

Chapter 4
Chemical Bonding: Understanding Climate Change
Learning Objectives

8.12.2022

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

1. **Describe the characteristics of ionic and covalent bonds.** You should be able to:
 - interpret the potential energy curve describing the interaction of atoms (or ions) to form a diatomic molecule (or ion pair) and determine the bond energy and equilibrium bond distance
 - explain why bond formation releases energy and bond breaking requires input of energy
 - define electronegativity and relate the electronegativity of an element to its position in the periodic table
 - use electronegativity differences between bonded atoms to predict bond type (ionic, polar covalent, or pure covalent) or to predict the relative polarities of different covalent bonds

2. **Describe the properties of ionic compounds,** and be able to:
 - predict the formula of an ionic compound from the ion charges
 - arrange ionic compounds in order of increasing lattice energy, based on their formulas

3. **Apply systematic nomenclature rules to name simple compounds.** Be able to:
 - recognize the names and formulas of the common cations, anions and common acids and bases listed in the General Chemistry Reference Sheet
 - name binary ionic compounds (including those containing transition metals and oxoanions) given the formulas and vice versa.
 - name binary molecular compounds given the formula (and vice-versa)

4. **Use Lewis structures to predict bonding arrangement in simple covalent compounds.** Be able to:
 - determine the number of valence electrons for the representative elements and the noble gases from their positions in the Periodic table
 - draw Lewis structures for molecules and ions containing covalent bond, including those that have an incomplete octet, an odd number of electrons, or an expanded octet
 - describe single, double, and triple covalent bonds, and identify their relative bond lengths and bond strengths
 - determine the formal charges of atoms in a molecule or ion
 - identify resonance structures and use formal charge to determine the relative importance of different resonance forms

Note - Section 4.9 (Vibrating Bonds and the Greenhouse Effect) is not assigned.