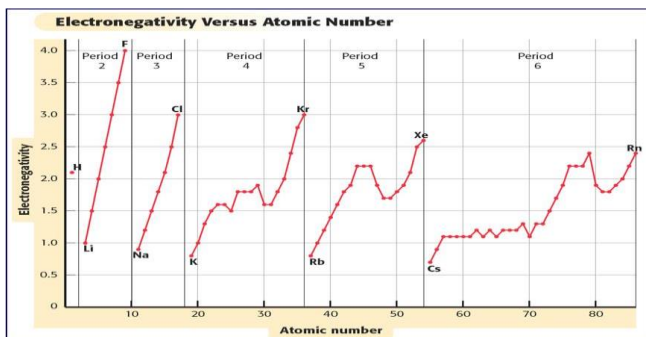
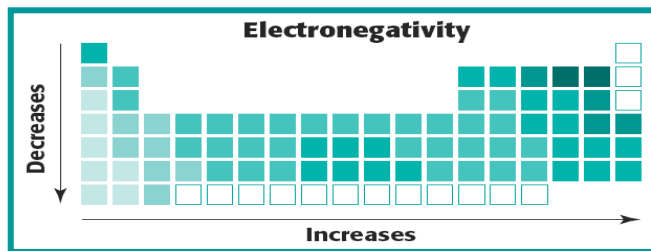


- Electronegativity increases from left to right across a period and decreases from top to bottom in a group.

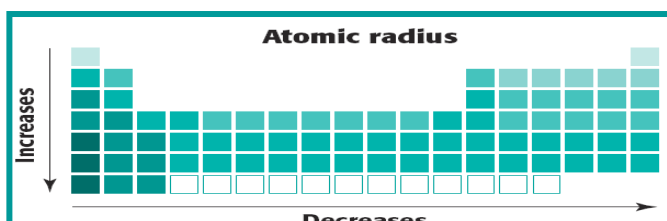


2. Metallic and Nonmetallic Properties

- About 80% of the elements in the periodic table are metals.
- Only the eleven elements, H, C, N, O, P, S, Se, F, Cl, Br, I and noble gases are nonmetals.
- However B, Si, Ge, As, Sb, Te, Po and At are metalloids.
- Metallic and nonmetallic properties are related to the number of valence electrons and radius of an atom.
- As we move closer to Fr among metals from right and top of periodic table metallic properties increase, and closer to F from left and bottom of periodic table nonmetallic properties increase.
- In the periodic table, the metalloids lie along the border between metals and nonmetals.
- Some metalloids such as silicon, germanium (Ge), and arsenic (As) are semiconductors.
- Metalloids have some chemical and physical properties of metals and other properties of nonmetals.

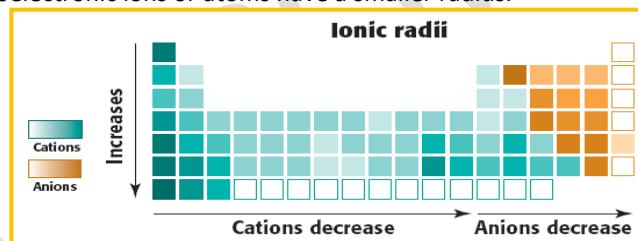
3. Atomic Radius

- Atomic radius is the distance between the nucleus and the outermost electron. It affects the melting point, boiling point, density of elements and the ability of losing or gaining electrons by atoms.
- Two factors affect the atomic radius of elements: number of energy level and nuclear charge.
- Atomic radius increases from top to bottom within a group, and it decreases from left to right across a period in the periodic table.



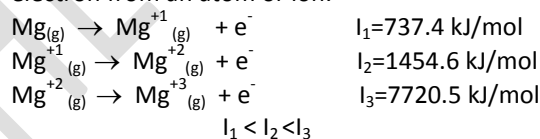
4. Ionic Radius

- When metal atoms become positive ion, cation, their atomic radii decrease, and when nonmetal atoms become negative ion, anion, their atomic radii increase.
- The atomic radii of isoelectronic ions are not equal to their parent atoms because of different protons in their nuclei. Since more protons mean more attraction, more protons in isoelectronic ions or atoms have a smaller radius.

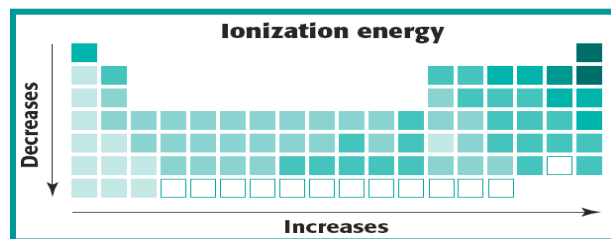


5. Ionization Energy

- The **ionization energy** is the energy required to remove an electron from an atom or ion.



- Ionization energies can be used to predict the number of valence electrons of an atom.
- Ionization energy decreases from top to bottom within a group, and it increases from left to right across a period.



6. Acidity and Basicity

Acidity and basicity of an oxide of an element depends upon the electronegativity of that element. The greater the electronegativity the more acidic oxide of the element, and the less the electronegativity, the more basic the oxide of the element.

- The acidity of the oxides of elements increases from left to right in a period, and the basicity of the oxides of elements decreases.
- In a group acidity of the oxides of elements decreases, and the basicity of the oxides of elements increases from top to bottom.

Section Review

1. Why are the Group 7A elements, the halogens, the most reactive of the nonmetal elements?

- A. They have the largest atomic radii.
- B. They have the highest ionization energies.
- C. They are the farthest right on the periodic table.
- D. They require only one electron to fill their outer energy level.

2. Which one of these is a transition element?

- A. Ba
- B. C
- C. Fe
- D. Xe

3. Why is iodine placed after tellurium on the periodic table if the atomic mass of tellurium is less than that of iodine?

3. Because the periodic table is based on atomic number, not atomic mass. The atomic number of iodine is one higher than the atomic number of tellurium.

4. Following elements are in the same period of the periodic table. How are they ordered in terms of electronegativity?

${}_{34}\text{Se}$, ${}_{20}\text{Ca}$, ${}_{32}\text{Ge}$, ${}_{35}\text{Br}$, ${}_{30}\text{Zn}$

4. Electronegativity increases from left to right across a period. Therefore; ${}_{35}\text{Br} > {}_{34}\text{Se} > {}_{32}\text{Ge} > {}_{30}\text{Zn} > {}_{20}\text{Ca}$

5. State the following elements as metal, metalloid, and nonmetal. Ba, C, Cr, Cl, Sb, W, Ge, Si, F

5. Metals: Ba, Cr, W. Metalloids: Sb, Ge, Si. Nonmetals: C, Cl, F

6. A metal is called malleable if it

- A. has a shiny appearance.
- B. can be hammered into sheets.
- C. can be squeezed out into a wire.
- D. exists naturally as an element.

7. Trends in the properties of elements in a group or period can be explained in terms of

- A. binding energy.
- B. atomic number.
- C. electron configuration.
- D. electron affinity.

8. Which is the best reason that the atomic radius generally increases with atomic number in each group of elements?

- A. The nuclear charge increases.
- B. The number of neutrons increases.
- C. The number of energy levels increases.
- D. A new octet forms.

9. A measure of the ability of an atom in a chemical compound to attract electrons is called

9. A measure of the ability of an atom in a chemical compound to attract electrons is called **electronegativity**.

10. State whether the oxides of the elements C, N, Ba, S, Na, Fe, P are acidic or basic.

10. Acidic oxides: CO_2 , NO_2 , N_2O_3 , SO_2 , SO_3 , P_2O_7

Basic Oxides: BaO, FeO, Fe_2O_3 , Na_2O

Neutral Oxides: CO, NO