Electron Configuration!

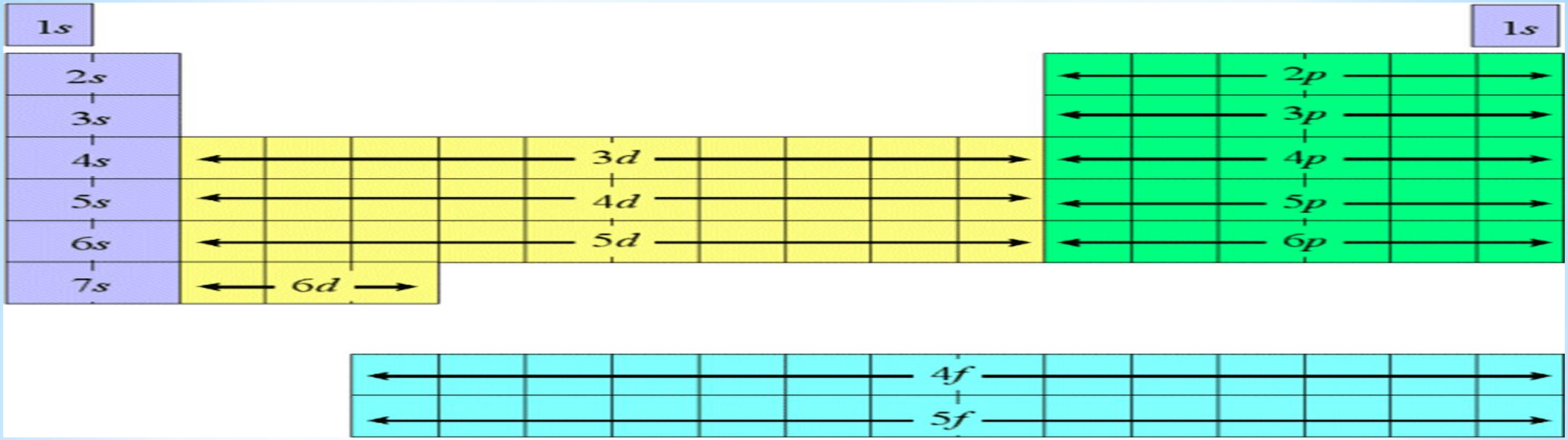
* 1s, 2s, 2p, 3s, 3p, 4s, 3d, 4p, 5s, 4d,
* 5p, 6s, 4f, 5d, 6p, 7s,
* 5f, 6d, 7p

* s, p, d, and f

* The different sections of the Periodic Table are very important in understanding Electron Configuration.
* There are 4 “Blocks” in the Periodic Table:
* the s-block, p-block, d-block, & f-block.
* Remember the special rules for the d- and f-blocks:
* d – n-1
* f – n - 2

* These refer to the sublevels within the principal quantum level (n).
* So, for n = 1, there is only one sublevel, s.
* n = 2, there are 2 sublevels: s & p
* n = 3, there are 3 sublevels: s, p, & d
* So, within each level, there are n sublevels.

What do s, p, d, and f mean?



* This shows the different blocks in the Periodic Table.
* It also shows in what order to write electron configurations (1s, 2s, 2p, 3s, 3p, 4s, 3d, 4p, 5s, 4d, 5p, 6s, 4f, 5d, 6p, 7s, 5f, 6d,7p)

* As - Arsenic
* 1s2 2s2 2p6 3s2 3p6 4s2 3d10 4p3
* The first number is which row it’s in, or the principal quantum number
* The character is the block its in, which refers to the sublevel
* The superscript is the total number of electrons in the sublevel

An Example

* A shortcut!

* 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 7iDo not exist in normal ground state atoms

*The Noble Gas ConfigurationAn obvious solution and convenient short cut

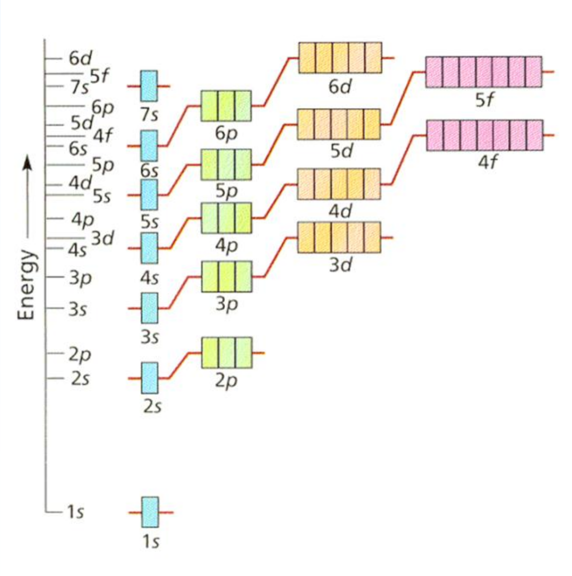
* The Noble Gases are:
* He, Ne, Ar, Kr, Xe, Rn
* Notice that each noble gas finishes a row, or energy level.
* Noble gas configurations take advantage of this by condensing what you have to write:
* Ex. He : 1s2
* Ex. C : 1s2 2s2 2p2
* Noble Gas Configuration for C: [He] 2s2 2p2

* The normal configuration for As-(Arsenic)
* 1s2 2s2 2p6 3s2 3p6 4s2 3d10 4p3
* Notice, the part in yellow is the same as Argon's configuration: 1s2 2s2 2p6 3s2 3p6
* The noble gas configuration will start with the gas in the row before it.
* [Ar] 4s2 3d10 4p3
* It cuts down on a lot of writing, and that's a good thing.

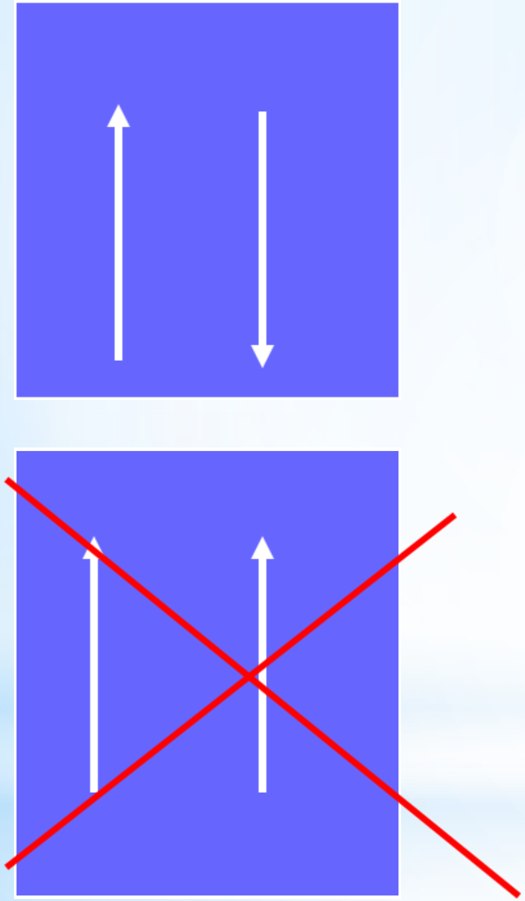
Noble Gas Config. – an example

The Aufbau Principle

* Each electron occupies the lowest energy orbital
* Electrons are Lazy!!!
* All orbitals related to an energy level are of equal energy.
* Ex. The three 2p orbitals are the same energy level.



*Orbital Diagrams They're Useful



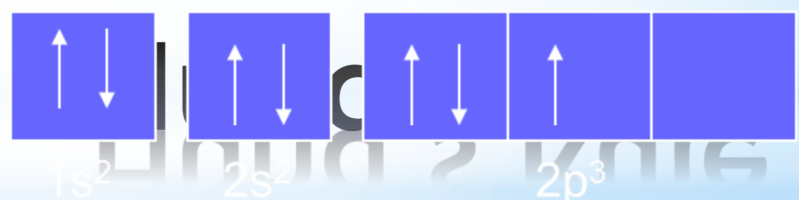
- A maximum of two electrons may occupy a single orbital, but only if the electrons have opposite spins.
- Spin -- Electrons has an associated “spin,” either one way or the other, like a top.
- These spins are called “spin up” and “spin down.”
- See example on board.

Pauli Exclusion Principle

* Single electrons with the same spin must occupy each equal-energy orbital before additional electrons with opposite spins can occupy the same orbitals.
* Electrons are UNFRIENDLY
* Why?

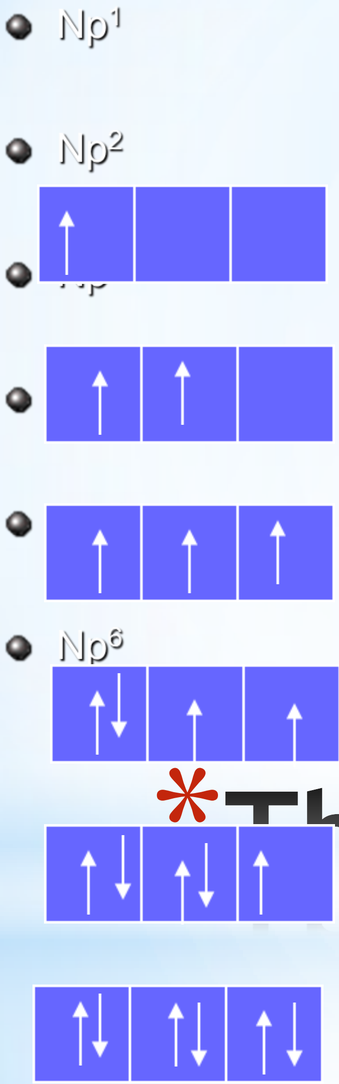
* Ex. Nitrogen:
* 1s2 2s2 2p3

NOT

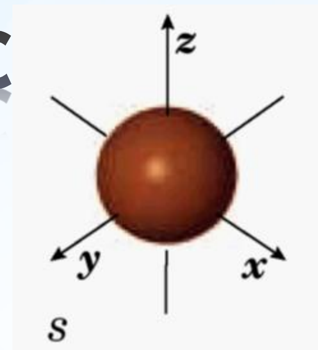


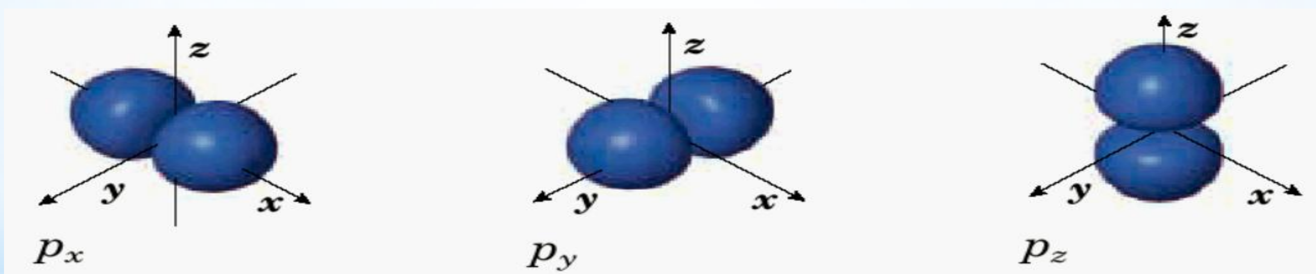
The order of Things…

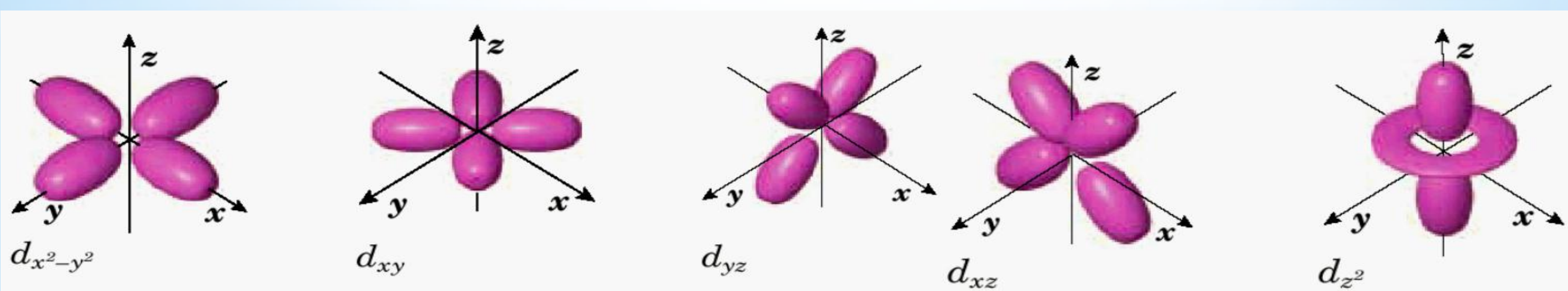
- Electrons, being unfriendly, fill up the empty orbitals before sharing orbitals.
- Similar to seats on a bus – on a bus, you sit alone, rather than with a stranger, if there is an option.



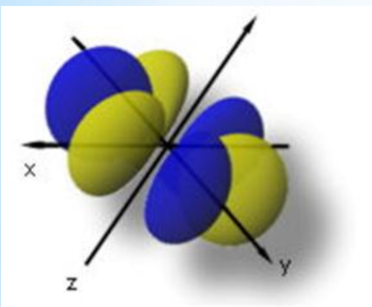
*The Shapes of the s, p, and d Orbitals
Sketc e at bottom of outline

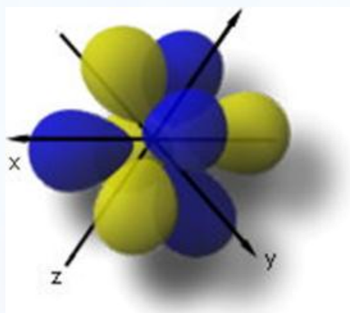


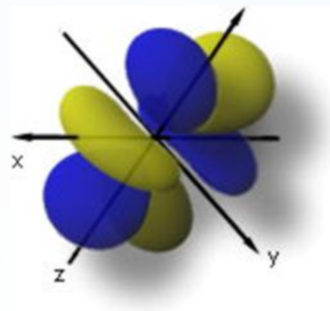


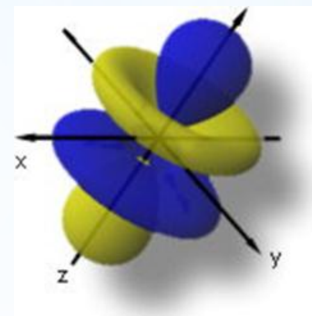


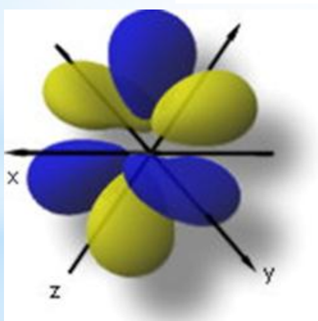
* Do not bother sketching these—just notice how STRANGE they are!

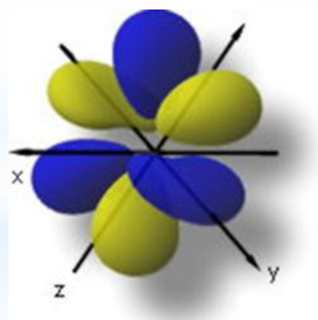




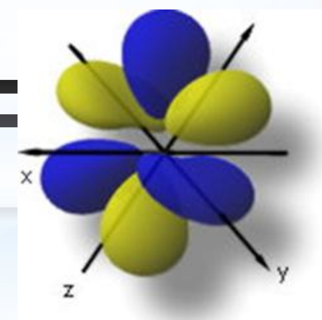








* F tals!



*Please write this at the bottom of your outline

* e- Config. and Orb. Diag. for Ions

* What is an ion?

* Examples of ions:
* Na^{+}
* Mg^{2+}
* Fe^{3+}
* Cl^{-}
* S^{2-}
* I'll do the configs. on the overhead.

* When writing electron configurations or orbital diagrams for ions it's a little harder because it can look like a different atom.
* Just subtract the missing electrons or add the extra electrons
* NOTE
* Li^{+} ($1s^2$ $2s^0$)

He ($1s^2$)

NOTE