

GLENCOE CORRELATION
CHEMISTRY: CONCEPTS AND APPLICATIONS
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: 4-11 <i>Chemistry and Society</i> 32, 146, 495 <i>Chemistry and Technology</i> 573, 728-729, 754-755 <i>ChemLab</i> 172-173, 422-423, 650-652 |
| 2. Assess the risks and benefits associated with alternative solutions. | SE: <i>Chemistry and Society</i> 32, 537 <i>Chemistry and Technology</i> 728-729 <i>Earth Science Connection</i> 727 <i>Everyday Chemistry</i> 19, 417, 685 <i>How It Works</i> 468, 569, 614 |
| 3. Engage in collaboration, peer review, and accurate reporting of findings. | SE: 59-65, 230-242 <i>Art Connection</i> 759 <i>Chemistry and Society</i> 32, 146, 495, 537 <i>Chemistry and Technology</i> 216-217, 240-241, 728-729 |
| 4. Explore cases that demonstrate the interdisciplinary nature of the scientific enterprise. | SE: <i>Art Connection</i> 759 <i>Biology Connection</i> 280, 487, 772 <i>Earth Science Connection</i> 524, 727 <i>Health Connection</i> 693 <i>History Connection</i> 141, 271 <i>Physics Connection</i> 566 |
| B. Inquiry and Problem Solving | |
| 1. Select and use appropriate instrumentation to design and conduct investigations. | SE: 789-793 <i>Chemistry and Technology</i> 240-241, 326-327 <i>ChemLab</i> 136-137, 328-329, 542-543, 606-607, 650-652 <i>How It Works</i> 410, 569 |
| 2. Show that experimental results can lead to new questions and further investigations. | SE: <i>Chemistry and Society</i> 32, 146, 537 <i>Chemistry and Technology</i> 424-425, 728-729 <i>ChemLab</i> 8-9, 172-173, 236-237, 560-561, 752-753 |
| C. Safety | |
| 1. Understand, evaluate and practice safe procedures for conducting science investigations. | SE: 839-840 <i>ChemLab</i> 56-57, 136-137, 206-207, 266-267, 504-505, 560-561, 650-652, 722-723 |

| 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: <i>Chemistry and Society</i> 146, 495, 537, 659 <i>Chemistry and Technology</i> 728-729 <i>History Connection</i> 58, 141, 271, 307 <i>Physics Connection</i> 232 |
| 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: 53-55, 61-65, 69-75, 88-94, 198 <i>Chemistry and Technology</i> 216-217 <i>ChemLab</i> 8-9 <i>History Connection</i> 58, 307 <i>Physics Connection</i> 232 |
| 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 Technology</i> 216-217, 288-291, 354-355, 484-485, 754-755 <i>Everyday Chemistry</i> 275, 417, 594, 715 <i>Fact of the Matter</i> 269 |
| 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: 59, 61-79, 86-94, 690, 744-751, 762-765 <i>Biology Connection</i> 280 <i>Health Connection</i> 610 <i>History Connection</i> 58, 307 |
| 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: 36-37, 406-409, 793-803 <i>ChemLab</i> 38-39, 56-57, 384-385, 422-423, 542-543 <i>MiniLab</i> 21, 63 |
| 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: 792-796 <i>ChemLab</i> 38-39, 362-363, 384-385, 542-543, 606-607, 752-753 <i>How It Works</i> 569 |
| C. Patterns and Algebra | |
| 1. Apply mathematical models that describe physical phenomena to predict real world events. | SE: 66-68, 74-79, 198-199, 342-352, 382-395, 419 <i>ChemLab</i> 38-39, 56-57 <i>Fact of the Matter</i> 42 <i>MiniLab</i> 63 |

| STANDARDS | PAGE REFERENCES |
|---|--|
| D. Data Analysis and Probability | |
| 1. Construct and interpret graphs of data to represent inverse and non-linear relationships, and statistical distributions. | SE: 382-383, 391-392, 426, 540-541, 711-714, 756, 805-808 <i>ChemLab</i> 362-363 |
| 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: 4-7, 34-37, 61-68, 74-79, 88-94, 106-107 <i>Chemistry and Technology</i> 108-109, 216-217, 424-425, 484 |
| 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> 32, 146, 495, 537 <i>Chemistry and Technology</i> 288-291, 424-425, 484, 573, 728-729 <i>How It Works</i> 614 |
| C. Technological Design | |
| 1. Plan, develop, and implement a proposal to solve an authentic, technological problem. | SE: <i>Chemistry and Technology</i> 216-217, 424-425, 728-729 <i>ChemLab</i> 136-137, 172-173, 362-363, 456-457, 542-543, 650-652, 722-723 |
| 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: 61-65, 74-79, 98-99, 131-133, 230-239, 303-309 <i>MiniLab</i> 245 TWE: CM 70 DE 66-67 |
| 2. Know that the number of protons in the nucleus defines the element. | SE: 66, 92-95, 244-247, 746, 766-767, 842-843 TWE: CE 65 TPK 233 |
| 3. Know that an atom's electron arrangement, particularly the outermost electrons, determines how the atom can interact with other atoms. | SE: 74-79, 130-134, 138-142, 156-157, 174-181, 238-242, 258-263, 285-295 <i>MiniLab</i> 97, 135 |
| 4. Explain that atoms form bonds (ionic and covalent) with other atoms by transferring or sharing electrons. | SE: 131-134, 138-142, 154-160, 302-311 TWE: DE 124-125 DI 162 |
| 5. Explain how the Periodic Table of Elements reflects the relationship between the properties of elements and their atomic structure. | SE: 90-93, 95-99, 102-107, 111-113 <i>ChemLab</i> 100-101 TWE: EX 94 |

| 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: 111-113, 690, 694-699, 734-735 <i>Chemistry and Technology</i> 108-109, 176-178, 326-327, 590-592 <i>Everyday Chemistry</i> 571, 683 |
| 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: 344-347, 382-392, 623-636, 654-661 <i>Chemistry and Technology</i> 176-178, 288-291, 470-471 <i>ChemLab</i> 172-173 <i>Everyday Chemistry</i> 248-249 <i>How It Works</i> 167 |
| 8. Know that different levels of energy of an atom are associated with different configurations of its electrons. | SE: 70-75, 78-79, 132-134 <i>Everyday Chemistry</i> 76 <i>MiniLab</i> 77, 234 |
| 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: 218-223, 676, 713-714, 716-718 <i>Chemistry and Technology</i> 216-217 <i>ChemLab</i> 674-675 <i>Everyday Chemistry</i> 715 |
| 2. Show that some changes in chemical bonds require a net input or net release of energy. | SE: 190-191, 195-196, 218, 708-714, 719-721, 734-737 <i>ChemLab</i> 722-723 <i>MiniLab</i> 726 TWE: DE 706-707, 716-717 |
| 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 discussed, but is implicit in the discussions of the kinetic theory of matter and booster rockets. SE: 342 <i>Physics Connection</i> 566 TWE: IS 246 |
| 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: 342, 372-379 TWE: IS 246 |
| 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: 4, 376-379, 382-383, 790 <i>Fact of the Matter</i> 42 |

| STANDARDS | PAGE REFERENCES |
|--|--|
| 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: 302-306, 308-311, 330-333 <i>How It Works</i> 748 TWE: MIN 263 |
| 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: 762, 766-767 <i>Fact of the Matter</i> 764 <i>MiniLab</i> 763 |
| 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: 602-605, 734-737, 762-767 <i>ChemLab</i> 606-607, 722-723 <i>Health Connection</i> 610 <i>How It Works</i> 612, 614 <i>MiniLab</i> 600 TWE: DE 706-707 |
| 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 generation of electric signals from movement through a magnetic field (balance). SE: 61 <i>How It Works</i> 410 |
| 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 generation of electromagnetic waves. SE: 70-75 TWE: DE 60-61 |
| 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: 696, 736-737 TWE: CM 711, 720 |
| 2. Explain that while energy can be transformed from one form to another, the total energy of a closed system is constant. | SE: 711-712, 719-720, 731-732 TWE: CB 708 CD 54 CM 720 |
| 3. Recognize that whenever mechanical energy is transformed, some heat is dissipated and is therefore unavailable for use. | SE: 716, 730-732, 736-737 TWE: CD 717 |
| 4. Explain the nature of electromagnetic radiation and compare the components of the electromagnetic spectrum from radio waves to gamma rays. | SE: 70-72, 74-75, 233 <i>MiniLab</i> 77 <i>Physics Connection</i> 73 |

Codes Used for TWE Pages

| | |
|-----|-----------------------------|
| CB | Content Background |
| CD | Concept Development |
| CE | Correcting Errors |
| CM | Correcting Misconceptions |
| DE | Demonstration |
| DI | Discussion |
| EX | Extension |
| IS | Integrating the Sciences |
| MIN | Meeting Individual Needs |
| TPK | Tying to Previous Knowledge |