

CHEMISTRY
LEARNING TARGETS for UNIT 4 and UNIT 5: Ionic and Covalent Bonding
Chapters 7, 8, and 9

From ACT Quality Core: Chemistry Course Standards

III. Discovering the Language of Chemistry

A. Formulas and Equations

1. Empirical Formulas, Molecular Formulas, and Percentage Composition

- a. Distinguish between chemical symbols, empirical formulas, molecular formulas, and structural formulas
- b. Interpret the information conveyed by chemical formulas for numbers of atoms of each element represented
- c. Use the names, formulas, and charges of commonly referenced polyatomic ions
- d. Provide the interconversion of molecular formulas, structural formulas, and names, including common binary and ternary acids

IV. Building Models of Matter

B. Atomic Structure and Chemical Bonding

3. Intermolecular Forces and Types of Bonds

- a. Describe the characteristics of ionic and covalent bonding
- b. Explain ionic stability, recognize typical ionic configurations, and predict ionic configurations for elements (e.g., electron configurations, Lewis dot models)
- c. Describe the nature of the chemical bond with respect to valence electrons in bonding atoms
- d. Explain how ionic and covalent compounds differ
- e. Describe the unique features of bonding in carbon compounds
- f. Compare the different types of intermolecular forces (e.g., van der Waals, dispersion)
- g. Explain and provide examples for dipole moments, bond polarity, and hydrogen bonding
- h. Describe the unique physical and chemical properties of water resulting from hydrogen bonding
- k. Classify solids as ionic, molecular, metallic, or network

4. Orbital Theory Applied to Bonding

- a. Use Lewis dot diagrams to represent bonding in ionic and covalent compounds
 - b. Draw Lewis structures for molecules and polyatomic ions, including those that must be represented by a set of resonance structures (Targets cont. on back.)
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- c. Use VSEPR theory to explain geometries of molecules and polyatomic ions
- d. Describe how orbital hybridization models relate to molecular geometry
- e. Describe the molecular orbital models for double bonds, triple bonds, and delocalized pi electrons
- f. Describe the relationship between molecular polarity and bond polarity