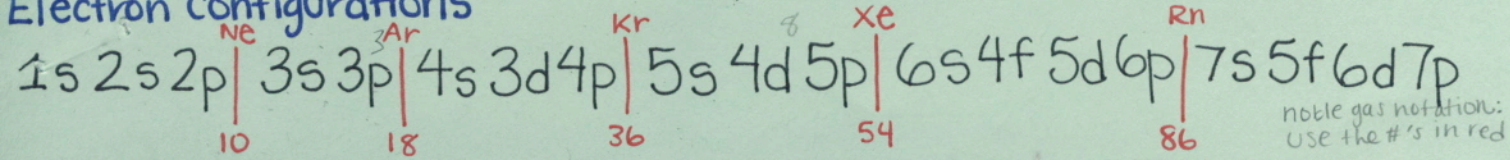
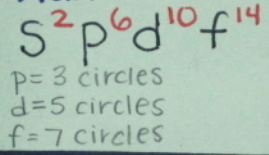


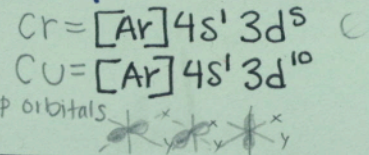
Electron Configurations



Max # of electrons



Exceptions to aufbau principle



isotopes: Atoms of the same element with different numbers of neutrons.

atomic mass: The weighted average mass of all the isotopes of an element.

Weighted average: $a\%(A) + b\%(B) + c\%(C)$

$1amu = \frac{1}{12}$ the mass of a carbon-12 isotope.

principal energy level	# of sublevels	# of orbitals				Total # of orbitals	electrons 1 squared is 1 times 2
		S	P	D	F		
n	=n					n^2	$2n^2$
1	1	1				1	2
2	2	1	3			4	8
3	3	1	3	5		9	18
4	4	1	3	5	7	16	32
5	5	1	3	5	7	25	50

Aufbau: electrons are in lowest energy.

Pauli: there is a max of 2 electrons in any one orbital. (both with opposite spins)

Hunds: there must be one electron in each orbital of a sublevel before the second can be added.

Bohr Model



- infrared - e⁻ returns to 3rd level
- ultra violet - returns to 1st level
- balmer - returns to 2nd level

emission spectrum - relate to? The electrons are unable to jump to higher levels by absorbing specific amounts of energy. When the electrons return to this energy they can be seen as colors of light.

FLAWS ↓

- Didn't explain the emission spectrum of elements other than hydrogen.
- Couldn't explain the chemical properties of elements.

Electrostatic force keeps electrons from flying away. The **electrostatic force** of attraction between the positively charged nucleus and negatively charged electrons

Finding subatomic particles

protons = atomic #

neutrons = mass # - number of protons

electrons = same as protons or #P - (charge)

mass # = protons + neutrons

ex: gallium-69

note: superscript 39 subscript 19

atomic mass ↓

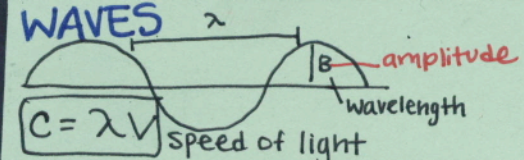
- Democritus said 2500 years ago that matter was composed of tiny, invisible particles.
- John Dalton was our father of atomic theory
- Electrons were discovered by the cathode ray tube.
- Plum pudding disapproved by Rutherford experiment.

The Quantum Model/Theory

- Each energy level has sublevels where electrons are.
- sublevels contain "orbitals" that describe the most probable location of an electron.
- shape of orbitals determined by 90%
- n represents principal energy level

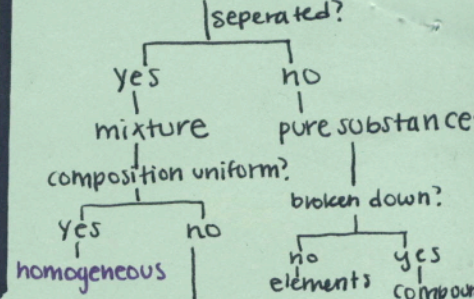
Heisenberg uncertainty principle

states that it's impossible to know precisely both the velocity and position of a particle at the same time.



All electromagnetic radiation results from the movement of electrons (or any charged particle)
FAST: high energy/frequency, short λ
SLOW: low energy/frequency, long λ

The Classification of matter



Electromagnetic spectrum low \rightarrow high
 radio \rightarrow microwaves \rightarrow infrared \rightarrow visible light \rightarrow ultraviolet \rightarrow x-rays \rightarrow gamma rays

J. J THOMSON'S PLUM PUDDING 1998

- Proposed that negatively charged electrons were distributed throughout a uniform positive charge.
- first used to discover electrons

not able to know the exact charge of the electron.

RUTHERFORD GOLD FOIL

- Alpha particles (2 protons + 2 neutrons)
- Alpha particle hit the middle and bounced back
- He concluded atoms/matter/ everything is made of empty space.
- he expected that the alpha particles would go right through
- Different from plum pudding? Some alpha particles were repelled away from the nucleus.

Electromagnetic spectra:

Includes all forms of electromagnetic radiation, with the only differences in the types of radiation being their frequencies/wavelengths.

Atomic emission spectra:

A set of frequencies of electromagnetic waves given off by atoms of an element; consists of series of fine lines of individual colors.

principal quantum # (n) assigns to indicate the relative size and energy

physical properties:

- color
- density
- chemical formula H_2O

heterogeneous

- boiling point
- state (s, l, g)
- melting point

chemical properties:

- flammability
- supports combustion
- reacts

homogeneous

- mass
- luster/odor
- solubility
- colorless
- sour taste
- can neutralize a base
- remains unchanged when in the presence of nitrogen

heterogeneous:

Don't blend throughout, remain distinct.

EX: sand, cookies, your body

homogeneous:

same throughout (solution)

EX: salt water, steel, soda pop

elements:

cannot be separated

EX: on the periodic table

compounds:

two or more different elements combined

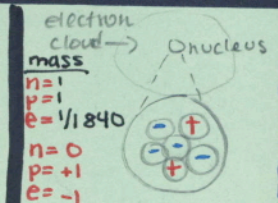
EX:

sodium chloride, sodium phosphate

Thomson concluded:

All elements give off the same negatively charged particles.

photon - no mass that carries quantum of energy.



(dense) **IMPORTANT**
 shows that atoms are made of empty space and all the mass of an atom can be found in the nucleus.