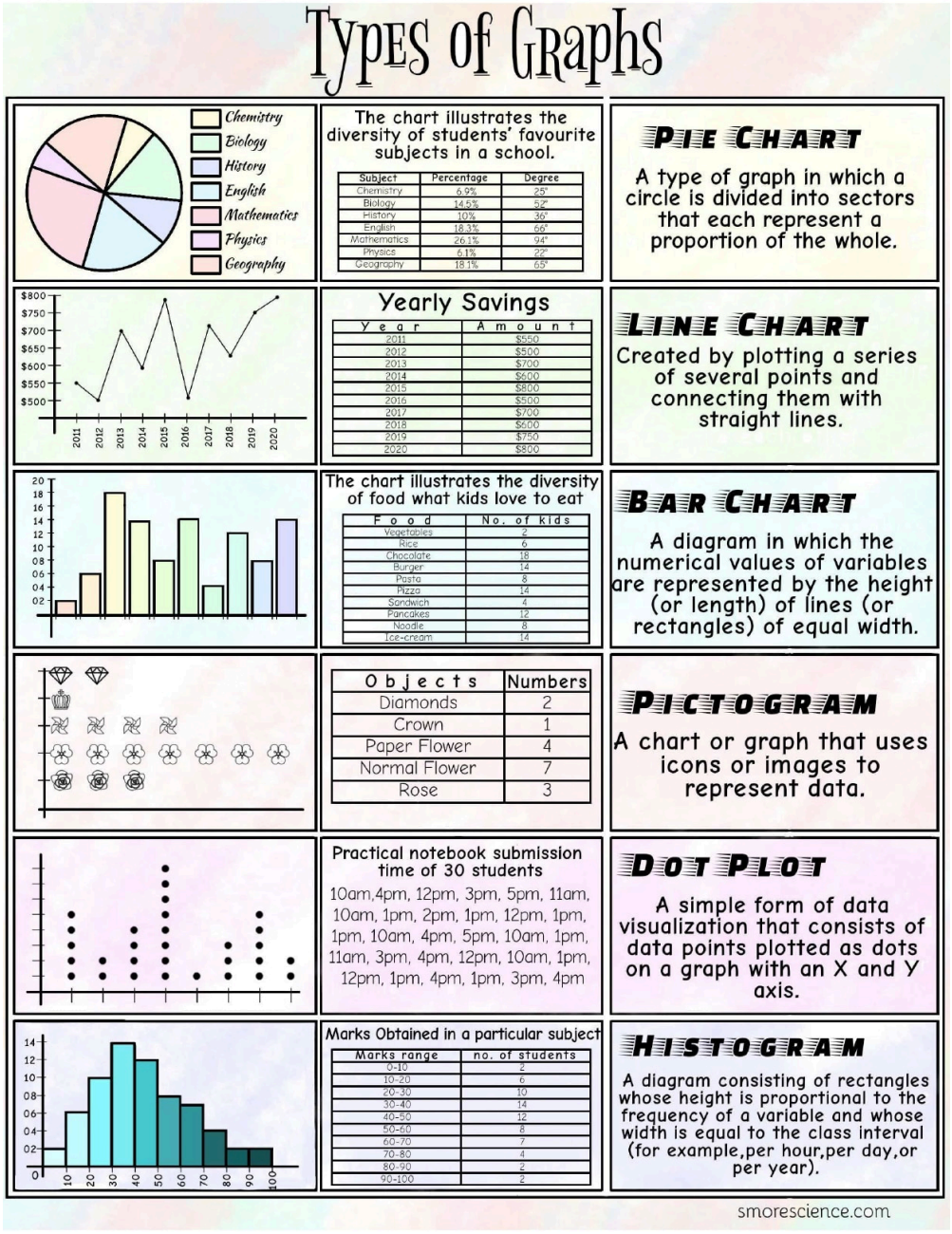
Rounding Numbers

Rules	Example
1. If the digit to the right of the last significant figure is **less than 5, do not change the last significant figure**	2.532 → 2.53
2. If the digit to the right of the last significant figure is **greater than 5, round up the last significant figure**	2.536 → 2.54
3. If the digits to the right of the last significant figure are a **5 followed by a nonzero digit, round up the last significant figure**	2.5351 → 2.54
4. If the digits to the right of the last significant figure are a 5 followed by 0 or no other number at all, look at the last significant figure. If it is odd, round it up, if it is even, do not round up	2.5350 → 2.54 2.5250 → 2.52
Adding and Subtracting	Round answer to fewest number of decimal places to right of decimal
Multiplying and Dividing	Answer should have same number of sig figs as measurement with fewest number

Graphs

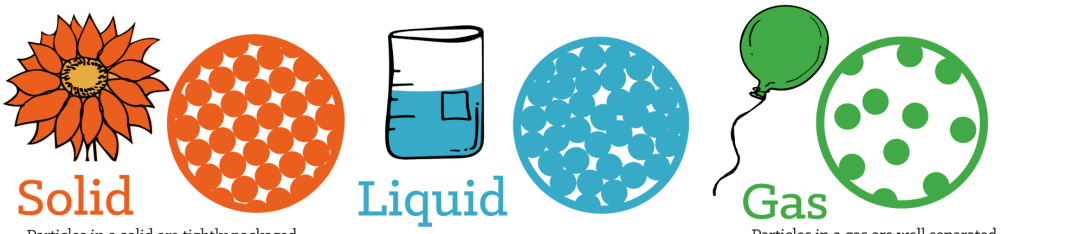
visual display of data

*Special Note: _____ for line graph = rise/run or change in y/change in x



Chapter 3: Matter- Properties and Change

Three States of Matter



Solid

- Particles in a solid are tightly packaged and usually in a regular pattern.
- Particles in a solid will vibrate but cannot move past each other.
- Solids retain their shapes.

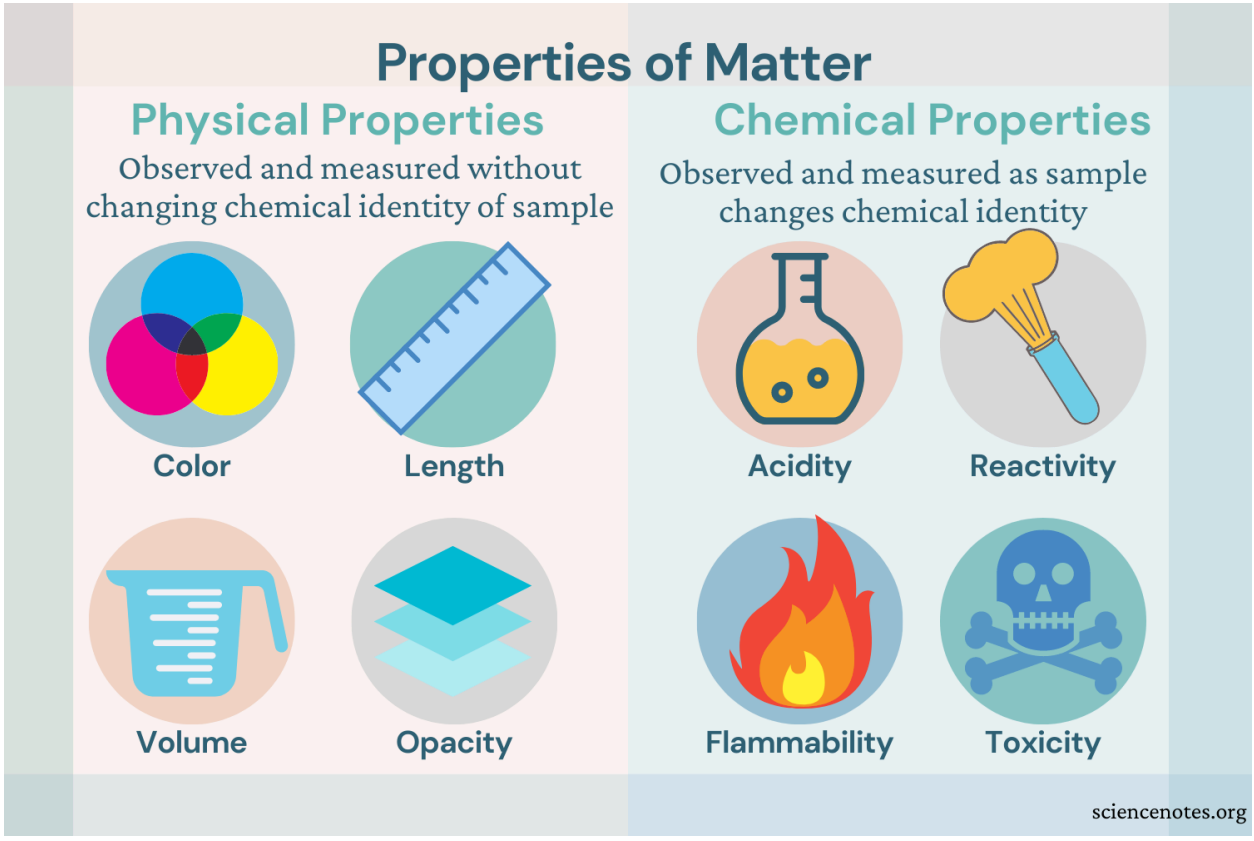
Liquid

- Particles in a liquid are close together with no regular pattern.
- Particles in a liquid flow and can easily move or slide past one another.
- Liquids assume the shape of their containers.

Gas

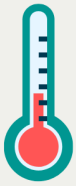
- Particles in a gas are well separated with no regular pattern.
- Particles in a gas vibrate freely at high speeds.
- Gasses assume the shapes of their containers.

Vapor: gas state of substance that is solid or liquid @ room temp



Intensive and Extensive Properties

Intensive properties do not depend on the amount of matter in a sample.



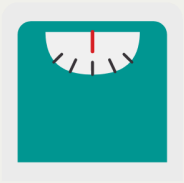
Temperature

Boiling Point

Concentration

Luster

Extensive properties depend on how much matter a sample contains.



Weight

Length

Volume

Entropy

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Chemical and Physical Changes

Chemical change: A chemical reaction forms new products.

Combustion

Rotting

Rusting

Digestion

Physical change: Matter changes form but not chemical identity.

Melting

Shredding

Boiling

Chopping

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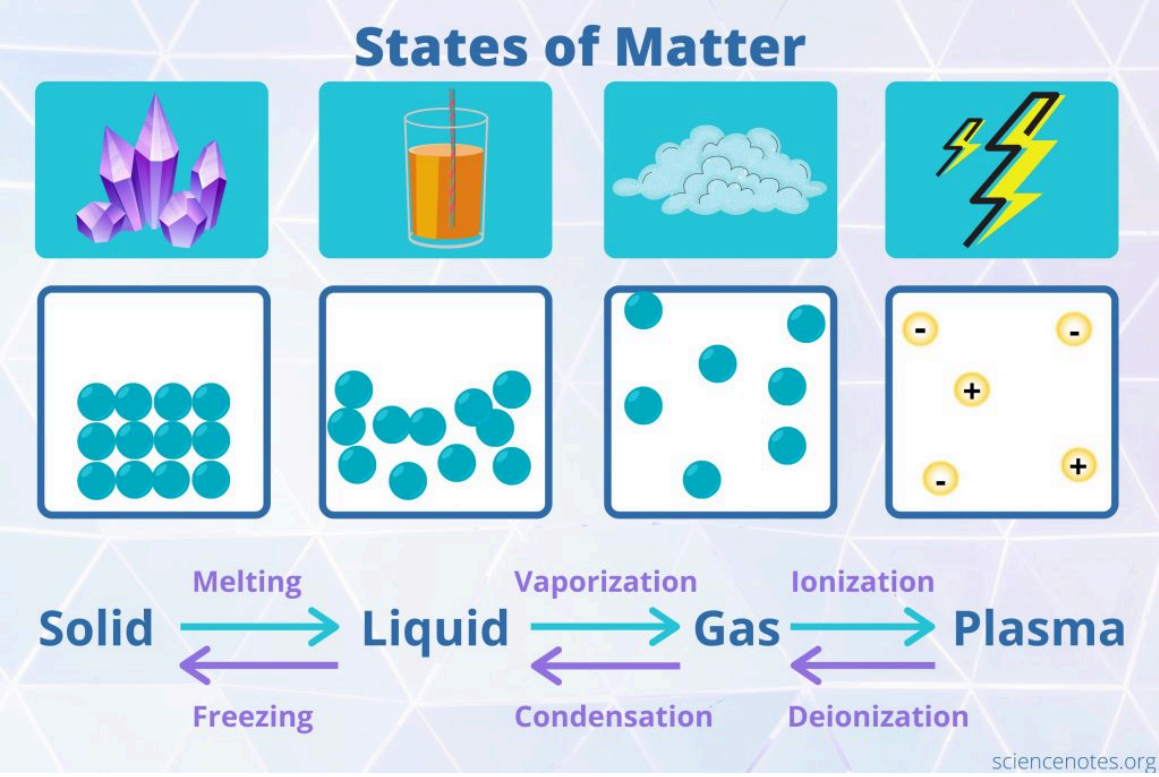
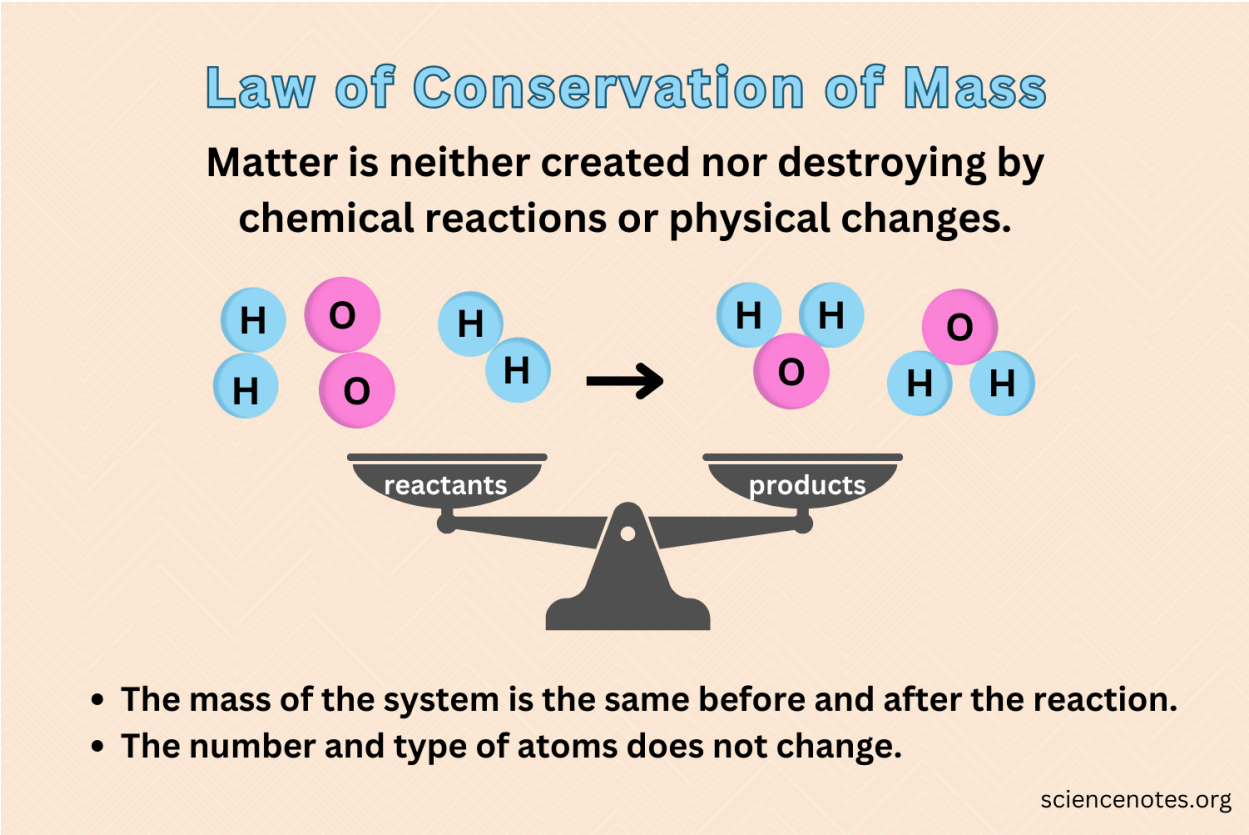
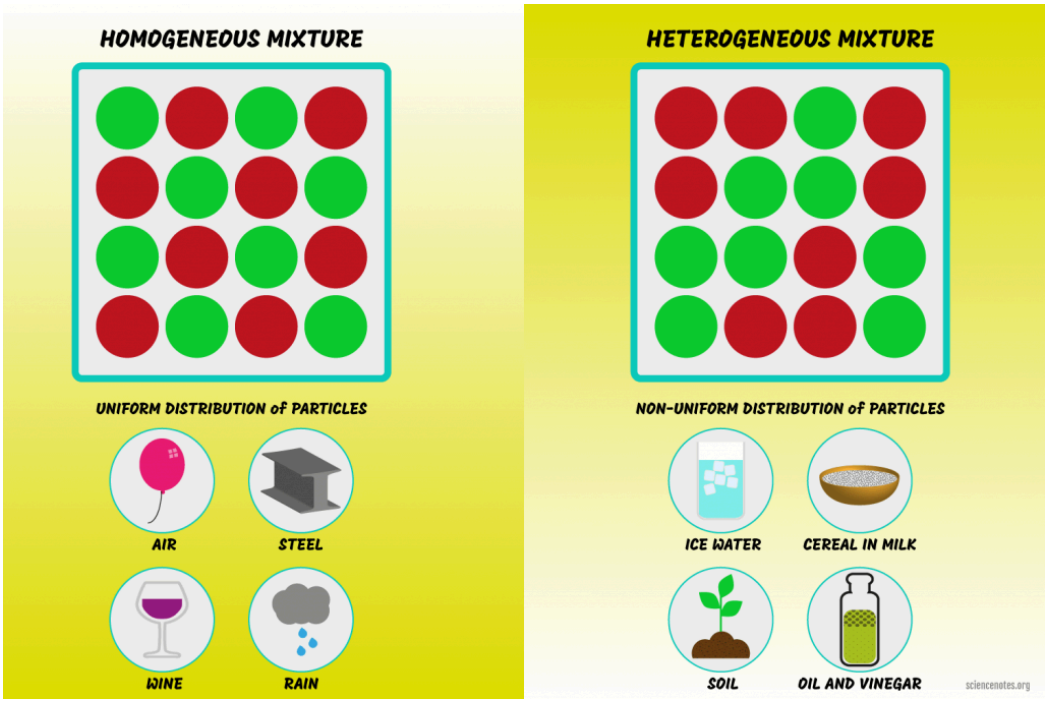
Phase Change






HOMOGENEOUS MIXTURE
UNIFORM DISTRIBUTION of PARTICLES
AIR
STEEL
WINE
RAIN
HETEROGENEOUS MIXTURE
NON-UNIFORM DISTRIBUTION of PARTICLES
ICE WATER
CEREAL IN MILK
SOIL
OIL AND VINEGAR
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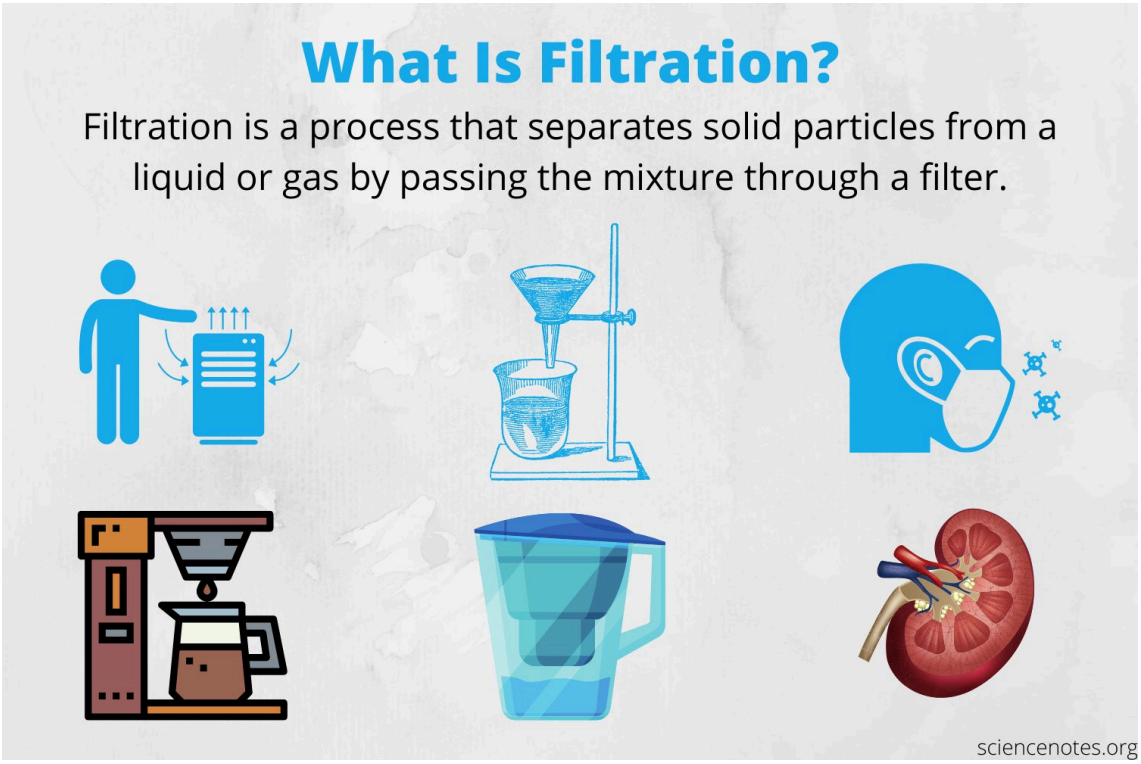
What Is Filtration?
Filtration is a process that separates solid particles from a liquid or gas by passing the mixture through a filter.
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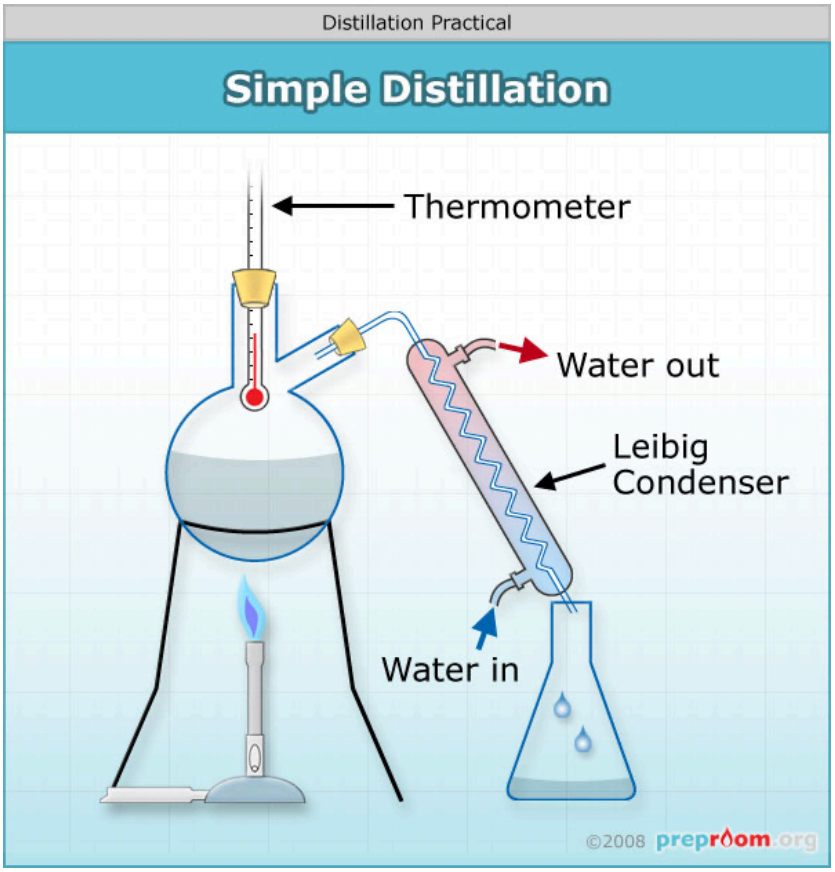
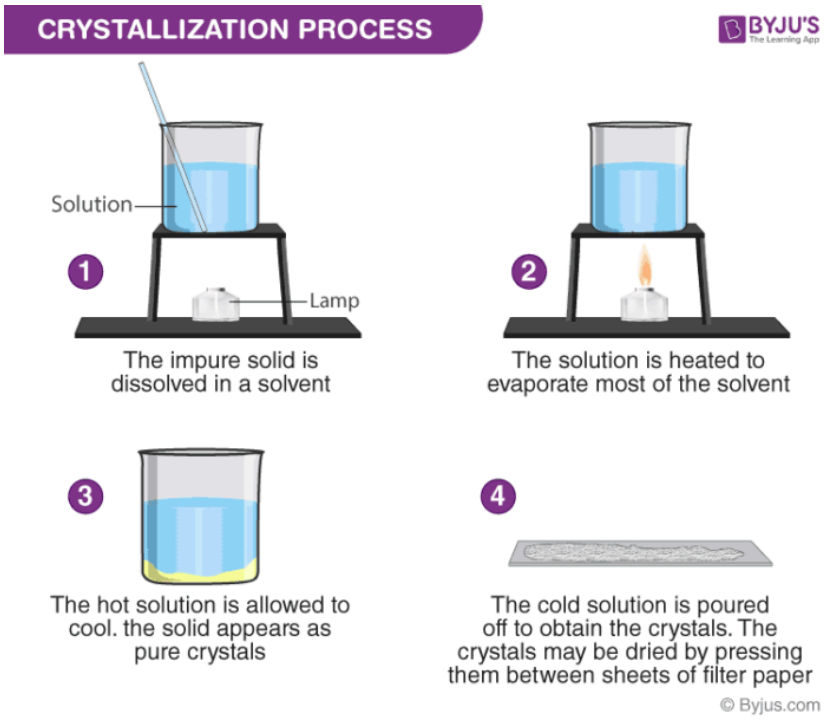
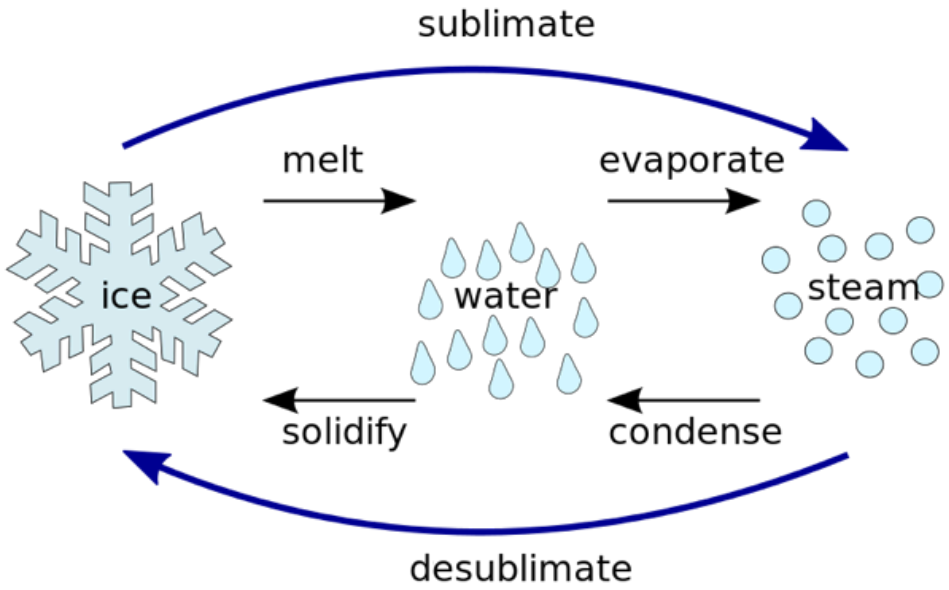
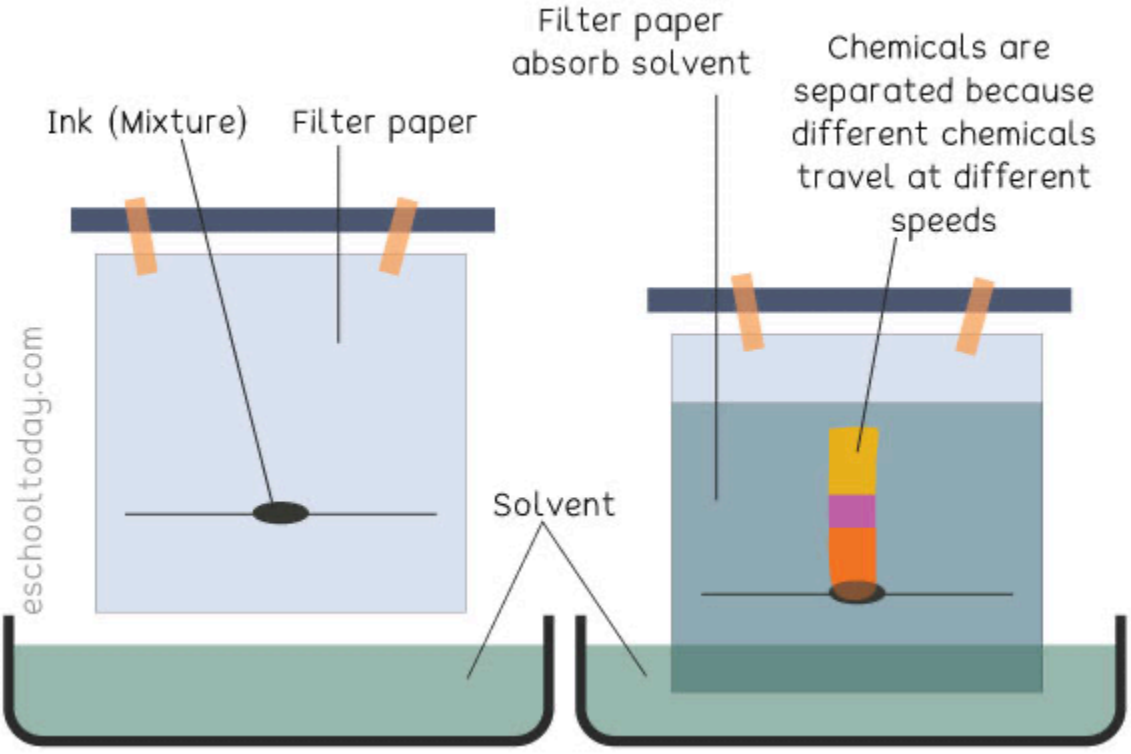
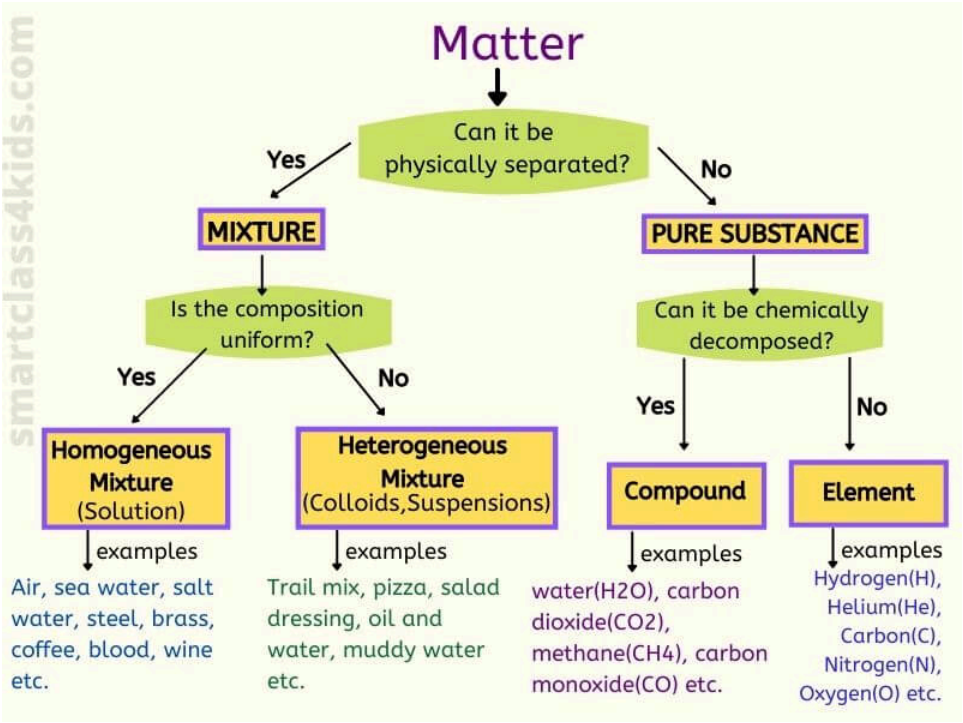
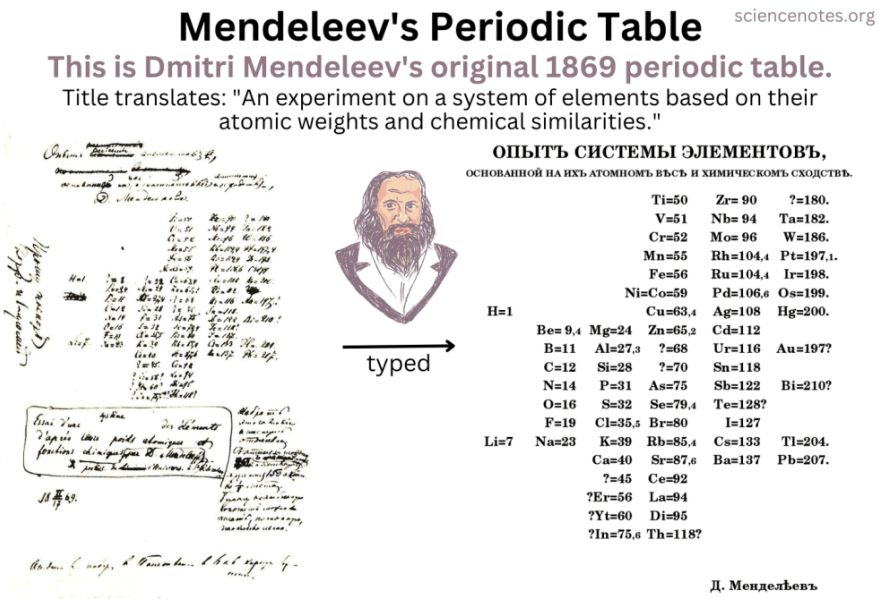

Distillation Practical
Simple Distillation
Thermometer
Water out
Leibig Condenser
Water in
©2008 preproom.org


CRYSTALLIZATION PROCESS
BYJU'S
Solution
Lamp
1
The impure solid is dissolved in a solvent
2
The solution is heated to evaporate most of the solvent
3
The hot solution is allowed to cool. the solid appears as pure crystals
4
The cold solution is poured off to obtain the crystals. The crystals may be dried by pressing them between sheets of filter paper
© Byjus.com

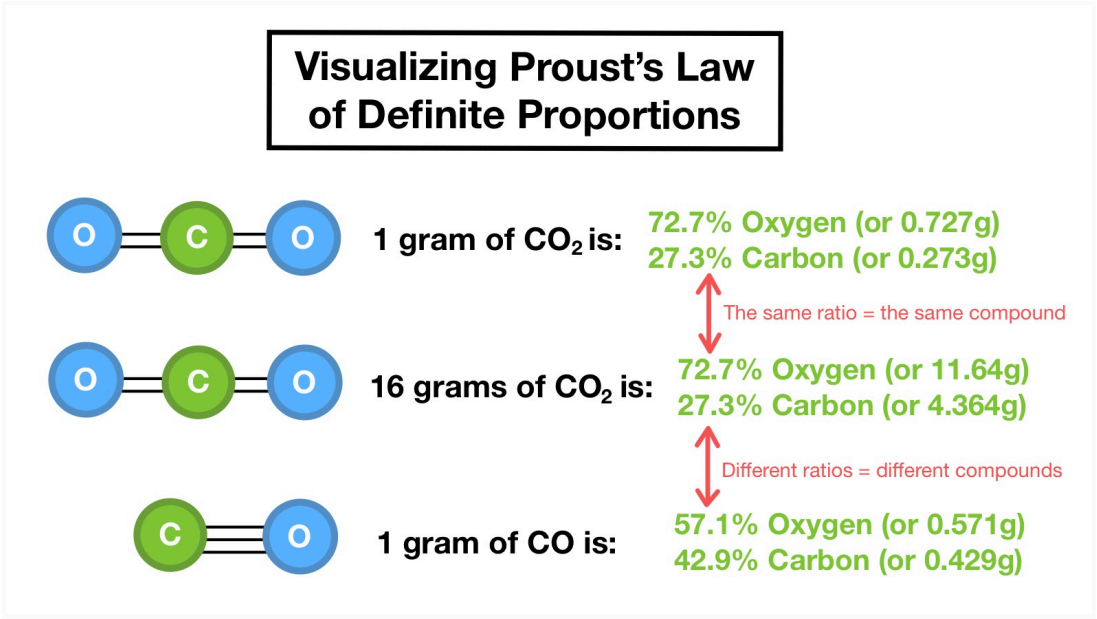

sublimate
melt
evaporate
ice
water
steam
solidify
condense
desublimate


Filter paper absorb solvent
Chemicals are separated because different chemicals travel at different speeds
Ink (Mixture)
Filter paper
eschooltoday.com
Solvent

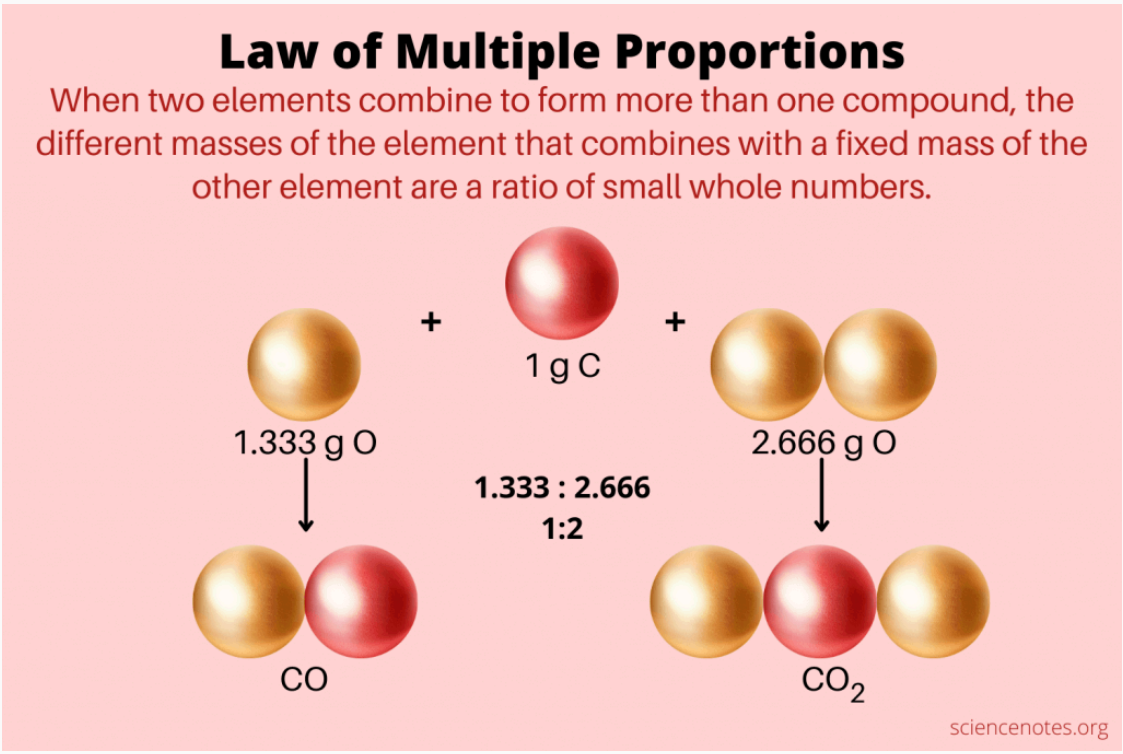




Dmitri Mendeleev's periodic table is the forerunner to the modern periodic table. It is a "periodic" table because it groups elements in rows and columns that showcase recurring properties, such as valence, electronegativity, and ionization energy.



Mass of Compound = sum of masses of elements
Percent by Mass = ratio of the mass of each element to the total mass of compound expressed as percentage
% mass = mass of element/mass of compound x 100



Homework 1 Tips

Density

Scientific Notation

Homework 2 Tips

Percent Error

Significant Figures & Rounding

Homework 3 Tips

Law of Definite Proportions

Law of Multiple Proportions