

# Nelson Chemistry 11

## Unit 1: Matter and Chemical Bonding

### Unit 1 Are You Ready?

#### Chapter 1: The Nature of Matter

##### Chapter 1 Opener

- 1.1 Elements and the Periodic Table  
Investigation 1.1.1: Element or Compound?
- 1.2 Developing a Model of the Atom  
Activity 1.2.1: Developing a Model
- 1.3 Understanding Atomic Mass  
Activity 1.3.1: Modelling Half-Life  
Activity 1.3.2: Debate: Disposing of Nuclear Waste
- 1.4 Toward a Modern Atomic Theory  
Investigation 1.4.1: Atomic Spectra  
Investigation 1.4.2: Flame Tests for Metallic Compounds
- 1.5 Trends in the Periodic Table  
Lab Exercise 1.5.1: Reactivity of Alkali Metals  
Activity 1.5.1: Following Trends in Ionization Energy  
Activity 1.5.2: Following Trends in Electronegativity

##### Chapter 1 Summary

##### Chapter 1 Review

#### Chapter 2: Chemical Bonding

##### Chapter 2 Opener

- 2.1 Classifying Compounds  
Investigation 2.1.1: Comparing Ionic and Molecular Compounds
- 2.2 Ionic Bonding
- 2.3 Covalent Bonding
- 2.4 Electronegativity and Polarity  
Investigation 2.4.1: Solutions and Molecular Polarity
- 2.5 The Shapes of Molecules
- 2.5 The Names and Formulas of Compounds

##### Chapter 2 Summary

##### Chapter 2 Review

#### Chapter 3: Chemical Reactions

##### Chapter 3 Opener

- 3.1 Recognizing and Understanding Chemical Changes  
Activity 3.1.1: Understanding Chemical Reactions
- 3.2 Combustion, Synthesis, and Decomposition Reactions  
Investigation 3.2.1: The Combustion of Butane
- 3.3 Single Displacement Reactions  
Investigation 3.3.1: A Single Displacement Reaction  
Investigation 3.3.2: Developing an Activity Series  
Lab Exercise 3.3.1: The Reactivity of Alloys  
Investigation 3.3.3: Testing the Activity Series
- 3.4 Double Displacement Reactions  
Investigation 3.4.1: Double Displacement Reactions  
Investigation 3.4.2: Identifying an Unknown

##### Chapter 3 Summary

##### Chapter 3 Review

### Unit 1 Performance Task: New Elements

### Unit 1 Review

## Unit 2: Quantities in Chemical Reactions

### Unit 2 Are You Ready?

#### Chapter 4: Quantities in Chemical Formulas

##### Chapter 1 Opener

- 4.1 Differing Proportions in Compounds
- 4.2 Relative Atomic Mass and Isotopic Abundance  
Lab Exercise 4.2.1: Determination of Relative Atomic Mass
- 4.3 The Mole and Molar Mass
- 4.4 Calculations Involving the Mole Concept
- 4.5 Percentage Composition  
Investigation 4.5.1: Percentage Composition by Mass of Magnesium Oxide
- 4.6 Empirical and Molecular Formulas
- 4.7 Calculating Chemical Formulas  
Investigation 4.7.1: Determining the Formula of an Unknown Hydrate

##### Chapter 4 Summary

##### Chapter 4 Review

#### Chapter 5: Quantities in Chemical Equations

##### Chapter 1 Opener

- 5.1 Quantitative Analysis  
Investigation 5.1.1: Quantitative Analysis of Sodium Carbonate Solution
- 5.2 Balancing Chemical Equations
- 5.3 Balancing Nuclear Equations
- 5.4 Calculating Masses of Reactants and Products  
Lab Exercise 5.4.1: Testing Gravimetric Stoichiometry
- 5.5 Calculating Limiting and Excess Reagents  
Lab Exercise 5.5.1: Calculating an Excess Reagent  
Investigation 5.5.1: Which Reagent Is Limiting and How Much Precipitate Is Formed?
- 5.6 The Yield of a Chemical Reaction  
Investigation 5.6.1: Determining Percentage Yield in a Chemical Reaction
- 5.7 Chemistry in Technology

##### Chapter 5 Summary

##### Chapter 5 Review

Unit 2 Performance Task: Quantitative Analysis of a Reaction

Unit 2 Review

# Nelson Chemistry 11

## Unit 3: Solubility and Solutions

### Unit 3 Are You Ready?

#### Chapter 6: The Nature and Properties of Solutions

##### Chapter 6 Opener

- 6.1 Defining a Solution
  - Investigation 6.1.1: Qualitative Chemical Analysis
  - Lab Exercise 6.1.1: Identification of Solutions
- 6.2 Explaining Solutions
  - Lab Exercise 6.2.1: Testing a Hypothesis
  - Investigation 6.2.1: Polar and Nonpolar Solutes
  - Lab Exercise 6.2.2: Predicting High and Low Solubilities
- 6.3 Solution Concentration
- 6.4 Drinking Water
  - Activity 6.4.1: Simulated Water Treatment
  - Activity 6.4.2: Take a Stand: Safe to Drink?
- 6.5 Solution Preparation
  - Activity 6.5.1: A Standard Solution from a Solid
  - Activity 6.5.2: A Standard Solution by Dilution

##### Chapter 6 Summary

##### Chapter 6 Review

#### Chapter 7: Solubility and Reactions

##### Chapter 7 Opener

- 7.1 Solubility
  - Investigation 7.1.1: Solubility Curve of a Solid
  - Lab Exercise 7.1.1: Solubility of a Gas
  - Investigation 7.1.2: The Solubility of Sodium Chloride in Water
- 7.2 Hard Water Treatment
- 7.3 Reactions in Solution
  - Investigation 7.3.1: Precipitation Reactions in Solution
  - Activity 7.3.1: Debate: Producing Photographs
- 7.4 Waste Water Treatment
- 7.5 Qualitative Chemical Analysis
  - Investigation 7.5.1: Sequential Chemical Analysis in Solution
- 7.6 Quantitative Analysis
  - Lab Exercise 7.6.1: Quantitative Analysis in Solution
  - Investigation 7.6.1: Percentage Yield of Barium SulfateOxide

##### Chapter 7 Summary

##### Chapter 7 Review

#### Chapter 8: Acids and Bases

##### Chapter 8 Opener

- 8.1 Understanding Acids and Bases
- 8.2 pH of a Solution
  - Investigation 8.2.1: Dilution and pH
- 8.3 Working with Solutions
- 8.4 Acid-Base Theories
  - Investigation 8.4.1: Arrhenius' Acid-Base Definitions
  - Activity 8.4.1: Role Play: How Does Scientific Knowledge Change?
- 8.5 Acid-Base Reactions
  - Investigation 8.5.1: Titration Analysis of Vinegar

##### Chapter 8 Summary

##### Chapter 8 Review

### Unit 3 Task: Analysis of ASA

### Unit 3 Review

## Unit 4: Gases and Atmospheric Chemistry

### Unit 4 Are You Ready?

### Chapter 9: The Gas State

#### Chapter 9 Opener

- 9.1 States of Matter
- 9.2 Gas Laws
  - Investigation 9.2.1: Pressure and Volume of a Gas
  - Investigation 9.2.2: Temperature and Volume of a Gas
- 9.3 Compressed Gases
- 9.4 The Ideal Gas Law
- 9.5 Air Quality

#### Chapter 9 Summary

#### Chapter 9 Review

### Chapter 10: Gas Mixtures and Reactions

#### Chapter 10 Opener

- 10.1 Mixtures of Gases
- 10.2 Reactions of Gases
  - Investigation 10.2.1: Molar Volume of a Gas
- 10.3 The Ozone Layer
- 10.4 Gas Stoichiometry
  - Investigation 10.4.1: Testing the Gas Stoichiometry Method
- 10.5 Applications of Gases

#### Chapter 10 Summary

#### Chapter 10 Review

### Unit 4 Performance Task: A Study of a Technological System

### Unit 4 Review

## Unit 5: Hydrocarbons and Energy

### Unit 5 Are You Ready?

### Chapter 11: Hydrocarbons

#### Chapter 11 Opener

- 11.1 Organic Compounds
- 11.2 Refining Petroleum
  - Lab Exercise 11.2.1: Fractional Distillation
  - Investigation 11.2.1: Destructive Distillation
- 11.3 Combustion of Hydrocarbons
  - Investigation 11.3.1: Combustion of Hydrocarbons
- 11.4 Alkanes and Cycloalkanes
- 11.5 Alkenes and Alkynes
  - Investigation 11.5.1: Evidence for Multiple Bonds
  - Activity 11.5.1: Structures and Properties of Isomers
  - Investigation 11.5.2: Preparation and Properties of Acetylene

#### Chapter 11 Summary

#### Chapter 11 Review

### Chapter 12: Energy from Hydrocarbons

#### Chapter 12 Opener

- 12.1 Classifying Energy Changes
  - Investigation 12.1.1: Building a Water Heater
- 12.2 Calorimetry
  - Investigation 12.2.1: Hot and Cold Packs
  - Investigation 12.2.2: Specific Heat of Combustion
- 12.3 Heats of Reaction
  - Investigation 12.3.1: Combustion of Octane
- 12.4 Our Use of Fossil Fuels

#### Chapter 12 Summary

#### Chapter 12 Review

### Unit 5 Performance Task: A Study of Gasoline

### Unit 5 Review