Schrodinger:

-- Model was based on mathematics

-- Based on energy levels, but the exact path of electrons is not defined

Electron Cloud: area where you are most likely to find an electron

Orbital: electrons have a 90% probability of occupying that region in space

-- each orbital has a maximum of 2 electrons

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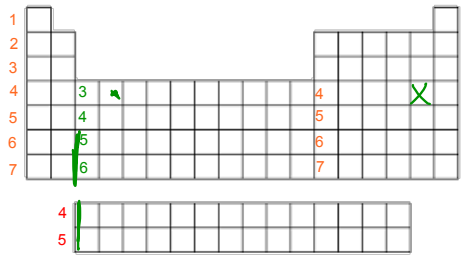
Energy Levels (Shells):



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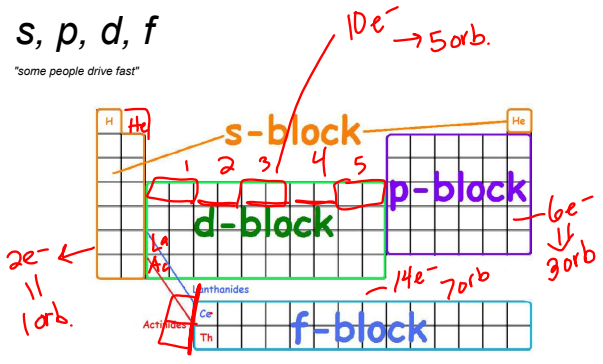
Sublevels (subshells):

s, p, d, f

"some people drive fast"



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Sublevels (subshells):

s = spherical clouds
-- one orbital
-- maximum of 2 electrons

p = dumbbell shaped clouds
-- 3 orbitals
-- maximum of 6 electrons

d = varied clouds
-- 5 orbitals
-- maximum of 10 electrons

f = varied clouds
-- 7 orbitals
-- maximum of 14 electrons

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Electron Configurations:

-- the way electrons are arranged around the nucleus — GPS coordinates for e-

-- 3 different types:

1. orbital configuration
2. electron configuration
3. noble gas configuration

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Order of Filling:

-- use the periodic table to help you

-- know where the different blocks are on the periodic table

-- know the maximum number of electrons in each sublevel

-- read from left to right across the periodic table starting with hydrogen and ending with your element

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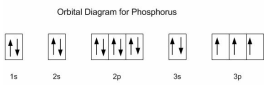
Rules for Electron Configurations:

1. Aufbau Principle- electrons fill lowest energy levels first
   (1s 2s 2p 3s 3p 4s 3d 4p etc)
2. Pauli Exclusion Principle- only 2 electrons can be placed in an orbital
   - The electrons must have opposite spins (clockwise and counter clockwise)
3. Hund's Rule- electrons entering orbitals of equal energy will fill one into each orbital with the same spin & then add a second spin when all contain one



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Orbital Diagrams:

Includes a box for each of the atom's orbitals, arrows represent electrons

- An empty box represents an unoccupied orbital ☐
- A box with one arrow represents an orbital with one electron ↑
- A box with 2 arrows (one up and one down) represents a filled orbital ↑↓
- Boxes should be labeled with the energy level and sublevel (s, p, d, f)

You can use an orbital diagram to identify an element

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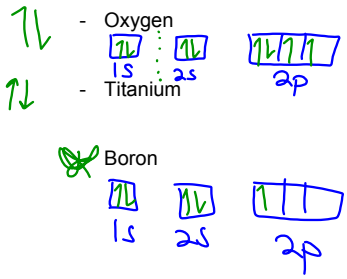
Practice

·Draw the orbital diagram for the following elements:

- Oxygen
- Titanium
- Boron



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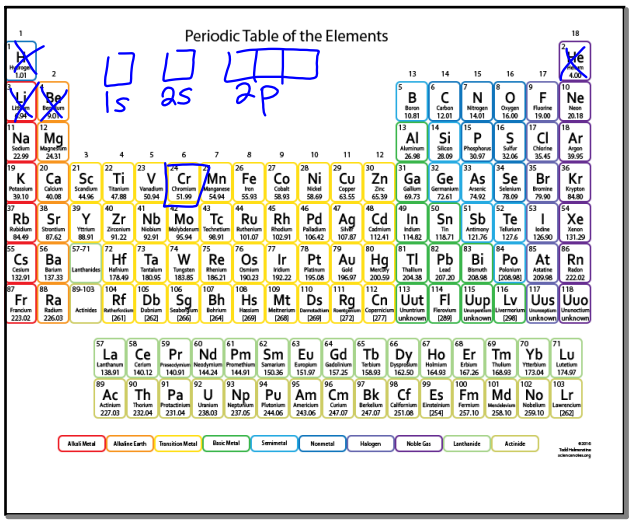

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Electron Configurations:

·Sometimes called ground state electron configurations because all electrons are in their lowest possible energy levels

·Steps for writing a ground state electron configuration:

- Start from hydrogen
- Write energy level (1-7) (for s and p sublevel it is the period #)
- Write sublevel (s,p,d,f)
- Write number of electrons in the sublevel as an exponent (superscript)
- Stop at the desired number of electrons

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Practice

·Write the electron configuration for the following elements:

- Cobalt (Co)
- Tungsten (W)

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Practice

·Elements can be identified by their ending electron configurations

·Examples:

$3d^8$

$2p^4$

$5s^1$

$1s^2$

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