###### The Periodic Table and *Periodicity*

###### 

**Background on the Organization of the Periodic Table**

*Dmitri Mendeleev*: given credit for Periodic Table (~1870)

* organized Table by increasing \_\_\_\_\_\_\_\_\_\_\_\_\_\_
* left blank spaces and predicted properties of undiscovered elements

*Henry Moseley*: put elements in order of increasing \_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Interpreting the Periodic Table**

**periodic law**: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**period**: the horizontal rows (represents *\_\_\_\_\_\_\_\_* *\_\_\_\_\_\_\_\_*)

each period has one more occupied energy level with valence electrons:

Li 🡪 2nd E.L. / 2nd period Na 🡪 3rd E.L. / 3rd period

Li Na

**group** (family): vertical columns

* *main groups* have similar properties *because* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

*\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_*

Li 1s2 2s1 Na 1s2 2s2 2p6 3s1

O 1s2 2s22p4 S 1s2 2s2 2p6 3s23p4

***Periodicity***  🡪 there are trends in the properties of elements

**ATOMIC RADIUS** (pages 134-137 in text)

1. **Define Atomic Radius:**
2. **In general, what is the trend in atomic radius as you go down a group?**
3. **In general, what is the trend in atomic radius as you go across a period?**
4. Rank the following elements in order of increasing atomic radius:
   1. Na, Cl, Al, S
   2. Be, Ba, Ca, Mg, Sr
   3. Mg, P, S, Cl
   4. O, Se, Po, Te

**IONIZATION ENERGY** (pages 137-139 in text)

1. **Define Ionization Energy:**
2. Metals form \_\_\_\_\_\_\_\_\_ by \_\_\_\_\_\_\_\_\_\_\_ electrons.

Nonmetals form \_\_\_\_\_\_\_\_\_ by \_\_\_\_\_\_\_\_\_\_\_ electrons.

1. Which takes more energy, removing an electron from an atom where the nucleus has a tight hold on its electrons, or a weak hold on its electrons?
2. **In general, what is the trend in first ionization energy as you go down a group?**
3. **In general, what is the trend in ionization energy as you go across a period?**
4. Which element has the highest first ionization energy: Ca, As, or S?
5. Rank the following elements in order of increasing ionization energy:
   1. Na, Cl, Al, S
   2. Be, Ba, Ca, Mg, Sr
   3. Mg, P, S, Cl
   4. O, Se, Po, Te

**ELECTRONEGATIVITY** (pages 198 in text)

1. **Define Electronegativity:**
2. **What is the trend in electronegativity going down a group?**
3. **What is the trend in electronegativity going across a period?**
4. What is the most electronegative element? \_\_\_\_ What is its value? \_\_\_\_

Who determined the scale of electronegativity? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. List the atoms in order of increasing electronegativity: O, Al, Ca
2. List the atoms in order of increasing electronegativity: Cl, K, P
3. Rank the elements in order of increasingelectronegativity and explain your reasoning:
   1. Na, Cl, Al, S
   2. Be, Ba, Ca, Mg, Sr
   3. Mg, P, S, Cl
   4. O, Se, Po, Te

**Summarizing *Periodicity***

1. Why is it still beneficial for chemists to understand periodic trends?
2. Sketch the trends on the periodic table with diagonal arrows:

