Atomic Emission Spectra and Flame Tests
Dr.Gergens - SD Mesa College

I. It is all about "e-" (electrons)

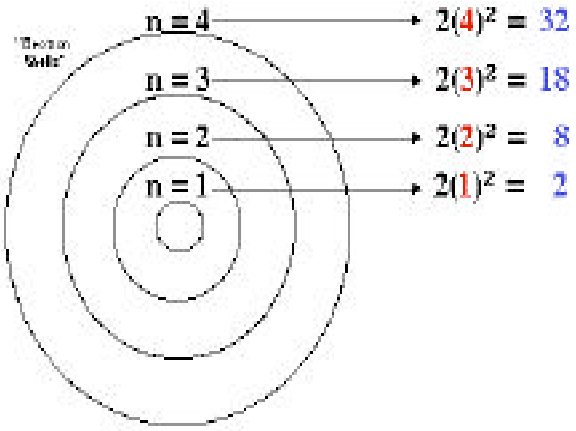
1. light weight particle; 1/2000th an atomic mass unit (amu)
2. (-) negatively charged particle
3. loosely bound; American Heritage Dictionary defines loose as
   - not fastened; unbound
4. attracted to (+) positively charged particles
5. repelled by other negatively charged particles
6. dynamic not static; I'd would like to move about or jump around
7. a traveler and would love to travel but never far from home
8. at home within an electron shell shown by Bohr's model
9. easily excitable

II. Bohr's Model

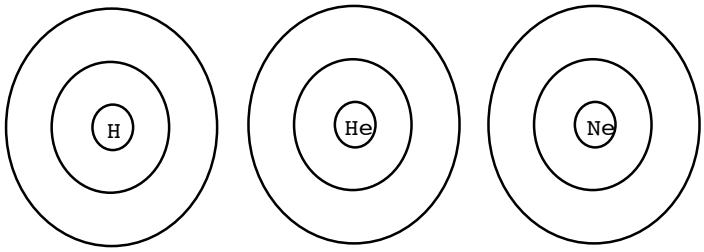
Electrons have a home in a given shell

The maximun number of Electrons per shell is given by $2(n)^2$

Bohr's Model of Hydrogen



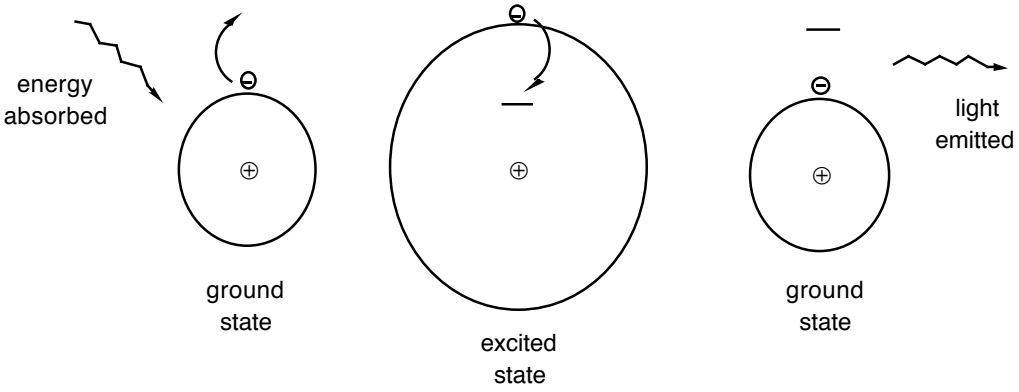
Unique Electron Configuration



$_{1}H$ $_{2}He$ $_{10}Ne$

III. Absorption versus Emission

A. Ground State versus Excited State

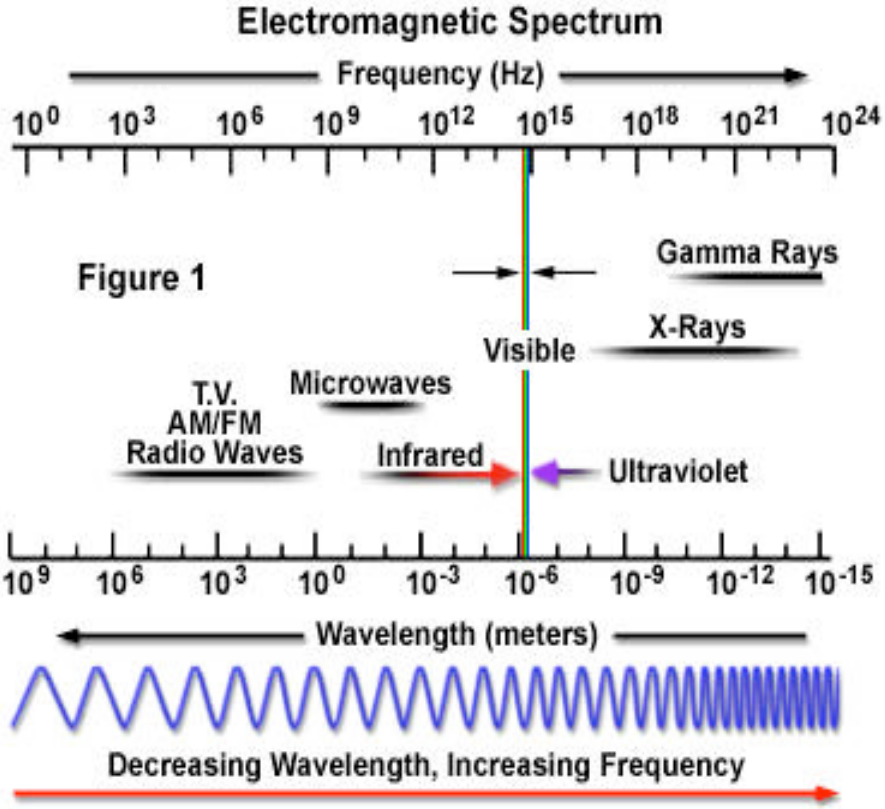


B. Producing Discrete (quantized) Line Spectra (pickle demo) versus Diffraction (Music CD)

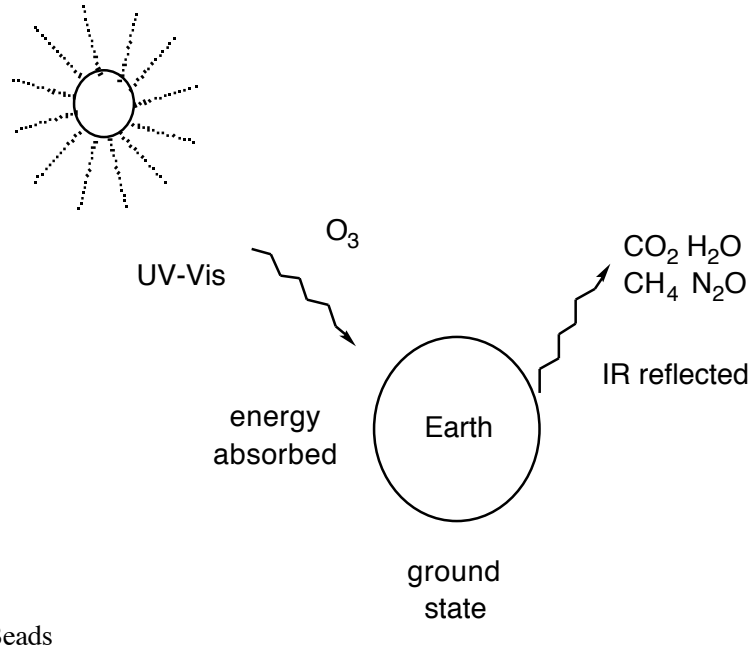
C. Diffraction (Music CD) versus Refraction (Rain Drop)

IV. Electromagnetic Radiation (energy in the form of waves)

A. ROY G BIV - Visible Light Rainbow



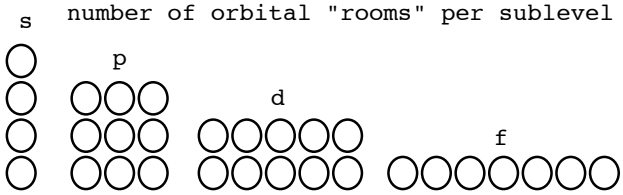
V. Global Warming and Ozone

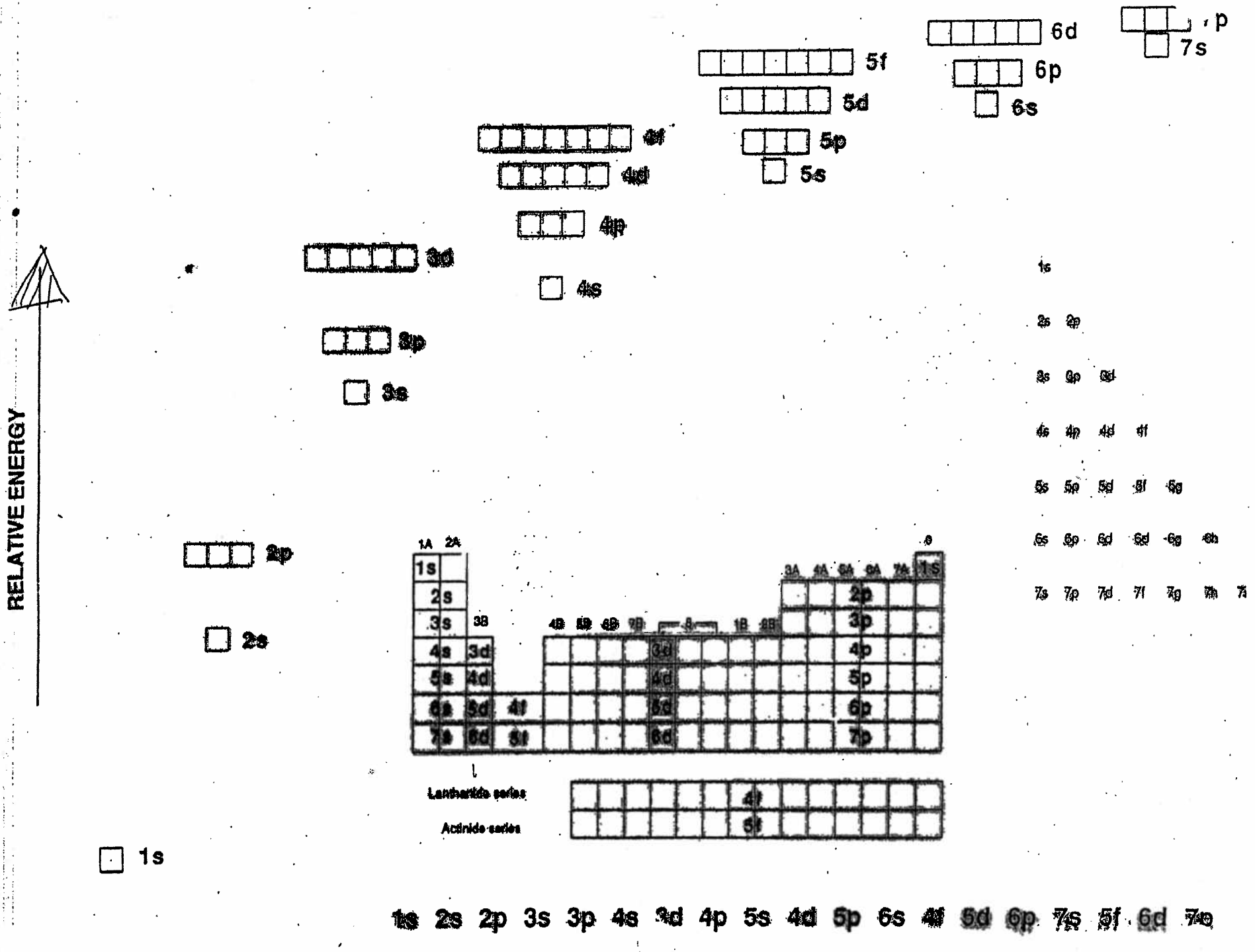


VI. UV-Visible Detecting Beads

VII. Quantum Mechanical Description for the location of an electron (principle structure "n" shell and substructure)

Shell level	subshell sublevel	orbital
1	one	s
2	two	s, p,
3	three	s, p, d
4	four	s, p, d, f

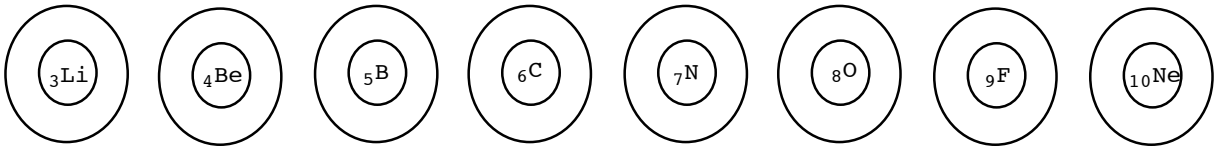



RELATIVE ENERGY
1s
2s
2p
3s
3p
3d
4s
4p
4d
4f
5s
5p
5d
5f
6s
6p
6d
7s
7p
1s
2s 2p
3s 3p 3d
4s 4p 4d 4f
5s 5p 5d 5f 5g
6s 6p 6d 6f 6g 6h
7s 7p 7d 7f 7g 7h 7i
1A 2A 3B 4B 5B 6B 7B 8 1B 2B 3A 4A 5A 6A 7A 0
Lanthanide series
Actinide series
1s 2s 2p 3s 3p 4s 3d 4p 5s 4d 5p 6s 4f 5d 6p 7s 5f 6d 7p

Part 2 Chemical Periodicity

A. Valence electrons - Valence (outermost) electrons are in the principle energy shell furthest from the nucleus (the highest energy shell).

a. Draw Bohr electron dot structures for the elements of period (row) 2.

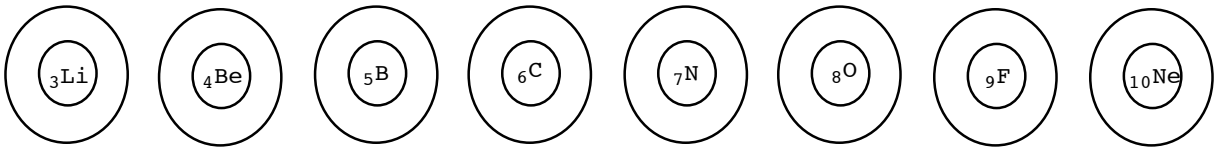


b. Draw Lewis electron dot structures or the elements of period (row) 2.

Li Be B C N O F Ne

B. General Chemical Reactivity - The reactivity of an element is related to the tendency to lose or gain electrons; that is to be oxidized (OIL) or reduced (RIG). The chemistry of metals and nonmetals are important to chemists. Metals tend to lose electrons to form positively charged cations, while nonmetals tend to gain electrons to from negatively charged anions.

a. Draw Bohr electron dot structures for the ions of period (row) 2.



Li^{+} Be^{2+} B^{3+} C^{4-} N^{3-} O^{2-} F^{1-} Ne^{0}

b. Draw Lewis electron dot structures or the ions of period (row) 2.

Li^{+} Be^{2+} B^{3+} C^{4-} N^{3-} O^{2-} F^{1-} Ne^{0}