

Chapter 4  
**Chemical Bonding: Understanding Climate Change**  
Learning Objectives

8.2.2021

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

1. Describe the characteristics of ionic bonds and be able to:
  - arrange ionic solids in order of increasing lattice energy
  - predict the formula of an ionic compound from the ion charges
2. Use valence bond theory to explain how a covalent bond forms and to account for molecular geometry. You should be able to:
  - explain why bond formation is an exothermic process and bond breaking is an endothermic process
  - understand a potential energy curve of a diatomic molecule and determine the bond energy and equilibrium bond distance
3. Explain how chemicals are systematically named and learn:
  - the names and formulas of the common cations, anions and common acids and bases listed in the General Chemistry Reference Sheet
  - how to name ionic compounds (including transition metals and oxoanions)
  - how to name binary molecular compounds
4. Describe the characteristics of ionic and covalent bonds and compare the properties of ionic and covalent compounds. You should be able to:
  - 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
5. Demonstrate an understanding of Lewis structures by:
  - determining the number of valence electrons for the representative elements and the noble gases from their positions in the Periodic table
  - drawing the Lewis structures for molecules and ions containing covalent bonds
  - describe single, double, and triple covalent bonds, and identify their relative bond lengths and bond strengths
  - determining the formal charges of atoms in a molecule or ion
  - 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
  - identify resonance structures and use formal charge to determine the relative importance of different resonance forms

**N.B. Section 4.9 will not be covered.**