Name _____ **Regents Chemistry**
Mrs. Baris **Due January 4, 2016**

Unit 3 - Periodic Table

Objectives:

1. Explain the placement of an unknown element in the Periodic Table based on its properties
2. Classify elements as metals, nonmetals, metalloids, or noble gases by their properties Describe the states of the elements at STP [STP = standard temperature & pressure]
3. Distinguish between the size of a parent atom and the resulting ion
4. Determine the group of an element, given the chemical formula of a compound, e.g., XCl or XCl_2
5. Compare metallic/nonmetallic properties of elements
6. Compare electronegativities between metals and nonmetals
7. Compare and contrast properties of elements within a group or a period for Groups 1,2,17,18 on the Periodic Table

I. Period (or Rows)

- _____
- Number at the beginning of the period indicates the _____

  _____

  Example: A) What period is potassium and bromine in? _____

  B) Based on the period, how many principal energy levels do potassium and bromine have? _____
- _____

  Example: A) What period is potassium and bromine in? _____

  B) Based on the period, how do the properties of potassium and bromine compare? _____

II. Groups (or Families)

- _____
- _____
  - Because each group has the same _____

Example: A) What group is magnesium and calcium in? _____

B) Based on the group, how do the properties of magnesium and calcium compare? _____

Sample Questions:

1) Which sequence of atomic numbers represents elements which have similar chemical properties?
   A) 19, 23, 30, 36 C) 9, 16, 33, 50
   B) 3, 12, 21, 40 D) 4, 12, 38, 88

2) Which two elements have the most similar chemical properties?
   A) Aluminum and Barium C) Nickel and Phosphorous
   B) Chlorine and Sulfur D) Sodium and Potassium

III. Metals

- Atoms that _____ electrons and form _____ ions (_____) when bonding

- **Properties of Metals:**

1. _____ ionization energy and electronegativity
2. _____ conductors of heat and electricity
3. Exhibit _____
4. More than _____ of the elements are _____
5. _____ is a metal which is a _____ at room temperature
6. Most active metal: _____

IV. Nonmetals

- Atoms that _____ and form _____ (_____) when bonding

- **Properties of Nonmetals:**

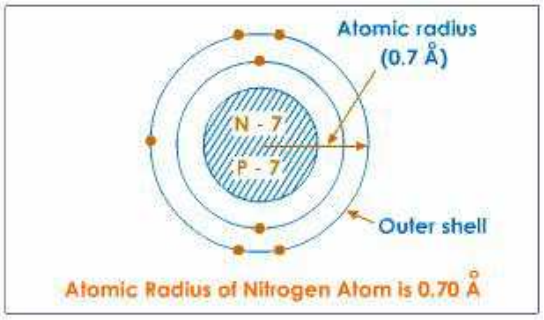
  1. _____ ionization energy and electronegativity
  2. _____ conductors of heat and electrivity
  3. _____
  4. Most active nonmetal: _____

V. Metalloids

- Atoms that _____ electrons and form ions when bonding
- Have properties of _____
- Can be located using the "_____" (see periodic table)

VI. Periodic Properties

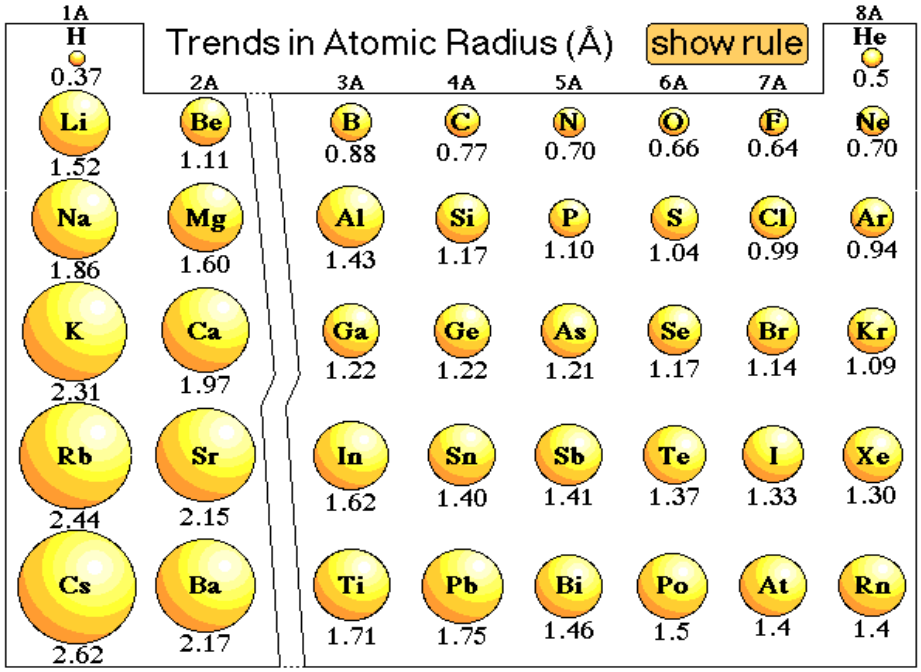
A. Atomic Radius



- **Periodic Trend (See Reference Tables – Table _____):**

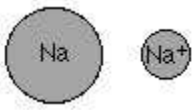
  Atomic Radius _____ as you move from _____

  Atomic Radius _____ as you move _____



B. <u>Ionic Radius</u> – _____causes an increase or reduction in atom's size

- **Metals:** _____ electrons when they form ions (_____) and ionic radius _____ than neutral atom



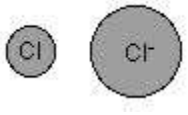
<u>Electron Configuration</u>:

Sodium is _____

Na^+ ion is _____

The atom has lost a whole layer of electrons, and the remaining 10 electrons are being pulled in by the full force of 11 protons

- **Nonmetals:** _____ electrons when they form ions (_____) and ionic radius _____ than neutral atom



Electron Configuration:

Chlorine is _____

Cl^- ion is _____

Although the electrons are still all in the 3 - level, the extra repulsion produced by the incoming electron causes the atom to expand. There are still only 17 protons, but they now have to hold 18 electrons.

Sample Questions:

1) Which element has an atomic radius that is greater than its ionic radius?
   A) S C) F
   B) K D) O

2) In period 4, the atom with the largest covalent radius is located in group…
   A) 1 B) 13 C) 3 D) 18

C. Ionization Energy – _____

_____

- **Periodic Trend for Ionization Energy (See Reference Tables – Table _____):**

  Ionization Energy _____ as you move down a group.

  (Number of _____ increases, so _____ held tighter)
  **** Increasing number of energy levels**

  Ionization Energy _____ as you move from_across a period.

  (Electrons are _____, so _____ to remove electrons)

  ****Increasing nuclear charge**

D. Electronegativity – measure of an atom's _____

_____

Desire of an atom to _____ electrons

- **Periodic Trend for Electronegativity (See Reference Tables – Table _____):**

Electronegativity _____ as you move down a group.

Electronegativity _____ as you move across a period.

VII. Groups within Groups

A. Group 1: _____

Have _____ valence electrons

- Form a charge of _____ when the bond

B. Group 2: _____

– Have _____ valence electrons

- Form a charge of _____ when the bond

In General for Groups 1 and 2: As you move down the groups, they become more _____

C. Groups 17: _____

– Have _____ valence electrons

- Mostly _____ elements

D. Groups 18: _____

– Have _____ valence electrons (or _____ for He)

- Have a _____ outer energy level

- Do not _____ because their outer shell is _____

- They are _____.
- ALL OTHER ELEMENTS WANT TO BE LIKE THEM

VIII. Other Categories

- **Diatomics**: molecule containing _____ atoms

  - **Remember them:**

- **Allotropes**:

  - **Remember them:**

Allotropes of Carbon

A) Diamond
B) Graphite (pencil "lead")

Allopes of Oxygen O_2, O_3