STANDARDS

CHE.1 Mathematical and Computational Analysis

Conceptual Understanding: Mathematical and computational analysis is a key component of scientific investigation and prediction of outcomes. These components create a more student-centered classroom.

CHE.1 Students will use mathematical and computational analysis to evaluate problems.

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<tr>
<th>Code</th>
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<tr>
<td>CHE.1.1</td>
<td>Use dimensional analysis (factor/label) and significant figures to convert units and solve stoichiometric problems.</td>
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<tr>
<th>Code</th>
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<tr>
<td>Student Edition:</td>
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<tr>
<td>Example Problems 375, 376, 377</td>
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<td>Math Handbook 956-959</td>
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<td>MiniLAB 378</td>
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Codes used for Teacher Edition pages are the initial caps of headings on that page.
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</table>
| **CHE.1.1 Use dimensional analysis (factor/label) and significant figures to convert units and solve stoichiometric problems.** | **Problem-Solving Strategy 374**  
**Practice Problems 375, 376, 377**  
**Teacher Wraparound Edition:**  
CJ 275; CU 377; ICE 375, 376, 377 |
| **CHE.1.2 Design and conduct experiments using appropriate measurements, significant figures, graphical analysis to analyze data.** | **Students will conduct the ChemLAB first then continue to design the next part of the experiment through the Inquiry Extension. The teacher will guide students through their designed experiment.**  
**Student Edition:**  
ChemLAB/Inquiry Extension 466, 584, 670, 776, 850  
This activity provides opportunity for students to design an experiment.  
**Teacher Wraparound Edition:**  
DI 415 |
| **CHE.1.3 Enrichment: Research information from multiple appropriate sources and assess the credibility, accuracy, possible bias, and conclusions of each publication.** | **The following page references can be used to discuss how to assess the credibility of researched information.**  
**Student Edition:**  
Writing in Chemistry 389, 465, 505, 511, 555, 697  
**Teacher Wraparound Edition:**  
CP 348 |
### Standards for Science CHE.2 Atomic Theory

**Conceptual Understanding:** Atomic theory is the foundation of modern chemistry concepts. Students must be presented with a solid foundation of the atom and its components. These concepts lead to an understanding of the interactions of these components to explain macro-observations of the world.

**CHE.2 Students will demonstrate an understanding of the atomic structure of atoms and the historical developments leading to modern atomic theory.**

<table>
<thead>
<tr>
<th>CHE.2.1 Investigate the historical progression leading to the modern atomic theory, including, but not limited to, work done by Dalton, Rutherford’s gold foil experiment, Thomson’s cathode ray experiment, Millikan’s oil drop experiment, and Bohr’s interpretation of bright line spectra.</th>
<th>Student Edition:</th>
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<td>102-104, 107-114, 146-152</td>
<td>Figure 7 108</td>
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<td>Figure 17 154</td>
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<td>Table 1 103</td>
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<td>Teacher Wraparound Edition:</td>
<td>As 147; CB 149; CD 110, 154; CJ 110; CP 103, 153; De 106-107; DI 109, 111; Ex 104, 112, 114; Re 114</td>
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<tr>
<th>CHE.2.2 Construct models (e.g., ball and stick, online simulations, mathematical computations) of atomic nuclei to explain the abundance-weighted average (relative mass) of elements and isotopes on the published mass of elements.</th>
<th>Student Edition:</th>
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<tr>
<td>ChemLAB 126</td>
<td>MiniLAB 120</td>
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<td>Teacher Wraparound Edition:</td>
<td>As 117</td>
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<tr>
<th>CHE.2.3 Investigate absorption and emission spectra to interpret explanations of electrons at discrete energy levels using tools such as online simulations, spectrometers, prisms, flame tests, and discharge tubes. Explore both laboratory experiments and real-world examples.</th>
<th>Student Edition:</th>
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<td>ChemLAB 92, 164</td>
<td>Document-Based Questions 169</td>
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<td>Problem-Solving LAB 150</td>
<td>Teacher Wraparound Edition:</td>
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| **CHE.2.4** Research appropriate sources to evaluate the way absorption and emission spectra are used to study astronomy and the formation of the universe. | **Student Edition:**  
  *Connection to Astronomy* 145 |

**CHE.3 Periodic Table**

- **Conceptual Understanding:** Modern chemistry is based on the predictability of atomic behavior. Periodic patterns in elements led to the development of the periodic table.
- Electron configuration is a direct result of this periodic behavior. The predictable behavior of electrons has led to the discovery of new compounds, elements, and atomic interactions. Predictability of atom behavior is a key to understanding ionic and covalent bonding and production of compounds or molecules.

**CHE.3 Students will demonstrate an understanding of the periodic table as a systematic representation to predict properties of elements.**

**CHE.3.1 Explore and communicate the organization of the periodic table, including history, groups, families, family names, metals, nonmetals, metalloids, and transition metals.**

**Student Edition:**
- 174-181
- *Figure 1 & 2* 175
- *Figure 3* 177
- *Figure 5* 178-179
- *Figure 9* 184-185
- *Section 1 Review* 181 #1-#4
- *Table 1* 174
- *Table 2* 176

**Teacher Wraparound Edition:**
- As 179; CJ 192; CP 177; DI 175; Ex 175; MI 174
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| **CHE.3.2** Analyze properties of atoms and ions (e.g., metal/nonmetal/metalloid behavior, electrical/heat conductivity, electronegativity and electron affinity, ionization energy, and atomic/ionic radii) using periodic trends of elements based on the periodic table. | **Student Edition:**
187-194
Applying Practices 191
ChemLAB 196
Example Problem 189
Figure 5 178-179
Figure 11 & 12 188
Figure 14 190
Figure 15 & 16 191
Figure 17 193
Figure 18 194
Practice Problems 189
Problem-Solving LAB 180
Section 1 Review 181 #5-#7
Section 3 Review 194

**Teacher Wraparound Edition:**
As 179, 182, 185, 188; CD 187; CJ 189; CP 188;
CU 194; De 190-191; Ext 181; ICE 189; MC 191;
QD 179; R 179; Re 181, 186, 194; VL 192 |
| **CHE.3.3** Analyze the periodic table to identify quantum numbers (e.g., valence shell electrons, energy level, orbitals, sublevels, and oxidation numbers). | **Student Edition:**
182-185
Example Problem 186
Figure 7 & 8 183
Practice Problems 186
Section 2 Review 186
Table 3 182
Table 4 184

**Teacher Wraparound Edition:**
As 183; CU 186; DI 182; Re 186 |
## CHE.4 Bonding

**Conceptual Understanding:** A firm understanding of bonding is necessary to further development of the basic chemical concepts of compounds and chemical interactions.

**CHE.4 Students will demonstrate an understanding of the types of bonds and resulting atomic structures for the classification of chemical compounds.**

| CHE.4.1 Develop and use models (e.g., Lewis dot, 3-D ball-stick, 3-D printing, or simulation programs such as PhET) to predict the type of bonding between atoms and the shape of simple compounds. | **Student Edition:**  
ChemLAB 272  
Example Problem 255, 256, 257, 260, 264  
Figure 13 253  
Figure 14 258  
Figure 23 268  
Practice Problem 255, 256, 257, 260, 264  
Problem-Solving Strategy 254  
Section 3 Review 260  
Section 5 Review 270 #72-#77  
Table 6 263  
Teacher Wraparound Edition:  
As 263, 267; CD 254, 257; CJ 263, 267; CP 263; CU 259; DI 258; ICE 255, 256, 257, 264; QD 253; Re 259, 263; VL 253 |
|---|---|
| CHE.4.2 Use models such as Lewis structures and ball and stick models to depict the valence electrons and their role in the formation of ionic and covalent bonds. | **Student Edition:**  
ChemLAB 272  
Example Problem 244  
Figure 3 241  
Practice Problem 212, 244  
Teacher Wraparound Edition:  
As 245; BM 243; CJ 214; CU 247; DI 211, 243; ICE 244; QD 261; R 241; VL 259 |
| CHE.4.3 Predict the ionic or covalent nature of different atoms based on electronegativity trends and/or position on the periodic table. | **Student Edition:**  
Figure 22 267  
Section 5 Review 270 #72-#77  
Table 7 266  
Teacher Wraparound Edition:  
CJ 267 |
| CHE.4.4 Use models and oxidation numbers to predict the type of bond, shape of the compound, and the polarity of the compound. | **Student Edition:**  
Example Problem 345, 349  
Practice Problem 346  
Section 4 Review 350 #68-#69  
Teacher Wraparound Edition:  
CU 349; ICE 345, 349 |
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<tr>
<td>CHE.4.5 Use models of simple hydrocarbons to exemplify structural isomerism.</td>
<td>Teacher Wraparound Edition: As 769; BM 766; QD 767</td>
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</tbody>
</table>
| CHE.4.6 Use mathematical and computational analysis to determine the empirical formula and the percent composition of compounds. | Student Edition: Example Problem 345, 349  
Practice Problem 346  
Section 4 Review 350 #68-#69  
Teacher Wraparound Edition: CU 349; ICE 345, 349 |
| CHE.4.7 Use scientific investigation to determine the percentage of composition for a substance (e.g., sugar in gum, water and/or unpopped kernels in popcorn, percent water in a hydrate). Compare results to justify conclusions based on experimental evidence. | Student Edition: ChemLAB 356  
MiniLAB 342 |
| CHE.4.8 Plan and conduct controlled scientific investigations to produce mathematical evidence of the empirical composition of a compound and its uses in the real world. | Teacher Wraparound Edition: As 345 |

**CHE.5 Naming Compounds**  
**Conceptual Understanding:** Polyatomic ions (radicals) and oxidation numbers are used to predict how metallic ions, nonmetals, and transition metals are used in naming compounds.

**CHE.5 Students** will investigate and understand the accepted nomenclature used to identify the name and chemical formulas of compounds.

| CHE.5.1 Use the periodic table and a list of common polyatomic ions as a model to derive chemical compound formulas from compound names and compound names from chemical formulas. | Student Edition:  
Chapter 7 Assessment 233 #83  
ChemLAB 230  
Example Problem 222  
Practice Problem 222, 223  
Problem-Solving Strategy 224  
Teacher Wraparound Edition: As 223, 224; ICE 222 |
|---|---|
| CHE.5.2 Generate formulas of ionic and covalent compounds from compound names. Discuss compounds in everyday life and compile lists and uses of these chemicals. | Student Edition:  
Chapter 7 Assessment 233 #81, 234 #102  
Chapter 8 Assessment 274 #95, #96; 277 #139  
Practice Problems 251  
Section 2 Review 252 #35, #36  
Standardized Test Practice 236 #5  
Teacher Wraparound Edition: CJ 222; CU 224 |
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| **CHE.5.3** Generate names of ionic and covalent compounds from their formulas. Name binary compounds, binary acids, stock compounds, ternary compounds, and ternary acids. | **Student Edition:**  
Chapter 7 Assessment 233 #82  
Chapter 8 Assessment 274 #93, #94; 277 #140  
Example Problem 249  
Personal Tutor 222  
Practice Problems 223, 249, 251  
Section 2 Review 252 #34  
**Teacher Wraparound Edition:** CJ 251; ICE 249; Re 224 |
| **CHE.6 Chemical Reactions**  
**Conceptual Understanding:** Understanding chemical reactions and predicting products of these reactions is essential to student success.  
**CHE.6 Students will demonstrate an understanding of the types, causes, and effects of chemical reactions.** |  
**CHE.6.1** Develop and use models to predict the products of chemical reactions (e.g., synthesis reactions; single replacement; double displacement; and decomposition, including exceptions such as decomposition of hydroxides, chlorates, carbonates, and acids). Discuss and/or compile lists of reactions used in everyday life.  
**Teacher Wraparound Edition:** AC 304; BM 297; CJ 302; CP 282; DI 368; Ext 303; IM 286 |
| **CHE.6.2** Plan, conduct, and communicate the results of investigations to demonstrate different types of simple chemical reactions. | **Student Edition:**  
ChemLAB 310  
Inquiry Extension 310  
**Teacher Wraparound Edition:** DI 294, 300 |
| **CHE.6.3** Use mathematics and computational analysis to represent the ratio of reactants and products in terms of masses, molecules, and moles (stoichiometry). | **Student Edition:**  
ChemLAB 390  
Example Problem 375, 376, 377  
Personal Tutor 371  
Practice Problems 372, 375, 376, 377  
Problem-Solving Strategy 374  
Section 11 Review 372 #8-#9  
**Teacher Wraparound Edition:** As 371; CJ 375; CP 373; CU 371, 377; DI 374; Ext 371; ICE 375, 376, 377; Re 371, 377 |
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<td><strong>CHE.6.4</strong> Use mathematics and computational analysis to support the claim that atoms, and therefore mass, are conserved during a chemical reaction. Give real-world examples (e.g., burning wood).</td>
<td><strong>Student Edition:</strong>&lt;br&gt;ChemLAB 390&lt;br&gt;Example Problem 370&lt;br&gt;MiniLAB 378&lt;br&gt;Practice Problems 371&lt;br&gt;Table 1 369&lt;br&gt;<strong>Teacher Wraparound Edition:</strong>&lt;br&gt;As 374; CJ 369; DI 286; ICE 370; QD 285, 374</td>
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<tr>
<td><strong>CHE.6.5</strong> Plan and conduct a controlled scientific investigation to produce mathematical evidence that mass is conserved. Use percent error to analyze the accuracy of results.</td>
<td><strong>Student Edition:</strong>&lt;br&gt;ChemLAB 390&lt;br&gt;MiniLAB 378</td>
</tr>
<tr>
<td><strong>CHE.6.6</strong> Use mathematics and computational analysis to support the concept of percent yield and limiting reagent.</td>
<td><strong>Student Edition:</strong>&lt;br&gt;Chapter 11 Assessment 394-395&lt;br&gt;Data Analysis LAB 387&lt;br&gt;Example Problem 382-383, 386&lt;br&gt;Practice Problem 383, 387&lt;br&gt;<strong>Teacher Wraparound Edition:</strong>&lt;br&gt;As 383; CU 388; DI 381; ICE 382, 386; IM 380; QD 386; Re 388</td>
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<tr>
<td><strong>CHE.6.7</strong> Plan and conduct a controlled scientific investigation to produce mathematical evidence to predict and confirm the limiting reagent and percent yield in the reaction. Analyze quantitative data, draw conclusions, and communicate findings. Compare and analyze class data for validity.</td>
<td><strong>Teacher Wraparound Edition:</strong>&lt;br&gt;CP 380; De 382-383; Ext 384</td>
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<tr>
<td>CHE.7 Gas Laws</td>
<td>CHE.7 Students will demonstrate an understanding of the structure and behavior of gases.</td>
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</table>
| **CHE.7.1** Analyze the behavior of ideal and real gases in terms of pressure, volume, temperature, and number of particles. | **Student Edition:**
| | *Concepts in Motion* 447
| | *Figure* 1 442
| | *Figure* 2 445
| | *Figure* 3 447
| | *Table* 1 451
| | *Virtual Investigations* 449
| | **Teacher Wraparound Edition:**
| | As 453; De 442-443; Di 455; Im 447; Qd 454, 455; R 452 |
| **CHE.7.2 Enrichment:** Use an engineering design process to develop models (e.g., online simulations or student interactive activities) to explain and predict the behavior of each state of matter using the movement of particles and intermolecular forces to explain the behavior of matter.* | The following lessons can be used to introduce the design process.
| **Student Edition:**
| | Chapter 12 Lessons 1-3
| | Students build models of phases/kinetic motion and crystalline structures.
| | **Teacher Wraparound Edition:**
| | BM 415; Di 421 |
| **CHE.7.3** Analyze and interpret heating curve graphs to explain the energy relationship between states of matter (e.g., thermochemistry-water heating from -20°C to 120°C). | **Student Edition:**
| | **Problem-Solving LAB** 531 |
| **CHE.7.4** Use mathematical computations to describe the relationships comparing pressure, temperature, volume, and number of particles, including Boyle’s law, Charles’s law, Dalton’s law, combined gas laws, and ideal gas laws. | **Student Edition:**
| | *Example Problem* 409, 443, 446, 448, 450, 453, 455
| | *Personal Tutor* 409, 449
| | *Practice Problems* 409, 443, 446, 448, 450, 453, 455
| | *Problem-Solving Strategies* 458
| | *Table* 1 451
| | **Teacher Wraparound Edition:**
| | As 448, 451, 454, 456; Di 445, 449, 455; ICE 409, 443, 446, 448, 450, 453, 455
| CHE.7.5 Enrichment: Use an engineering design process and online simulations or lab investigations to design and model the results of controlled scientific investigations to produce mathematical evidence that confirms the gas-laws relationships.* | Teacher Wraparound Edition:  
Student Edition:  
Teacher Wraparound Edition:  
Student Edition:  
Example Problem 461, 462-463  
Figure 10 460  
Practice Problems 463  
Student Edition:  
Chapter 12 Lesson 3 |
|---|---|
| CHE.6 Use the ideal gas law to support the prediction of volume, mass, and number of particles produced in chemical reactions (i.e., gas stoichiometry). | CHE.7.6 Use the ideal gas law to support the prediction of volume, mass, and number of particles produced in chemical reactions (i.e., gas stoichiometry).  
Student Edition:  
460-461, 464  
Example Problem 461, 462-463  
Figure 10 460  
Practice Problems 463  
Teacher Wraparound Edition:  
CD 461; CU 464; DI 460; Ext 464; ICE 461, 463; Re 464 |
| CHE.7.7 Plan and conduct controlled scientific investigations to produce mathematical evidence that confirms that reactions involving gases conform to the law of conservation of mass. | CHE.7.7 Plan and conduct controlled scientific investigations to produce mathematical evidence that confirms that reactions involving gases conform to the law of conservation of mass.  
Student Edition:  
ChemLAB 466  
Inquiry Extension 466  
Teacher Wraparound Edition:  
QD 462 |
| CHE.7.8 Enrichment: Using gas stoichiometry, calculate the volume of carbon dioxide needed to inflate a balloon to occupy a specific volume. Use the engineering design process to design, construct, evaluate, and improve a simulated air bag.* | The following lesson can be used to introduce the design process.  
Student Edition:  
Chapter 12 Lesson 3 |
| CHE.8 Solutions  
Conceptual Understanding: Solutions exist as solids, liquids, or gases. Solution concentration is expressed by specifying relative amounts of solute to solvent.  
CHE.8 Students will demonstrate an understanding of the nature of properties of various types of chemical solutions. |  
CHE.8.1 Use mathematical and computational analysis to quantitatively express the concentration of solutions using the concepts such as molarity, percent by mass, and dilution.  
Student Edition:  
Chapter 14 Assessment 508-509 #67-#85  
Example Problem 481, 483, 486  
Practice Problems 481, 483, 486  
Section 2 Review 488 #33  
Teacher Wraparound Edition:  
ICE 481, 483, 486 |
| CHE.8.2 Develop and use models (e.g., online simulations, games, or video representations) to explain the dissolving process in solvents on the molecular level. | CHE.8.2 Develop and use models (e.g., online simulations, games, or video representations) to explain the dissolving process in solvents on the molecular level.  
Student Edition:  
Concepts in Motion 490 |

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College- and Career-Readiness Standards for Science
Chemistry

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Chemistry: Matter & Change
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| **CHE.8.3** Analyze and interpret data to predict the effect of temperature and pressure on solids and gases dissolved in water. | Teacher Wraparound Edition:  
As 496; De 492-493; Ext 496; VL 494 |
| **CHE.8.4** Design, conduct, and communicate the results of experiments to test the conductivity of common ionic and covalent compounds in solution. | Student Edition:  
Inquiry Extension 230 |
| **CHE.8.5** Use mathematical and computational analysis to analyze molarity, molality, dilution, and percentage dilution problems. | Student Edition:  
Chapter 14 Assessment 508 #67-#77  
Example Problem 483, 486, 487  
Personal Tutor 487  
Practice Problems 483, 486, 487  
Teacher Wraparound Edition:  
As 485; ICE 483, 487; R 487 |
| **CHE.8.6** Design, conduct, and communicate the results of experiments to produce a specified volume of a solution of a specific molarity, and dilute a solution of a known molarity. | Teacher Wraparound Edition:  
As 485; QD 484 |
| **CHE.8.7** Use mathematical and computational analysis to predict the results of reactions using the concentration of solutions (i.e., solution stoichiometry). | This standard can be introduced with classroom discussion and information on stoichiometry. |
| **CHE.8.8 Enrichment:** Investigate parts per million and/or parts per billion as it applies to environmental concerns in your geographic region, and reference laws that govern these factors. | Teacher Wraparound Edition:  
CD 486-487; CP 485; Ext 488 |
| **CHE.9 Acids and Bases (Enrichment)** | |
| **CHE.9 Enrichment:** Students will understand the nature and properties of acids, bases, and salt solutions. | |
| **CHE.9.1 Enrichment:** Analyze and interpret data to describe the properties of acids, bases, and salts. | Student Edition:  
Section 1 Review 643 #6  
Virtual Investigations 616  
Teacher Wraparound Edition:  
CU 643; Ext 637; MI 634; QD 634, 635, 638 |
| **CHE.9.2 Enrichment:** Analyze and interpret data to identify differences between strong and weak acids and bases (i.e., dissociation). | Student Edition:  
MiniLAB 648  
Teacher Wraparound Edition:  
CB 644; CP 647; CU 649; DI 645; MI 644; Re 649 |
| **CHE.9.3 Enrichment:** Plan and conduct investigations using the pH scale to classify acid and base solutions. | Student Edition:  
ChemLAB 670 |
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| **CHE.9.4 Enrichment:** Analyze and evaluate the Arrhenius, Bronsted-Lowry, and Lewis acid-base definitions. | **Student Edition:** 637-643  
Figure 7 639  
Figure 9 640  
**Teacher Wraparound Edition:** As 639; De 640-641; DI 639, 642; Re 643 |
| **CHE.9.5 Enrichment:** Use mathematical and computational thinking to calculate pH from the hydrogen-ion concentration. | **Student Edition:** Example Problem 653, 654  
Practice Problems 653, 654  
Section 3 Review 658 #42  
**Teacher Wraparound Edition:** ICE 653, 654 |
| **CHE.9.6 Enrichment:** Obtain, evaluate, and communicate information about how buffers stabilize pH in acid-base reactions. | **Student Edition:** Problem-Solving LAB 668  
**Teacher Wraparound LAB:** As 667; De 666-667; QD 666 |
| **CHE.10 Thermochemistry (Enrichment)** | **CHE.10 Enrichment:** Students will understand that energy is exchanged or transformed in all chemical reactions. |
| **CHE.10.1 Enrichment:** Construct explanations to explain how temperature and heat flow in terms of the motion of molecules (or atoms). | **Student Edition:** 526-528, 530-531  
Concepts in Motion 530  
Figure 8 527  
Figure 9 528  
Figure 10 530  
**Teacher Wraparound Edition:** CP 526; CU 528; DI 525; Ext 533; MC 527; QD 530 |
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| **CHE.10.2 Enrichment:** Classify chemical reactions and phase changes as exothermic or endothermic based on enthalpy values. Use a graphical representation to illustrate the energy changes involved. | Student Edition:  
530-531  
Chapter 15 Assessment 553 #90-#91  
ChemLAB 550  
Example Problem 536  
Figure 8 527  
Figure 9 528  
Figure 10 530  
Figure 13 535  
Practice Problem 537  
Section 2 Review 528 #17  
Teacher Wraparound Edition:  
CD 527; DI 525; MC 527 |
| **CHE.10.3 Enrichment:** Analyze and interpret data from energy diagrams and investigations to support claims that the amount of energy released or absorbed during a chemical reaction depends on changes in total bond energy. | Student Edition:  
540  
ChemLAB 550  
Example Problem 540  
Practice Problem 541  
Teacher Wraparound Edition:  
ICE 540 |
| **CHE.10.4 Enrichment:** Use mathematical and computational thinking to solve problems involving heat flow and temperature changes, using known values of specific heat and latent heat of phase change. | Student Edition:  
Example Problem 525  
MiniLAB 526  
Practice Problems 525  
Section 2 Review 528 #21 |
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<tr>
<td>CHE.11 Equilibrium (Enrichment)</td>
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<td>CHE.11 Enrichment: Students will understand that chemical equilibrium is a dynamic process at the molecular level.</td>
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**CHE.11.1 Enrichment:** Construct explanations to explain how to use Le Chatelier’s principle to predict the effect of changes in concentration, temperature, and pressure.

**Student Edition:**
- 607-610
- Chapter 17 Assessment 626 #54-#57
- Concepts in Motion 610
- Figure 12 608
- Figure 13 609
- Figure 14 & 15 610
- MiniLAB 611
- Section 1 Review 605 #12
- Section 2 Review 611

**Teacher Wraparound Edition:**
- AC 609; As 609; CB 612; Ext 610; QD 607; Re 610

**CHE.11.2 Enrichment:** Predict when equilibrium is established in a chemical reaction.

**Student Edition:**
- Extended Response 631 #13-#14
- Figure 2 595
- Figure 3 596

**Teacher Wraparound Edition:**
- VL 595, 596

**CHE.11.3 Enrichment:** Use mathematical and computational thinking to calculate an equilibrium constant expression for a reaction.

**Student Edition:**
- Example Problem 603, 605
- Practice Problem 603, 605
- Section 1 Review 605 #11

**Teacher Wraparound Edition:**
- As 605; ICE 603, 604; QD 603
<table>
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<th>Standards</th>
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<td>CHE.12 Organic Nomenclature (Enrichment)</td>
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<tr>
<td>CHE.12 Enrichment: Students will understand that the bonding characteristics of carbon allow the formation of many different organic molecules with various sizes, shapes, and chemical properties.</td>
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| **CHE.12.1 Enrichment:** Construct explanations to explain the bonding characteristics of carbon that result in the formation of basic organic molecules. | **Student Edition:**  
Chapter 21 Assessment 778 #40  
Concepts in Motion 765  
Figure 4 & 5 746  
Figure 9 752  
Figure 10 755  
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**Teacher Wraparound Edition:**  
BM 766; CU 749; DI 751, 765; LL 742; MI 744, 765; VL 752 |
| **CHE.12.2 Enrichment:** Obtain information to communicate the system used for naming the basic linear hydrocarbons and isomers that contain single bonds, simple hydrocarbons with double and triple bonds, and simple molecules that contain a benzene ring. | **Student Edition:**  
751-753  
Chapter 21 Assessment 778-780  
Example Problem 754-755, 756-757, 761, 773  
Figure 5 746  
Figure 10 755  
Figure 12 & 13 760  
Practice Problems 755, 757, 761, 773  
Section 2 Review 758 #13  
Section 3 Review 764 #21  
Table 2 751  
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**Teacher Wraparound Edition:**  
As 751; DI 756; ICE 755, 757, 761, 773; IM 754; MI 759; R 753; VL 752 |
| **CHE.12.3 Enrichment:** Develop and use models to identify the functional groups that form the basis of alcohols, ketones, ethers, amines, esters, aldehydes, and organic acids. | **Teacher Wraparound Edition:**  
As 801; DI 797 |