

CHAPTER 8 LEARNING OBJECTIVES

To satisfy the minimum requirements for this course, you should be able to:

Explain the relationship between valence electron configurations and the organization of the periodic table. You should be able to:

- demonstrate that elements in a group have similar valence electron configurations
- identify and explain the basis for the following categories: representative (or main group) elements, noble gases, transition metals, lanthanides and actinides (f-block transition elements), and the zinc, cadmium, mercury group (group 2B)

Write the formulas for the most stable form of elements that exist as discrete molecules (H_2 , N_2 , O_2 , F_2 , Cl_2 , Br_2 , I_2 , P_4 , S_8)

Write the electron configuration for any ion including transition metal cations

Explain periodic trends. You should be able to:

- explain how and why the effective nuclear charge (Z_{eff}) felt by the valence electrons varies across a period and down a group in the periodic table
- use effective nuclear charge and the distance of valence electrons from the nucleus to explain how and why atomic radius, ionization energy, and electron affinity vary across a period and down a group in the periodic table
- use the concept of isoelectronic series to explain the periodic trends in ionic radii

Explain the observed changes in values of the successive ionization energies for a given atom (Table 8.2)

Use the periodic trends for ionization energy and electron affinity to explain the following:

- why the metallic character of the elements decreases from left to right in a period and from top to bottom in a group
- why metals form cations and non-metals form anions in ionic compounds
- why, upon ion formation, atoms tend to gain or lose electrons until they become isoelectronic with the nearest noble gas