

GLENCOE CORRELATION
CHEMISTRY: MATTER AND CHANGE
NEW JERSEY
 Core Curriculum Content Standards for Science
 Grade 12

STANDARDS	PAGE REFERENCES
STANDARD 5.1 (SCIENTIFIC PROCESSES) ALL STUDENTS WILL DEVELOP PROBLEM-SOLVING, DECISION-MAKING AND INQUIRY SKILLS, REFLECTED BY FORMULATING USABLE QUESTIONS AND HYPOTHESES, PLANNING EXPERIMENTS, CONDUCTING SYSTEMATIC OBSERVATIONS, INTERPRETING AND ANALYZING DATA, DRAWING CONCLUSIONS, AND COMMUNICATING RESULTS.	
Building upon knowledge and skills gained in the preceding grades, by the end of Grade 12, students:	
A. Habits of Mind	
1. When making decisions, evaluate conclusions, weigh evidence, and recognize that arguments may not have equal merit.	SE: 10-13 <i>Chemistry and Society</i> 80, 482 <i>Chemistry and Technology</i> 768 <i>ChemLab</i> 46-47, 410-411, 550-551 <i>Problem-Solving Lab</i> 130, 191, 583, 860
2. Assess the risks and benefits associated with alternative solutions.	SE: 3-6, 828-831 <i>Chemistry and Society</i> 482, 834 <i>Chemistry and Technology</i> 344, 690 <i>Everyday Chemistry</i> 730 <i>Problem-Solving Lab</i> 44, 390, 860
3. Engage in collaboration, peer review, and accurate reporting of findings.	SE: 10-15, 36-41, 129-134, 893-896 <i>Chemistry and Society</i> 20, 110 <i>Chemistry and Technology</i> 344, 690, 768 <i>Everyday Chemistry</i> 730
4. Explore cases that demonstrate the interdisciplinary nature of the scientific enterprise.	SE: <i>Chemistry and Society</i> 20, 80, 482 <i>Chemistry and Technology</i> 690, 768 <i>Everyday Chemistry</i> 412 <i>Physics Connection</i> 808 <i>Problem-Solving Lab</i> 647, 679, 860
B. Inquiry and Problem Solving	
1. Select and use appropriate instrumentation to design and conduct investigations.	SE: 118-120, 827-828 <i>Problem-Solving Lab</i> 96, 478 <i>ChemLab</i> 480-481, 626-627, 688-689, 796-797, 832-833, 862-863
2. Show that experimental results can lead to new questions and further investigations.	SE: 92-104, 117-126, 151-158 <i>Chemistry and Society</i> 110 <i>ChemLab</i> 78-79, 170-171, 300-301, 520-521, 626-627, 832-833
C. Safety	
1. Understand, evaluate and practice safe procedures for conducting science investigations.	SE: 14-16 <i>ChemLab</i> 142-143, 300-301, 520-521, 654-655, 728-729, 832-833 <i>Problem-Solving Lab</i> 60, 390, 830

STANDARDS	PAGE REFERENCES
STANDARD 5.2 (SCIENCE AND SOCIETY) ALL STUDENTS WILL DEVELOP AN UNDERSTANDING OF HOW PEOPLE OF VARIOUS CULTURES HAVE CONTRIBUTED TO THE ADVANCEMENT OF SCIENCE AND TECHNOLOGY, AND HOW MAJOR DISCOVERIES AND EVENTS HAVE ADVANCED SCIENCE AND TECHNOLOGY.	
Building upon knowledge and skills gained in the preceding grades, by the end of Grade 12, students:	
A. Cultural Contributions	
1. Recognize the role of the scientific community in responding to changing social and political conditions and how scientific and technological achievement effect historical events.	SE: 824-825, 843-849 <i>Chemistry and Society</i> 20, 80, 110, 482 <i>Chemistry and Technology</i> 588, 690 <i>Problem-Solving Lab</i> 860 TWE: CB 823
B. Historical Perspectives	
1. Examine the lives and contributions of important scientists who effected major breakthroughs in our understanding of the natural and designed world.	SE: 70-71, 89-95, 122-132, 421-426, 806 <i>Biology Connection</i> 14 <i>Chemistry and Technology</i> 588 <i>History Connection</i> 75, 190, 311
2. Discuss significant technological achievements in which science has played an important part as well as technological advances that have contributed directly to the advancement of scientific knowledge.	SE: <i>Chemistry and Society</i> 20, 80, 110 <i>Chemistry and Technology</i> 344, 588, 768 <i>How It Works</i> 144, 204 <i>History Connection</i> 190 <i>Physics Connection</i> 808
3. Describe the historical origin of important scientific developments such as atomic theory, genetics, plate tectonics, etc., showing how scientific theories develop, are tested, and can be replaced or modified in light of new information and improved investigative techniques.	SE: 70-71, 89-95, 118-124, 127-134, 806 <i>Biology Connection</i> 14, 701 <i>Chemistry and Society</i> 20, 110 <i>Chemistry and Technology</i> 344
STANDARD 5.3 (MATHEMATICAL APPLICATIONS) ALL STUDENTS WILL INTEGRATE MATHEMATICS AS A TOOL FOR PROBLEM-SOLVING IN SCIENCE, AND AS A MEANS OF EXPRESSING AND/OR MODELING SCIENTIFIC THEORIES.	
Building upon knowledge and skills gained in the preceding grades, by the end of Grade 12, students:	
A. Numerical Operations	
1. Reinforce indicators from previous grade level.	SE: 27-29, 31-35, 40-42, 75-77, 280-283, 370-373, 421-427, 460-461, 463-470, 887-911
B. Geometry and Measurement	
1. When performing mathematical operations with measured quantities, express answers to reflect the degree of precision and accuracy of the input data.	SE: 31-33, 36-42, 75-77, 122-124, 131-132, 311-312, 322-327, 331-337 <i>ChemLab</i> 46-47 <i>Problem-Solving Lab</i> 314
C. Patterns and Algebra	
1. Apply mathematical models that describe physical phenomena to predict real world events.	SE: 386-392, 421-427, 434-438, 440-443 <i>ChemLab</i> 46-47, 444-445, 480-481 <i>Problem-Solving Lab</i> 130, 314, 830
D. Data Analysis and Probability	
1. Construct and interpret graphs of data to represent inverse and non-linear relationships, and statistical distributions.	SE: 43-45, 421-426 <i>ChemLab</i> 46-47, 480-481, 550-551 <i>MiniLab</i> 539 <i>Problem-Solving Lab</i> 267, 390, 503, 830

STANDARDS	PAGE REFERENCES
STANDARD 5.4 (NATURE AND PROCESS OF TECHNOLOGY) ALL STUDENTS WILL UNDERSTAND THE INTERRELATIONSHIPS BETWEEN SCIENCE AND TECHNOLOGY AND DEVELOP A CONCEPTUAL UNDERSTANDING OF THE NATURE AND PROCESS OF TECHNOLOGY.	
Building upon knowledge and skills gained in the preceding grades, by the end of Grade 12, students:	
A. Science and Technology	
1. Know that scientific inquiry is driven by the desire to understand the natural world and seeks to answer questions that may or may not directly influence humans, while technology is driven by the need to meet human needs and solve human problems.	SE: <i>Chemistry and Society</i> 20, 482, 834 <i>Chemistry and Technology</i> 344, 588, 690 <i>How It Works</i> 204, 376, 522, 656
B. Nature of Technology	
1. Assess the impacts of introducing a new technology in terms of alternative solutions, costs, tradeoffs, risks, benefits and environmental impact.	SE: <i>Chemistry and Society</i> 80, 110 <i>Chemistry and Technology</i> 344, 446, 588, 690, 768 <i>Everyday Chemistry</i> 412, 730 <i>History Connection</i> 190
C. Technological Design	
1. Plan, develop, and implement a proposal to solve an authentic, technological problem.	SE: 14, 844-849, 858-861 <i>Chemistry and Technology</i> 588, 690 <i>ChemLab</i> 46-47, 480-481, 832-833, 862-863 <i>Everyday Chemistry</i> 730
STANDARD 5.6 (CHEMISTRY) ALL STUDENTS WILL GAIN AN UNDERSTANDING OF THE STRUCTURE AND BEHAVIOR OF MATTER.	
Building upon knowledge and skills gained in the preceding grades, by the end of Grade 12, students:	
A. Structure and Properties of Matter	
1. Know that atoms are made of a positive nucleus surrounded by negative electrons and that the nucleus, a tiny fraction of the volume of an atom, is composed of protons and neutrons, each almost 2,000 times more massive than an electron.	SE: 92-97, 100-103, 117-124, 127-131, 135-136, 159-161, 806-812, 815-817, 822-823 TWE: MIN 98
2. Know that the number of protons in the nucleus defines the element.	SE: 98-101, 106-107, 152-155, 810-812, 815-816, 822-823 TWE: AS 156
3. Know that an atom's electron arrangement, particularly the outermost electrons, determines how the atom can interact with other atoms.	SE: 159-162, 211-216, 221-227, 242-247, 263-267 <i>ChemLab</i> 232-233, 300-301 TWE: CD 241 DE 166-167
4. Explain that atoms form bonds (ionic and covalent) with other atoms by transferring or sharing electrons.	SE: 211-216, 242-246, 252-258, 263-267 <i>ChemLab</i> 232-233 TWE: CD 241 CJ 217 DE 248-249
5. Explain how the Periodic Table of Elements reflects the relationship between the properties of elements and their atomic structure.	SE: 70-73, 151-157, 160-161, 163-169, 181-201, 212, 221-222, 263-266

STANDARDS	PAGE REFERENCES
6. Know that many biological, chemical and physical phenomena can be explained by changes in the arrangement and motion of atoms and molecules.	SE: 385-392, 404-408, 419-427, 778-780, 788-791, 850-852, 858-861 <i>Chemistry and Society</i> 20, 482 <i>Everyday Chemistry</i> 798
7. Recognize that the properties of matter are related to the structure and arrangement of their molecules and atoms, such as in metallic and nonmetallic crystals and carbon compounds.	SE: 58-60, 217-220, 228-231, 396-403, 699-701, 711-715, 740-741 <i>Everyday Chemistry</i> 234, 412 <i>How It Works</i> 204 <i>Problem-Solving Lab</i> 267
8. Know that different levels of energy of an atom are associated with different configurations of its electrons.	SE: 125-128, 135-138, 167-169 <i>ChemLab</i> 142-143 <i>How It Works</i> 144 <i>Problem-Solving Lab</i> 130, 219 TWE: AC 132
B. Chemical Reactions	
1. Explain that the rate of reactions among atoms and molecules depends on how often they encounter one another and that the rate is affected by nature of reactants, concentration, pressure, temperature, and the presence of a catalyst.	SE: 532-534, 536-541, 778-779 <i>ChemLab</i> 550-551 <i>Discovery Lab</i> 529 <i>How It Works</i> 552 TWE: AS 542 CU 535
2. Show that some changes in chemical bonds require a net input or net release of energy.	SE: 246-247, 496-500, 506-512, 530-535, 665-666, 673-679, 684-686 <i>ChemLab</i> 520-521, 688-689
STANDARD 5.7 (PHYSICS) ALL STUDENTS WILL GAIN AN UNDERSTANDING OF NATURAL LAWS AS THEY APPLY TO MOTION, FORCES, AND ENERGY TRANSFORMATIONS.	
Building upon knowledge and skills gained in the preceding grades, by the end of Grade 12, students:	
A. Motion and Forces	
1. Apply the mathematical relationship between the mass of an object, the net force exerted on it, and the resulting acceleration.	Note: Newton's Second Law of Motion is not explicitly described in this text, but the reference below deals with a negative acceleration produced by an applied braking force. SE: <i>Problem-Solving Lab</i> 44
2. Explain that whenever one object exerts a force on another, an equal and opposite force is exerted on the first object.	Note: Newton's Third Law is not explicitly discussed in this chemistry text, but it is implicit in the discussions of kinetic-molecular theory and gas pressure. SE: 385-386, 388-392
3. Recognize gravity as a universal force of attraction between masses and that the force is proportional to the masses and inversely proportional to the square of the distance between them.	Note: Gravity is discussed qualitatively in the comparison of mass and weight, and in the function of a barometer. SE: 8, 389

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4. Recognize that electrically charged bodies can attract or repel each other with a force that depends upon the size and nature of the charges and the distance between them and know that electric forces play an important role in explaining the structure and properties of matter.	SE: 92-94, 215-220, 263-266, 393-395 <i>Problem-Solving Lab 267</i>
5. Know that there are strong forces that hold the nucleus of an atom together and that significant amounts of energy can be released in nuclear reactions (fission, fusion, and nuclear decay) when these binding forces are disrupted.	SE: 810-811, 821-826
6. Explain how electromagnetic, gravitational, and nuclear forces can be used to produce energy by causing chemical, physical, or nuclear changes and relate the amount of energy produced to the nature and relative strength of the force.	SE: 489-491, 498-500, 673-679, 792-795, 821-826 <i>Chemistry and Technology 690</i> <i>ChemLab 18-19</i> <i>Everyday Chemistry 730</i> TWE: DE 280-281
7. Demonstrate that moving electric charges can produce magnetic forces and moving magnets can produce electric forces.	Note: Discussion of electric and magnetic forces focuses on their effect on beams of electrons and other particles. SE: 92-93, 106
8. Recognize that magnetic and electrical forces are different aspects of a single electromagnetic force.	Note: Discussion of electric and magnetic forces focuses on their effect on beams of electrons and other particles. SE: 92-93
B. Energy Transformations	
1. Explain how the various forms of energy (heat, electricity, sound, light) move through materials and identify the factors that affect that movement.	SE: 118-121, 491-494, 496-500 <i>How It Works 144, 522</i> TWE: AC 132
2. Explain that while energy can be transformed from one form to another, the total energy of a closed system is constant.	Note: To be complete, the Law of Conservation of Matter must be considered along with the Law of Conservation of Energy. SE: 75, 490, 821-822 TWE: CJ 64
3. Recognize that whenever mechanical energy is transformed, some heat is dissipated and is therefore unavailable for use.	SE: <i>ChemLab 520-521</i> TWE: EN 491, 516
4. Explain the nature of electromagnetic radiation and compare the components of the electromagnetic spectrum from radio waves to gamma rays.	SE: 106-107, 118-124 <i>ChemLab 142-143</i> <i>How It Works 144</i>

Codes Used for TWE Pages

AC	Applying Chemistry
AS	Assessment
CB	Content Background
CD	Concept Development
CJ	Chemistry Journal
CU	Check for Understanding
DE	Demonstration
EN	Enrichment
MIN	Meeting Individual Needs