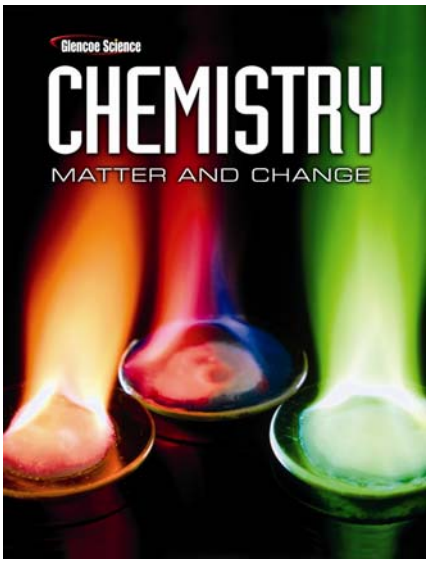
Glencoe

2010 Science Framework
Chemistry

Mississippi



CHEMISTRY
MATTER AND CHANGE

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STANDARDS	PAGE REFERENCES
INQUIRY	
1. Apply inquiry-based and problem-solving processes and skills to scientific investigations.	
a. Use current technologies such as CD-ROM, DVD, Internet, and on-line data search to explore current research related to a specific topic. (DOK 3)	**Student Edition:** *Concepts in Motion* 11, 33, 110, 114, 262, 263, 290, 416, 479, 530, 787, 882 **Teacher Wraparound Edition:** CIM 618; CJ 876; GT 111, 192, 241, 489; VLa 180, 709; ViL 377, 538
b. Clarify research questions and design laboratory investigations. (DOK 3)	**Student Edition:** *CHEMLAB* 310 *DATA ANALYSIS LAB* 478 *Inquiry Extension* 92, 230, 432, 550, 670, 816 *Launch Lab* 69, 707 **Teacher Wraparound Edition:** A 345, 405, 427, 524; DAL 478; DI 294, 407, 415, 450; Ex 14
c. Demonstrate the use of scientific inquiry and methods to formulate, conduct, and evaluate laboratory investigations (e.g., hypotheses, experimental design, observations, data analyses, interpretations, theory development). (DOK 3)	**Student Edition:** *DATA ANALYSIS LAB* 478 *Launch Lab* 707 **Teacher Wraparound Edition:** A 405, 524, 660; CJ 81; DAL 478; DI 407, 450; Ex 14

Codes used for Teacher Wraparound Edition pages are the initial caps of headings on that page.

STANDARDS	PAGE REFERENCES
d. Organize data to construct graphs (e.g., plotting points, labeling x-and y-axis, creating appropriate titles and legends for circle, bar, and line graphs), draw conclusions, and make inferences. (DOK 3)	**Student Edition:** *CHEMLAB* 60 *DATA ANALYSIS LAB* 408 *Problem-Solving Lab* 180, 294, 531 *Mini Lab* 873 **Teacher Wraparound Edition:** A 188, 294; MC 191
e. Evaluate procedures, data, and conclusions to critique the scientific validity of research. (DOK 3)	**Student Edition:** *CHEMLAB* 24, 60, 92, 126, 196, 310, 550 **Teacher Wraparound Edition:** CP 267; D 112-113
f. Formulate and revise scientific explanations and models using logic and evidence (data analysis). (DOK 3)	**Student Edition:** *CHEMLAB* 60, 196, 310, 466, 698, 850 *Inquiry Extension* 584, 816, 892 *Problem-Solving Lab* 531 **Teacher Wraparound Edition:** CJ 89; D 112-113
g. Collect, analyze, and draw conclusions from data to create a formal presentation using available technology (e.g.,computers, calculators, SmartBoard, CBL's, etc.) (DOK 3)	**Student Edition:** *Inquiry Extension* 892 **Teacher Wraparound Edition:** CP 188, 729, 872
Physical Science	
2. Demonstrate an understanding of the atomic model of matter by explaining atomic structure and chemical bonding.	
a. Describe and classify matter based on physical and chemical properties and interactions between molecules or atoms. (DOK 1) • Physical properties (e.g., melting points, densities, boiling points) of a variety of substances	**Student Edition:** 73-75 *CHEMLAB* 92, 432 *Figure 12.1* 402 *Mini Lab* 39 *Table 12.5* 422 **Teacher Wraparound Edition:** CP 70; D 76-77; DI 72; E 421; Ex 427; IM 73; Re 83
• Substances and mixtures	**Student Edition:** 70, 80-82 *CHEMLAB* 92 *Mini Lab* 82 *Section 3.3 Assessment* 83 **Teacher Wraparound Edition:** A 80; CP 82; CU 83; DI 80; MI 80; Re 83

STANDARDS	PAGE REFERENCES
• Three states of matter in terms of internal energy, molecular motion, and the phase transitions between them	**Student Edition:** 71-72, 402-403, 415-418, 420-428 *Concepts in Motion* 72 *Figure 3.2 & 3.3* 71 *Figure 3.4* 72 **Teacher Wraparound Edition:** A 71, 429; CJ 417, 425; DI 71; MI 425; UST 428
b. Research and explain crucial contributions and critical experiments of Dalton, Thomson, Rutherford, Bohr, de Broglie, and Schrődinger and describe how each discovery contributed to the current model of atomic and nuclear structure. (DOK 2)	**Student Edition:** 106-113, 146-150, 152 *Figure 4.6* 107 *Figure 4.9* 110 *Figure 5.15* 152 *Table 4.2* 104 **Teacher Wraparound Edition:** CJ 110; De 106-107, 112-113; DI 104; Ex 104; GT 104
c. Develop a model of atomic and nuclear structure based on theory and knowledge of fundamental particles. (DOK 2) • Properties and interactions of the three fundamental particles of the atom	**Student Edition:** 114, 146-150 *Figure 4.14* 114 *Figure 5.10* 146 *Figure 5.15* 152 *Figure 5.17* 154 **Teacher Wraparound Edition:** A 147; CB 149; CP 153; DI 115, 146; Ex 114
• Laws of conservation of mass, constant composition, definite proportions, and multiple proportions	**Student Edition:** 77, 87-90, 369 *Example and Practice Problems* 370-371 *Section 3.4 Assessment* 90 **Teacher Wraparound Edition:** A 374; CB 89; CJ 78, 369; CP 78, 88; ICE 370

STANDARDS	PAGE REFERENCES
d. Write appropriate equations for nuclear decay reactions, describe how the nucleus changes during these reactions, and compare the resulting radiation with regard to penetrating ability. (DOK 1) • Three major types of radioactive decay (e.g., alpha, beta, gamma) and the properties of the emissions (e.g., composition, mass, charge, penetrating power)	**Student Edition:** 123-124, 862-864, 866-869, 875-883 *Example & Practice Problems* 869 *Figure 24.3* 862 *Figure 24.4* 863 *Figure 24.8* 867 *Figure 24.9* 868 *Section 24.1 Assessment* 864 *Table 24.3* 868 **Teacher Wraparound Edition:** A 863, 867, 868; CU 864; DI 862, 863; Ex 874; ICE 869; R 863
• The concept of half-life for a radioactive isotope (e.g., carbon-14 dating) based on the principle that the decay of any individual atom is a random process	**Student Edition:** 870-871, 873-874 *Connection to Biology* 873 *Connection to Earth Science* 874 *Example & Practice Problems* 872 *Figure 24.11* 871 *Mini Lab* 873 *Table 24.4* 871 **Teacher Wraparound Edition:** A 871; Ex 871; ICE 872; GT 871; VLa 873
e. Compare the properties of compounds according to their type of bonding. (DOK 1) • Covalent, ionic, and metallic bonding	**Student Edition:** 210-217, 225-228, 241-247 *Figure 7.7* 213 *Figure 7.9* 215 *Figure 7.11* 225 *Figure 7.12* 226 *Figure 8.2* 241 *Figure 8.9* 246 *Mini Lab* 227, 242 *Table 7.4* 211 **Teacher Wraparound Edition:** CJ 214, 241; DI 211; E 246; GT 241; MC 214; MI 240; QD 240; Re 270

STANDARDS	PAGE REFERENCES
• Polar and non-polar covalent bonding	**Student Edition:** 266-270 *Concepts in Motion* 267 *How It Works* 271 *Section 8.5 Assessment* 270 *Table 8.7* 266 **Teacher Wraparound Edition:** A 267, 270; CIM 267; CJ 241, 267; IM 266; QD 267; TS 271
• Valence electrons and bonding atoms	**Student Edition:** 206-207, 258-259 *Example & Practice Problems* 255-257, 260 *Figure 7.3 208* *Figure 8.16 & 8.17* 259 *Problem-Solving Strategy* 254 **Teacher Wraparound Edition:** CD 254; DI 258; Ex 259; ICE 255, 256; VL 259
f. Compare different types of intermolecular forces and explain the relationship between intermolecular forces, boiling points, and vapor pressure when comparing differences in properties of pure substances. (DOK 1)	**Student Edition:** 269-270, 411-414, 417, 427 *Figure 12.9* 412 *Figure 12.10 & 12.11* 413 *Figure 12.30* 430 *Table 12.2* 411 *Table 12.3* 414 **Teacher Wraparound Edition:** A 270, 412; AC 413; CJ 417; CP 412; CU 270, 414; DI 411; MI 411; QD 411; Re 270, 414
g. Develop a three-dimensional model of molecular structure. (DOK 2) • Lewis dot structures for simple molecules and ionic compounds	**Student Edition:** *CHEMLAB* 272 *Example & Practice Problems* 244, 256 *Table 7.4* 211 **Teacher Wraparound Edition:** BM 243; CU 247, 259; DI 211, 246; ICE 244; VL 252

STANDARDS	PAGE REFERENCES
• Valence shell electron pair repulsion theory (VSEPR)	**Student Edition:** 261-262 *CHEMLAB* 272 *Concepts in Motion* 263 *Example & Practice Problems* 264 *Figure 8.19* 262 *Table 8.6* 263 **Teacher Wraparound Edition:** A 263; CM 263; Ex 262; MC 262; MI 261; QD 261; Re 263; VLa 261
3. Develop an understanding of the periodic table.	
a. Calculate the number of protons, neutrons, and electrons in individual isotopes using atomic numbers and mass numbers, write electron configurations of elements and ions following the Aufbau principle, and balance equations representing nuclear reactions. (DOK 1)	**Student Edition:** 115, 117, 123-124, 177, 182-185 *Example & Practice Problems* 116, 118, 186 *Figure 6.3* 177 *Figure 6.8* 183 *Periodic Table* 178-179 *Table 6.3* 182 **Teacher Wraparound Edition:** A 117; DI 123; ICE 116, 186; Re 124, 186
b. Analyze patterns and trends in the organization of elements in the periodic table and compare their relationship to position in the periodic table. (DOK 2) • Atomic number, atomic mass, mass number, and number of protons, electrons, and neutrons in isotopes of elements	**Student Edition:** 117, 182-185, 187-194 *CHEMLAB* 126 *Example & Practice Problems* 118 *Figure 4.15* 115 *Figure 4.17* 117 *Figure 6.8* 183 *Figure 6.11 & 6.12* 188 *Figure 6.14* 190 *Problem-Solving Lab* 180 **Teacher Wraparound Edition:** A 117, 190; CD 115, 187; D 190; ICE 118; MC 191
• Average atomic mass calculations	**Student Edition:** 119-120 *CHEMLAB* 126 *Example & Practice Problems* 121 *Mini Lab* 120 **Teacher Wraparound Edition:** CU 121; ICE 121; R 119; Re 121

STANDARDS	PAGE REFERENCES
• Chemical characteristics of each region	**Student Edition:** 177, 180-181 *CHEMLAB* 196 *Figure 6.8* 183 *Figure 6.12* 188 *Figure 6.14* 190 *Figure 6.15* 191 *Periodic Table of the Elements* 178-179 *Section 6.3 Assessment* 194 **Teacher Wraparound Edition:** A 179, 183; CD 182; CJ 184, 189; D 191; R 179; Re 194
• Periodic properties (e.g., metal/nonmetal/metalloid behavior, electrical/heat conductivity, electronegativity, electron affinity, ionization energy, atomic/covalent/ionic radius)	**Student Edition:** 180-185, 188-194 *CHEMLAB* 196 *Figure 6.8* 183 *Figure 6.11* 188 *Figure 6.16* 191 *Figure 6.17* 193 *Figure 6.18* 194 **Teacher Wraparound Edition:** CD 182, 187; CU 186, 194; D 190-191; MC 191; QD 192; VL 192
c. Classify chemical reactions by type. (DOK 2) • Single displacement, double displacement, synthesis (combination), decomposition, disproportionation, combustion, or precipitation.	**Student Edition:** 289-294, 296-298, 300-301 *Example & Practice Problems* 295 *Figure 9.10* 291 *Mastering Problems* 313 #81-#82 *Practice Problems* 291, 292 *Table 9.4* 298 **Teacher Wraparound Edition:** CB 292; CP 289, 292; MI 289; QD 300; R 298
• Products (given reactants) or reactants (given products) for each reaction type	**Student Edition:** 300-301 *Chapter 9 Assessment* 313 #85, #87, #88 *Example & Practice Problems* 295, 302, 304, 306 *Practice Problems* 297 **Teacher Wraparound Edition:** A 307; CP 292; Ex 298; ICE 295, 302, 304, 306

STANDARDS	PAGE REFERENCES
• Solubility rules for precipitation reactions and the activity series for single and double displacement reactions	**Student Edition:** 293, 300-301 *CHEMLAB* 310 *Figure 9.13* 293 *Reference Tables* 974 *Table 9.3* 297 **Teacher Wraparound Edition:** A 294; CJ 293; DI 294; PSL 294; QD 293
d. Use stoichiometry to calculate the amount of reactants consumed and products formed. (DOK 3) • Difference between chemical reactions and chemical equations	**Student Edition:** 369, 460-462 *Example & Practice Problems* 370-371, 375-377, 461-463 *Mastering Concepts* 312 #58 *Mini Lab* 378 *Problem-Solving Strategy* 374 *Section 11.2 Assessment* 378 *Table 11.1* 369 **Teacher Wraparound Edition:** A 371, 374; CU 377; DI 368; Ex 377; ICE 375, 376, 377
• Formulas and calculations of the molecular (molar) masses	**Student Edition:** 333-340 *Example & Practice Problems* 334, 336-339 *Figure 10.11* 340 *Section 10.3 Assessment* 340 *Supplemental Practice Problems* 981 **Teacher Wraparound Edition:** A 336, 339; CJ 339; CU 340; DI 334; ICE 337; MI 333
• Empirical formula given the percent composition of elements	**Student Edition:** 344 *Example & Practice Problems* 345-346 *Figure 10.15* 347 *Supplemental Practice Problems* 982 **Teacher Wraparound Edition:** A 348; CD 344; CU 349; ICE 345, 348, 349; Re 349; VL 346

STANDARDS	PAGE REFERENCES
• Molecular formula given the empirical formula and molar mass	**Student Edition:** 346-347 *Example & Practice Problems* 348-349 *Figure 10.15* 347 *Supplemental Practice Problems* 982 **Teacher Wraparound Edition:** A 348; CU 349
4. Analyze the relationship between microscopic and macroscopic models of matter.	
a. Analyze the nature and behavior of gaseous, liquid, and solid substances using the kinetic molecular theory. (DOK 3)	**Student Edition:** 402-404, 415-418, 420 *Figure 12.1* 402 *Figure 12.3* 404 *Figure 12.19* 420 **Teacher Wraparound Edition:** A 409; CB 420; CJ 405; CU 424; DI 402; E 421; GT 402
b. Use the ideal gas laws to explain the relationships between volume, temperature, pressure, and quantity in moles. (DOK 2) • Difference between ideal and real gas	**Student Edition:** 454, 457-459 *Figure 13.8* 458 *Section 13.2 Assessment* 459 #33-34 **Teacher Wraparound Edition:** DI 455; E 443; VL 459
• Assumptions made about an ideal gas	**Student Edition:** 454, 457-459 *Section 13.2 Assessment* 459 #33 **Teacher Wraparound Edition:** DI 455; IM 447; MI 452
• Conditions that favor an ideal gas	**Student Edition:** 452, 454, 457-459 *Section 13.2 Assessment* 459 #34 **Teacher Wraparound Edition:** MI 452
c. Use the gas laws of Boyles, Charles, Gay-Lussac, and Dalton to solve problems based on the laws. (DOK 2)	**Student Edition:** 408-410, 442-445, 447, 449 *Example & Practice Problems* 409, 443, 446, 448, 450 *Problem-Solving Strategy* 458 **Teacher Wraparound Edition:** A 409; DI 449; GT 458; ICE 409, 443, 446

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d. Explain the thermodynamics associated with physical and chemical concepts related to temperature, entropy, enthalpy, and heat energy. (DOK 2) • Specific heat as it relates to the conservation of energy	**Student Edition:** 516-519, 525-531, 533 *Connection to Biology* 532 *Figure 15.8* 527 *Figure 15.9* 528 **Teacher Wraparound Edition:** A 525; CD 516; CU 528; MI 516; Re 528
• Amount of heat absorbed or released in a process, given mass, specific heat, and temperature change	**Student Edition:** 520 *CHEMLAB* 550 *Example & Practice Problems* 525, 532 *Mini Lab* 526 **Teacher Wraparound Edition:** DI 531; ICE 521, 532; IM 520
• Energy (in calories and joules) required to change the state of a sample of a given substance, using its mass and its heat of vaporization or heat of fusion.	**Student Edition:** 530-531 *Concepts in Motion* 530 *Figure 15.10* 530 *Supplemental Practice Problem* 986 #7, #8 **Teacher Wraparound Edition:** ICE 532
• Endothermic or exothermic changes	**Student Edition:** 247, 527-528, 564-565 *Figure 15.8* 527 *Figure 15.9* 528 *Section 15.3 Assessment* 533 #31 **Teacher Wraparound Edition:** A 532; CU 533; MC 527; QD 518, 530
e. Describe and identify factors affecting the solution process, rates of reaction, and equilibrium. (DOK 2) • Concentration of a solution in terms of its molarity, using stoichiometry to perform specified dilutions	**Student Edition:** 480-482, 485 *Chapter 14 Assessment* 508 #76-#79 *Example & Practice Problems* 483, 486 **Teacher Wraparound Edition:** A 485; ICE 483, 486

STANDARDS	PAGE REFERENCES
• Chemical reaction rates affected by temperature, concentration, surface area, pressure, mixing, and the presence of a catalyst	**Student Edition:** 492-496, 568-573 *CHEMLAB* 506 *Mini Lab* 571 *Section 16.2 Assessment* 573 *Table 14.4* 494 **Teacher Wraparound Edition:** A 494, 496; CB 564; CJ 494; D 492-493, 568-569; DI 571-572; MI 568; QD 569; Re 573; VL 494, 495
• Relationship of solute character	**Student Edition:** 489-492 *Concepts in Motion* 490 *Figure 14.10* 490 *Figure 14.12* 491 *Section 14.3 Assessment* 497 #40-#41 *Table 14.4* 494 **Teacher Wraparound Edition:** A 489; AC 491; CD 492; GT 489; MI 489; VL 494
• LeChatelier's Principle	**Student Edition:** 606-611, 651, 662 *Chapter 17 Assessment* 626 #50-#57 *CHEMLAB* 624 *Figure 17.11* 608 *Mini Lab* 611 *Section 17.2 Assessment* 611 *Section 18.3 Assessment* 658 #38 **Teacher Wraparound Edition:** A 493; DI 609; R 606; VL 608
5. Compare factors associated with acid/base and oxidation/reduction reactions.	
a. Analyze and explain acid/base reactions. (DOK 2) • Properties of acids and bases, including how they affect indicators and the relative pH of the solution	**Student Edition:** 634-635, 652-653 *Figure 18.3* 636 *Figure 18.23* 662 *Launch Lab* 633 *Section 18.1 Assessment* 643 #6 **Teacher Wraparound Edition:** CB 662; CP 636; Ex 637; QD 634, 635, 652

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• Formation of acidic and basic solutions	**Student Edition:** 636-642 *Figure 18.7* 639 *Figure 18.9* 640 **Teacher Wraparound Edition:** A 643; CD 638; D 640-641; DI 642; Ex 637; GT 640; R 637, 639
• Definition of pH in terms of the hydronium ion concentration and the hydroxide ion concentration	**Student Edition:** 650-651 *Figure 18.3* 636 *Figure 18.13* 650 *Figure 18.14* 652 *Figure 18.15* 653 *Figure 18.22* 661 *Section 18.3 Assessment* 658 #35 **Teacher Wraparound Edition:** A 654; CB 650; MI 650
• The pH or pOH from the hydrogen ion or hydroxide ion concentrations of solution	**Student Edition:** 650 *Example & Practice Problems* 651, 653-655 *Section 18.3 Assessment* 658 **Teacher Wraparound Edition:** A 654; CU 658; DI 652, 657; ICE 651, 653, 655; Re 658
• How a buffer works and examples of buffer solutions	**Student Edition:** 666-667 *Problem-Solving Lab* 668 *Table 18.7* 667 **Teacher Wraparound Edition:** A 667; D 666-667; Ex 667; QD 666; Re 667
b. Classify species in aqueous solutions according to the Arrhenius and Bronsted-Lowry definitions, respectively and predict products for aqueous neutralization reactions. (DOK 2)	**Student Edition:** 637-639, 659-660 *Figure 18.7* 639 *Practice Problems* 640 **Teacher Wraparound Edition:** A 639; CD 659; GT 640; MI 659; R 639; Re 643

STANDARDS	PAGE REFERENCES
c. Analyze a reduction/oxidation reaction (REDOX) to assign oxidation numbers (states) to reaction species and identify the species oxidized and reduced, the oxidizing agent, and reducing agent. (DOK 2)	**Student Edition:** 680-684, 688-689 *Example & Practice Problems* 685 *Figure 19.4* 684 *Mini Lab* 683 *Table 19.1* 683 **Teacher Wraparound Edition:** A 682; CD 684; CU 688; ICE 685; IM 681; MI 680; Re 688