

Chapter 3 Chemical Compounds

Learning Objectives

3.1 Ionic and Molecular Compounds

- Describe the differences between ionic and molecular compounds.
- Classify a compound as ionic or molecular from its formula.
- Distinguish between electrolytes and nonelectrolytes, and between strong electrolytes and weak electrolytes.
- Predict whether a substance is an electrolyte or nonelectrolyte from its formula.
- Describe the composition and general structure of ionic compounds and molecular compounds.
- Describe how some physical properties, such as melting point and electrical conductivity, differ for ionic versus molecular compounds.

3.2 Monatomic and Polyatomic Ions

- Describe the different types of ions found in ionic compounds.
- Predict the charge on common monatomic ions (those in Figure 3.12).
- Name monatomic cations and ions.
- Name polyatomic ions from their formulas (See lecture notes!).
- Write formulas for polyatomic ions from their names (those indicated in Table 3.4 in lecture notes).

3.3 Formulas for Ionic compounds

- Describe how the formula for an ionic compound describes its composition.
- Determine the formula for an ionic compound given the identity of its ion symbols or ion names.
- Understand the importance of charge neutrality in compounds and in aqueous solutions of ionic compounds.

3.4 Naming Ionic Compounds

- Describe the general systematic approach to naming ionic compounds.
- Name ionic compounds containing cations that are common monatomic ions.
- Name ionic compounds containing metals that can form multiple charges using the systematic *stock* system.
- Write formulas for ionic compounds given their names.
- Name ionic compounds containing metals that can form multiple charges using the *common* nomenclature system.

3.5 Naming and Writing Formulas for Molecular Compounds

- Describe how the formula for a molecular compound describes its composition.
- Describe the general systematic approach to naming molecular compounds.
- Name molecular compounds from their formulas.
- Write formulas for molecular compounds from their names.
- Know the trivial, or nonsystematic, names for H_2O , NH_3 , and H_2O_2 .

3.6 Acids and Bases

- List some common acids and bases and describe the general approach to naming them.
- Describe how an acid behaves when dissolved in water.
- Define ionization, and describe how this process is different from dissociation.
- Describe how a metal hydroxide base behaves when dissolved in water.
- Describe the common structural feature in carboxylic acids.
- Describe how a base such as ammonia, NH_3 , behaves when dissolved in water.
- Name binary acids and oxoacids from their formulas. (See lecture notes and handout online for ones to memorize)

3.7 Predicting Properties and Naming Compounds

- Classify compounds as ionic, molecular, or acidic based on its formula, name and/or properties.
- Name a given compound using the correct rules that correspond to its classification.