

# Announcements

To join clicker to class today  
(Clickers with LCD display  
join automatically):

- Turn on the Clicker (the red LED comes on).
- Push “Join” button followed by “20” followed by the “Send” button (switches to flashing green LED if successful).

- Will probably start on next section of material today. You should have got a new suggested reading and problem over the e-mail list.
- You should also have got a list of polyatomic ions to memorize.

• D2L is not uploading scores properly so only a few of you have up-to-date clicker, discussion and lab information.

# Review

- How to read the ground state electronic configuration from the periodic table.
  - Extra stability of half-full and full d leads to moving electron from s to d. Cr:  $[\text{Ar}]3d^54s^1$  and Cu:  $[\text{Ar}]3d^{10}4s^1$ .
  - f-Block filling order varies.
- Higher numbered shells (n-levels) are higher energy because they are farther from the nucleus on average.

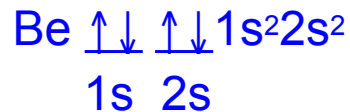
# Review

- In a multi-electron atoms, electrons in lower shells also “shield” or “screen” the electrons which are farther out.
  - Farther out electrons see a smaller effective nuclear charge (sometimes called  $Z_{\text{eff}}$ ).
  - Within a shell the probability of electrons being near the nucleus goes in the following order  $s > p > d > f > g$ .
  - Orbitals that “penetrate” more see a larger  $Z_{\text{eff}}$  and are lower energy, making **s fill before p, which fills before d, etc...**

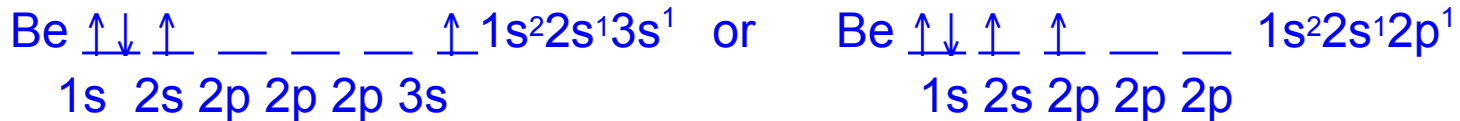
# Excited States

- It is possible to have excited states of atoms (absorption of light can move the electron to a higher level):

Ground State



Some Excited States



# First Ionization Energies

Chang Fig. 8.9

# Sequential Ionization Energies

Z	element	The First Eleven Ionization Energies of the Elements (J x 10 <sup>18</sup> )									
		3s, 2p, 2s, 1s.									
1	H	2.18									
2	He	3.94	8.72								
3	Li	0.86	12.1	20.							
4	Be	1.49	2.92	25.	35.						
5	B	1.33	4.03	6.08	41.	54.					
6	C	1.80	3.90	7.67	10.3	63.	78.				
7	N	2.33	4.75	7.61	12.4	15.6	88.	107.			
8	O	2.18	5.62	8.80	12.4	18.2	22.1	118.			
9	F	2.79	5.60	10.0	14.0	18.3	25.2	29.7	N/A	N/A	
10	Ne	3.46	6.56	10.2	15.6	20.2	25.3	33.2	N/A	N/A	N/A
11	Na	0.82	7.57	11.4	15.8	22.1	27.5	33.4	42.3	48.0	234. 264.

# Atomic Radius

Chang Fig. 8.5

# Common Ions Formed

Chang Fig. 2.10



# Metals, Metalloids, Nonmetals

Chang Fig. 2.9

# Composition of the Earth and an Introduction to RXNs

- Composition of Earth
- Composition of early atmosphere
- Naming of Simple compounds (binary: ionic vs. molecular, polyatomic ions, and oxoacids)
- The mole (chemist dozen) & molar mass
- Balancing chemical equations
- Stoichiometry (moles vs. mass)
- Chemical analysis & % composition.
- Percent yield (will be on Exam 3 not Exam 2)
- Limiting reagents (will be on Exam 3 not Exam 2)

# Overall Composition of Earth

- 34.63 % Fe
- 29.53 % O
- 15.20 % Si
- 12.70 % Mg
- 2.39 % Ni
- 1.93 % S
- 1.92 % Al, Na, Cr combined.
- 1.13% Ca

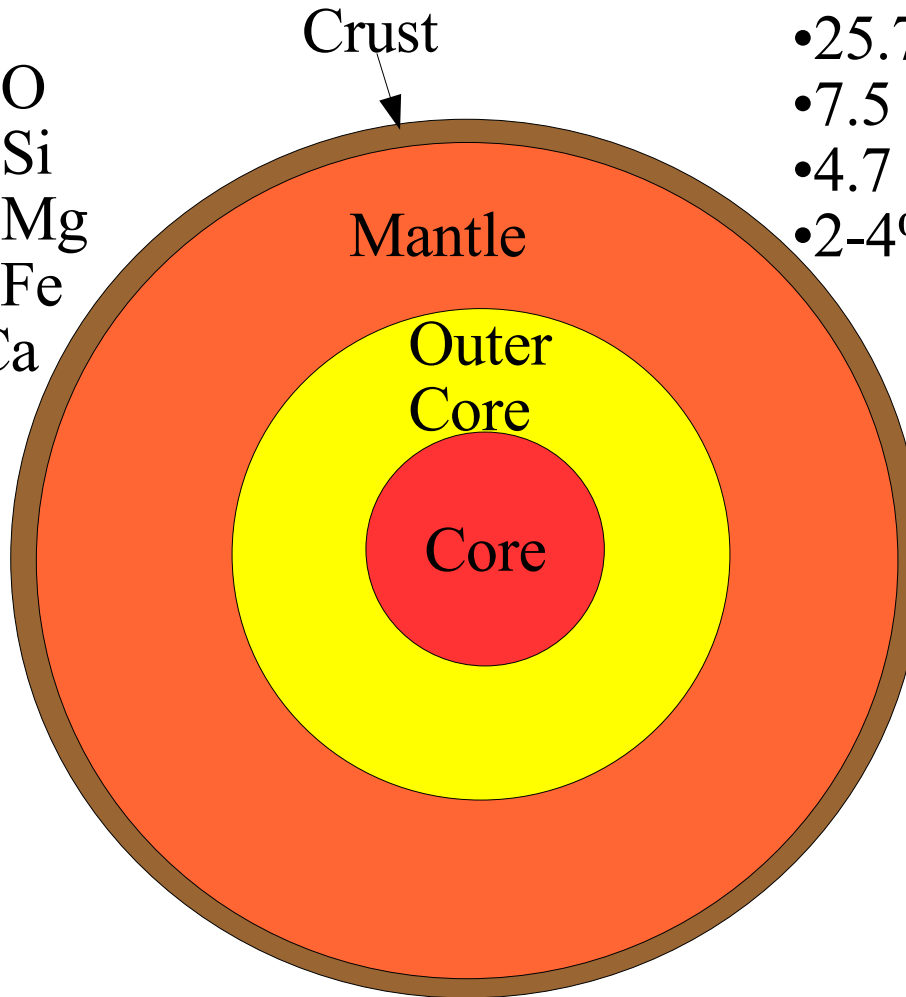
# Composition of layers in Earth

## Mantle

- 43.7% O
- 21.6% Si
- 16.6% Mg
- 13.2% Fe
- 2.1% Ca

## Crust

- 49.5% O
- 25.7% Si
- 7.5 % Al
- 4.7 % Fe
- 2-4% each of Mg, K, Na, Ca



## Core & Outer Core

- 88.6 % Fe
- 8.5 % Ni