

# Activities Index

## Career Focus

- Unit 1: Ask a Nanotechnologist, p. 1-49  
 Unit 2: Ask an Exercise Physiologist, p. 2-40  
 Unit 3: Ask a Marine Conservationist, p. 3-59  
 Unit 4: Ask a Pharmaceutical Chemist, p. 4-59  
 Unit 5: Building Up and Breaking Down Bitumen, p. 5-94  
 Unit 6: Ask a Pipeline Corrosion Expert, p. 6-71  
 Unit 7: Ask a Chemical Safety Expert, p. 7-55  
 Unit 8: Ask a Dairy Farmer, p. 8-63

## Connections Features

- Chapter 1: Ionic Liquids, p. 1-16  
 Chapter 2: Mane Products, p. 1-43  
 Chapter 3: Technology and the Development of Barometers, p. 2-18  
 Chapter 4: Technology and the Process of Discovery, p. 2-32  
 Chapter 4: Chinook Winds and the Gas Laws, p. 2-36  
 Chapter 5: Biomagnification and Bioaccumulation, p. 3-28  
 Chapter 6: Drain Cleaners, p. 3-57  
 Chapter 7: Waste Water Treatment, p. 4-24  
 Chapter 8: Sulfur from Sour Gas, p. 4-54  
 Chapter 9: Energy for Living: How Food Fuels You, p. 5-34  
 Chapter 10: Efficient Home Heating, p. 5-63  
 Chapter 11: Car Pollution Solution? Inside a Catalytic Converter, p. 5-87  
 Chapter 12: How Green Is White Paper?, p. 6-31  
 Chapter 14: Tar Sands and Bitumen, p. 7-28  
 Chapter 15: Trans Fats in the Diet, p. 7-41  
 Chapter 16: The Development of Equilibrium Theories, p. 8-24  
 Chapter 17: Buffers in the Blood, p. 8-59

## Investigations

- 1.A: Modelling Molecules, p. 1-18  
 2.A: Building Ionic Crystals, p. 1-33  
 2.B: Soap Bubble Molecules, p. 1-34  
 2.C: Dipole Balloons, p. 1-38  
 2.D: Investigating the Properties of Water, p. 1-39  
 2.E: Properties of Substances, p. 1-42  
 3.A: The Relationship between the Pressure on and the Volume of a Gas, p. 2-17

- 3.B: The Relationship between Temperature and Volume of a Gas, p. 2-20  
 4.A: Finding the Molar Mass of a Gas, p. 2-35  
 4.B: Finding the Value of the Universal Gas Constant,  $R$ , p. 2-37  
 5.A: Classifying Solutions, p. 3-21  
 5.B: Plotting Solubility Curves, p. 3-24  
 5.C: Pollution of Waterways: A Risk–Benefit Analysis, p. 3-30  
 5.D: Preparing and Diluting a Standard Solution, p. 3-31  
 6.A: An Empirical Definition for Acids and Bases, p. 3-44  
 6.B: Testing the Arrhenius Theory of Acids and Bases, p. 3-46  
 6.C: Differentiating between Weak and Strong Acids and Bases, p. 3-49  
 6.D: Determining the pH of an Unknown Solution with Indicators, p. 3-53  
 6.E: The Effect of Dilution on the  $[\text{H}_3\text{O}^+(\text{aq})]$  and pH of an Acid, p. 3-55  
 7.A: Qualitative Analysis, p. 4-19  
 7.B: Determining the Concentration of a Solution, p. 4-25  
 7.C: Analyzing Industrial Processes, p. 4-27  
 8.A: The Limiting Reactant, p. 4-43  
 8.B: Determining the Percentage Yield of a Chemical Reaction, p. 4-47  
 8.C: Standardizing a Hydrochloric Acid Solution, p. 4-51  
 8.D: Titrating a Strong Base with a Strong Acid, p. 4-55  
 9.A: Determining the Enthalpy of a Neutralization Reaction, p. 5-29  
 9.B: Molar Enthalpy of Combustion, p. 5-31  
 10.A: Hess's Law and the Enthalpy of Combustion of Magnesium, p. 5-54  
 10.B: Build a Heating Device, p. 5-59  
 10.C: Fossil Fuels as Energy Sources: A Risk–Benefit Analysis, p. 5-65  
 10.D: Fuelling Thermal Power Plants, p. 5-66  
 11.A: The Effect of a Catalyst on the Decomposition of Hydrogen Peroxide,  $\text{H}_2\text{O}_2(\text{aq})$ , p. 5-88  
 12.A: Testing Relative Oxidizing and Reducing Strengths of Metal Atoms and Ions, p. 6-22

## Investigations (continued)

**Activities Index**

- 12.B: Redox Reactions and Balanced Equations, p. 6-26  
 12.C: Measuring the Concentration of Vitamin C in Orange Juice, p. 6-34  
 13.A: Measuring Cell Potential of Voltaic Cells, p. 6-54  
 13.B: Electrolysis of Aqueous Potassium Iodide, p. 6-62  
 13.C: Electroplating, p. 6-66  
 14.A: Comparing Organic and Inorganic Compounds, p. 7-16  
 14.B: Modelling Organic Compounds, p. 7-22  
 14.C: Separate and Organic Mixture, p. 7-28  
 15.A: Preparing Esters, p. 7-42  
 15.B: Modelling and Making Polymers, p. 7-48  
 16.A: Modelling Equilibrium, p. 8-20  
 16.B: Disturbing Equilibrium, p. 8-25  
 16.C: Using Experimental Data to Determine an Equilibrium Constant, p. 8-31  
 17.A: Determining  $K_a$  for Ethanoic Acid, p. 8-51  
 17.B: Preparing a Buffer and Investigating Its Properties, p. 8-56

**Launch Labs**

- Chapter 1: Chemistry Recall, p. 1-13  
 Chapter 2: Crystalline Columns, p. 1-30  
 Chapter 3: Balloon in a Bottle, p. 2-13  
 Chapter 4: Changing Gas Temperature, Pressure, and Volume at the Same Time, p. 2-30  
 Chapter 5: Sink or Float?, p. 3-19  
 Chapter 6: The Colour of Your Breath, p. 3-41  
 Chapter 7: The Thermal Decomposition of Baking Soda, p. 4-17  
 Chapter 8: The Model Air Bag, p. 4-40  
 Chapter 9: Hot Packs and Cold Packs, p. 5-23  
 Chapter 10: Bake a Cake, p. 5-52  
 Chapter 11: Does It Gel?, p. 5-82  
 Chapter 12: Penny Chemistry, p. 6-20  
 Chapter 13: What Determines Voltage?, p. 6-50  
 Chapter 14: Familiar Organic Compounds, p. 7-13  
 Chapter 15: Comparing the Reactivity of Alkanes and Alkenes, p. 7-37  
 Chapter 16: The Chemical Blues, p. 8-18  
 Chapter 17: Buffering Ground Water: A Delicate Balance, p. 8-45

**Thought Labs**

- 1.1: Lewis Structures, p. 1-17  
 3.1: The Importance of the Kelvin Temperature Scale, p. 2-22  
 4.1: Molar Volumes of Gases, p. 2-33  
 5.1: Expressing Concentration, p. 3-28  
 6.1: Risks and Benefits of Transporting Acids and Bases, p. 3-51  
 7.1: Identifying Unknown Aqueous Solutions, p. 4-19  
 8.1: The Limiting Item, p. 4-42  
 8.2: Plotting a Titration Curve, p. 4-53  
 10.1: Improving Energy Efficiency at Home, p. 5-61  
 12.1: Oxidation Numbers and Lewis Structures, p. 6-30  
 13.1: Assigning Reference Values, p. 6-54  
 14.1: Nanotubes, Buckyballs, and Allotropes, p. 7-14  
 15.1: Fossil Fuels and Climate Change, p. 7-40  
 15.2: Problem Solving with Organic Compounds, p. 7-44  
 16.1: Finding an Equilibrium Law, p. 8-30  
 17.1: Analyzing a Weak Acid-Strong Base Titration, p. 8-55

# Answer Index

(Answers to featured questions begin on the Teacher's Resource pages noted below. The corresponding page in the student textbook (ST) where the questions appear is noted in brackets.)

## **Career Focus Questions**

- Unit 1 (ST 84-85) 1-49
- Unit 2 (ST 154-155) 2-40
- Unit 3 (ST 246-247) 3-59
- Unit 4 (ST 326-327) 4-59
- Unit 5 (ST 422-423) 5-94
- Unit 6 (ST 524-525) 6-71
- Unit 7 (ST 618-619) 7-55
- Unit 8 (ST 722-723) 8-63

## **Chapter Review Questions**

- 1 (ST 44-45) 1-22
- 2 (ST 82-83) 1-44
- 3 (ST 124-125) 2-23
- 4 (ST 152-153) 2-38
- 5 (ST 204-205) 3-33
- 6 (ST 244-245) 3-58
- 7 (ST 292-293) 4-30
- 8 (ST 324-325) 4-57
- 9 (ST 366-367) 5-36
- 10 (ST 400-401) 5-67
- 11 (ST 420-421) 5-91
- 12 (ST 474-475) 6-36
- 13 (ST 522-523) 6-68
- 14 (ST 584-585) 7-30
- 15 (ST 616-617) 7-52
- 16 (ST 676-677) 8-35
- 17 (ST 720-721) 8-60

## **Connections Questions**

- Chapter 1 (ST 22) 1-16
- Chapter 2 (ST 79) 1-43
- Chapter 3 (ST 108) 2-18
- Chapter 4 (ST 131) 2-32
- Chapter 4 (ST 146) 2-36
- Chapter 5 (ST 189) 3-28
- Chapter 6 (ST 239) 3-57
- Chapter 7 (ST 279) 4-24
- Chapter 8 (ST 320) 4-54
- Chapter 9 (ST 361) 5-34
- Chapter 10 (ST 390) 5-63

- Chapter 11 (ST 414) 5-87
- Chapter 12 (ST 465) 6-31
- Chapter 14 (ST 576) 7-28
- Chapter 15 (ST 592) 7-41
- Chapter 16 (ST 645) 8-24
- Chapter 17 (ST 717) 8-59

## **Practice Problems**

### *Chapter 1*

- 1-6 (ST 25) 1-17
- 7-17 (ST 27) 1-17
- 18-24 (ST 29) 1-18

### *Chapter 2*

- 1-10 (ST 56) 1-33
- 11-16 (ST 59) 1-35

### *Unit 2 Preparation*

- 1-6 (ST 95) 2-5

### *Chapter 3*

- 1-6 (ST 110) 2-18
- 7-10 (ST 119) 2-22
- 11-14 (ST 120) 2-22

### *Chapter 4*

- 1-6 (ST 130) 2-32
- 7-9 (ST 133) 2-32
- 10-16 (ST 141) 2-35
- 17-19 (ST 142) 2-35

### *Chapter 5*

- 1-5 (ST 186) 3-28
- 6-10 (ST 188) 3-28
- 11-16 (ST 191) 3-28
- 17-22 (ST 193) 3-28
- 23-26 (ST 194) 3-29
- 27-30 (ST 195) 3-29
- 31-33 (ST 198) 3-30

### *Chapter 6*

- 1-6 (ST 230) 3-53
- 7-12 (ST 237) 3-56
- 13-18 (ST 241) 3-57

# Answer Index

***Unit 4 Preparation***

1-2 (ST 258) 4-6

***Chapter 7***

1-2 (ST 264) 4-18

3-7 (ST 274) 4-23

8-15 (ST 278) 4-24

16-19 (ST 282) 4-25

20-23 (ST 286) 4-27

24-27 (ST 287) 4-27

***Chapter 8***

1-6 (ST 299) 4-43

7-12 (ST 303) 4-44

13-19 (ST 308) 4-47

20-25 (ST 315) 4-51

***Unit 5 Preparation***

1-4 (ST 337) 5-8

***Chapter 9***

1-6 (ST 349) 5-27

7-12 (ST 355) 5-29

13-17 (ST 363) 5-35

***Chapter 10***

1-6 (ST 374) 5-54

7-12 (ST 382) 5-57

13-16 (ST 387) 5-59

***Chapter 11***

1-5 (ST 409) 5-84

***Chapter 12***

1-2 (ST 448) 6-26

3-6 (ST 452) 6-28

7-10 (ST 457) 6-30

11-14 (ST 461) 6-31

15-18 (ST 464) 6-31

19-22 (ST 469) 6-34

***Chapter 13***

1-4 (ST 487) 6-53

5-8 (ST 508) 6-61

9-12 (ST 516) 6-66

***Chapter 14***

1-3 (ST 549) 7-19

4-9 (ST 550) 7-19

10-13 (ST 554) 7-20

14-15 (ST 555) 7-20

16-17 (ST 556) 7-20

18-23 (ST 559) 7-21

24-27 (ST 562) 7-21

28-30 (ST 567) 7-24

31-32 (ST 569) 7-24

33-36 (ST 570) 7-25

37-38 (ST 572) 7-25

***Chapter 15***

1-6 (ST 596) 7-41

7-12 (ST 606) 7-47

***Chapter 16***

1-5 (ST 641) 8-24

6-10 (ST 644) 8-24

11-15 (ST 649) 8-25

16-20 (ST 651) 8-25

21-24 (ST 658) 8-29

25-29 (ST 660) 8-30

***Chapter 17***

1-4 (ST 687) 8-49

5-7 (ST 688) 8-49

8-10 (ST 690) 8-49

11-13 (ST 692) 8-51

14-18 (ST 693) 8-51

19-23 (ST 698) 8-53

24-27 (ST 699) 8-53

28-33 (ST 701) 8-53

34-38 (ST 703) 8-54

***Questions for Comprehension******Unit 1 Preparation***

1-2 (ST 7) 1-5

3-8 (ST 13) 1-5

***Chapter 1***

1-5 (ST 19) 1-16

6-7 (ST 21) 1-16

8 (ST 31) 1-19

9 (ST 34) 1-19

10-12 (ST 41) 1-21

***Chapter 2***

1-2 (ST 50) 1-32

3-4 (ST 57) 1-35

5-7 (ST 69) 1-41

8-10 (ST 75) 1-42

***Chapter 3***

1-4 (ST 104) 2-16

5-9 (ST 116) 2-21

10-11 (ST 118) 2-22

12-13 (ST 121) 2-23

***Chapter 4***

1-2 (ST 133) 2-32

3-5 (ST 135) 2-32

6-7 (ST 141) 2-35

8-10 (ST 144) 2-35

***Chapter 5***

1-2 (ST 168) 3-21

3-5 (ST 170) 3-21

6 (ST 172) 3-21

7-8 (ST 175) 3-23

9 (ST 177) 3-24

10-11 (ST 179) 3-24

***Chapter 6***

1-2 (ST 209) 3-44

3-4 (ST 213) 3-46

5-7 (ST 222) 3-50

8-10 (ST 233) 3-54

***Chapter 7***

1-2 (ST 268) 4-19

3-4 (ST 272) 4-23

5-6 (ST 275) 4-24

7 (ST 280) 4-24

8 (ST 285) 4-27

9 (ST 286) 4-27

***Chapter 8***

1 (ST 297) 4-42

2-3 (ST 307) 4-46

4-7 (ST 314) 4-51

8-10 (ST 319) 4-53

***Chapter 9***

1-2 (ST 342) 5-26

3-4 (ST 346) 5-26

5-6 (ST 347) 5-26

7-10 (ST 355) 5-29

Questions for Comprehension (continued)

# Answer Index

***Chapter 10***

1-3 (ST 378) 5-57  
4-7 (ST 379) 5-57

***Chapter 11***

1-3 (ST 407) 5-84  
4-5 (ST 413) 5-87

***Chapter 12***

1-4 (ST 437) 6-21  
5-8 (ST 440) 6-23  
9-11 (ST 442) 6-25

***Chapter 13***

1-3 (ST 480) 6-52  
4-7 (ST 482) 6-53  
8-9 (ST 493) 6-58  
10-12 (ST 496) 6-58  
13-16 (ST 500) 6-59  
17-20 (ST 510) 6-63

***Chapter 14***

1-2 (ST 573) 7-26

***Chapter 15***

1-6 (ST 589) 7-40

***Chapter 16***

1-3 (ST 636) 8-22

***Chapter 17***

1-2 (ST 682) 8-47  
3-5 (ST 686) 8-49  
6-8 (ST 696) 8-53  
9-12 (ST 710) 8-56

**Section Review Questions**

1.1 (ST 35) 1-19  
1.2 (ST 42) 1-21  
2.1 (ST 62) 1-35  
2.2 (ST 70) 1-41  
2.3 (ST 80) 1-44  
3.1 (ST 101) 2-15  
3.2 (ST 112) 2-18  
3.3 (ST 122) 2-23  
4.1 (ST 138) 2-33  
4.2 (ST 150) 2-38  
5.1 (ST 175) 3-23

5.2 (ST 183) 3-26  
5.3 (ST 196) 3-29  
5.4 (ST 202) 3-32  
6.1 (ST 217) 3-48  
6.2 (ST 226) 3-52  
6.3 (ST 242) 3-57  
7.1 (ST 270) 4-21  
7.2 (ST 289) 4-28  
8.1 (ST 304) 4-45  
8.2 (ST 311) 4-48  
8.3 (ST 322) 4-57  
9.1 (ST 350) 5-27  
9.2 (ST 364) 5-35  
10.1 (ST 383) 5-58  
10.2 (ST 392) 5-63  
10.3 (ST 398) 5-66  
11.1 (ST 410) 5-85  
11.2 (ST 418) 5-90  
12.1 (ST 440) 6-24  
12.2 (ST 454) 6-28  
12.3 (ST 466) 6-32  
12.4 (ST 472) 6-35  
13.1 (ST 490) 6-57  
13.2 (ST 501) 6-59  
13.3 (ST 513) 6-63  
13.4 (ST 520) 6-67  
14.1 (ST 543) 7-17  
14.2 (ST 564) 7-22  
14.3 (ST 574) 7-26  
14.4 (ST 582) 7-30  
15.1 (ST 602) 7-45  
15.2 (ST 614) 7-51  
16.1 (ST 638) 8-22  
16.2 (ST 655) 8-28  
16.3 (ST 665) 8-33  
16.4 (ST 674) 8-35  
17.1 (ST 683) 8-47  
17.2 (ST 690) 8-50  
17.3 (ST 704) 8-54  
17.4 (ST 718) 8-59

4 (ST 328-331) 4-59  
5 (ST 424-427) 5-94  
6 (ST 526-529) 6-72  
7 (ST 620-623) 7-56  
8 (ST 724-727) 8-64

**Unit Review Questions**

1 (ST 86-89) 1-49  
2 (ST 156-157) 2-41  
3 (ST 248-251) 3-59