CHAPTER 9 LEARNING OBJECTIVES

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

Describe the characteristics of ionic and covalent bonds and compare the properties of ionic and covalent compounds. You should be able to:

- calculate the lattice energy of an ionic solid using a Born-Haber cycle and arrange ionic solids in order of increasing lattice energy
- describe single, double, and triple covalent bonds, and discuss their relative bond lengths and bond strengths
- relate the electronegativity of an element to its position in the periodic table
- use electronegativity to predict the type of bond (ionic, polar covalent, or pure covalent) that forms between two atoms and the relative polarities of different covalent bonds

Demonstrate an understanding of Lewis structures by:

- determining the number of valence electrons for the representative elements and the noble gases (except for He) from their group numbers
- drawing the Lewis structures for molecules and ions containing covalent bonds
- drawing resonance forms for molecules or polyatomic ions that are not adequately described by a single Lewis structure
- describing how the concept of resonance relates to the actual arrangement of electrons in molecules including benzene
- determining the formal charges of atoms in a molecule and using formal charge to determine the preferred resonance structures
- drawing the Lewis structures for molecules and ions containing covalent bonds that have an incomplete octet, an odd number of electrons, or an expanded octet

Relate bond enthalpies to bond strengths and be able to:

- use bond enthalpies to estimate ΔH for reactions
- explain why ΔH_{rxn} calculated from bond enthalpies can be different from the ΔH_{rxn} calculated from enthalpies of formation