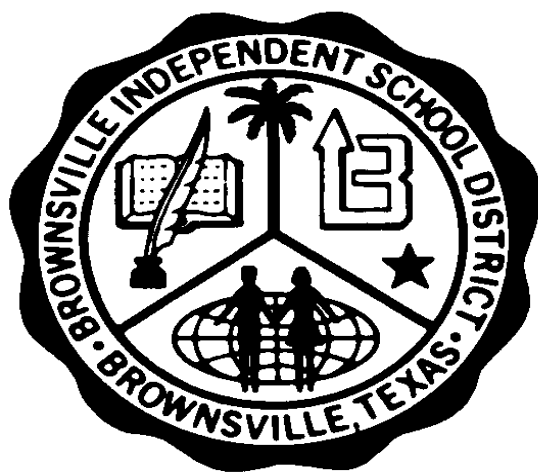


# SCIENCE CURRICULUM FRAMEWORK



Pre-AP CHEMISTRY

2004-2005

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# **Brownsville Independent School District MISSION STATEMENT**

The mission of the Brownsville Independent School District, an international community respected for its rich cultural heritage is to produce responsible, well-rounded graduates

who

- have the ability to pursue a post-secondary education and/or career
- possess a capability for independent learning and thinking with a competitive edge in a multi-cultural, multi-lingual world

by

- identifying and maximizing physical, financial, and human resources and
- unifying community and school commitment to excellence in education and equal educational opportunity.

# **Brownsville Independent School District BELIEF STATEMENT**

- Excellence is our common goal.
- Parental responsibility is an integral factor in student success.
- Belief in self is fundamental to success.
- Everyone deserves respect as a human being.
- Perseverance and hard work are essential for success.
- Change creates opportunities for growth.
- Truthfulness is important for effective communication.
- Public schools are an extension of the community.
- Sensitivity is essential for understanding the needs of others.
- Great achievements follow high expectations.
- Cooperation is necessary to get things done.
- Active listening is essential for effective communication.
- Successful students are active participants in the learning process.

# Acknowledgment

The Brownsville Independent School District gratefully acknowledges the contributions given by the Science teachers who participated in the development of this secondary Science curriculum framework. Science teachers from the following campuses assisted in the development of the framework:

- ❖ Hanna High School
- ❖ Lopez High School
- ❖ Pace High School
- ❖ Porter High School
- ❖ Rivera High School
- ❖ Lincoln Park School
- ❖ BUSP Secondary Science Mentors
- ❖ Secondary Science Curriculum Specialist

# Introduction

Texas Legislation requires that all Texas school districts develop, implement, and evaluate a comprehensive educational program aimed at student mastery of the Texas Essential Knowledge and Skills as defined in Chapter 112.

The purpose of this Secondary Science Curriculum Framework is to match learning experiences to the Texas Essential Knowledge and Skills and provide a sequence of objectives and lab activities that are also aligned, including the **40% lab requirement** for all High School Science courses. Brownsville ISD also requires the 40% lab minimum curriculum requirement for all Middle School Science courses.

In addition, this document includes sample activities and **required “EXEMPLAR” labs** to be taught in each course. EXEMPLAR labs are not intended to be the only labs taught in each course, but are provided to ensure consistency in high-quality instruction throughout the district. They should further serve to avoid overemphasis in one area while neglecting another, and thus, focus on student needs.

**Pre-AP** accommodations are indicated throughout the document, either as additional TEKS added to the course to meet the needs of the Pre-AP course sequence, or emphasized TEKS that need to be taught with added depth to the Pre-AP student in order to prepare them for the AP or Dual Enrollment course. Adaptations for other special populations will be made as needed, but the basic curriculum is the same for all students.

The **textbook** provided by the state **is a resource** for teaching the course, **not the curriculum**. Although the textbook “covers” all TEKS for the course, it does not necessarily provide instructional support for teaching the TEKS to the level of depth necessary to fulfill the TEKS intention. Therefore, it is highly recommended that teachers use a variety of additional resources from multiple sources in order to meet the TEKS requirements. Some of these resources may include, but are not limited to required Exemplar Labs, FOSS kits (which should be taught in their entirety as a unit), TEXTEAMS activities, Calculator Based Labs, Snapshot Activities and Vistas provided through the Charles A. Dana Center Science Toolkit.

This curriculum framework is primarily a working document that prescribes what is to be taught in a given subject or area of study. It gives both structure and direction to the educational program. As a formal document, it is an official statement of the curriculum and a teacher’s guide to instruction.

## Student Participation in TEKS-Based Inquiry and the BISD Science Fairs

Research, inquiry and invention are essential skills successful students must develop as they grow academically. Students must be able to discuss and evaluate social, technological and scientific issues evident today and trends influencing the future. A challenge for educators is to exploit the natural curiosity all students possess. Allowing time, opportunity and support during school hours for student-based inquiry permits learners to expose their misconceptions and pursue the “why” questions they have. Students should plan investigations and conduct research that can help them test their ideas, interpret differing points of view and justify consequent discoveries. Students are much more likely to internalize and remember concepts learned if they are actively involved with them, rather than passively observing them take place.

TEKS-based investigations enable students to effectively learn and use content-area concepts and skills. Through these types of direct investigations students are able to “maximize their ability to make sense of the world and to learn more about it.” (*Science for All Americans*) Therefore, it is a **BISD requirement that all students participate in a research-based inquiry project at the sixth, eighth, and ninth grades**. Participation at other grades or courses is highly recommended. When students are engaged in research-based inquiry, they are involved in using a rich variety of primary and secondary source materials and the Science Process Skills as required by law in the Science TEKS.

A successful classroom science investigation **may be** developed into a research-based inquiry project and **entered in the Science Fair**. Students who choose to enter the fair will be able to create investigations from among fifteen different categories. The Science Fair will be held annually in the fall, allowing teachers and students to prepare for one science competition per year following the rules of the Intel International Science and Engineering Fair, ([www.sciserv.org/isef](http://www.sciserv.org/isef)). Individual campuses, teachers and students will be able to choose which projects to enter in the Science Fair, but **all students will have the opportunity to complete an original investigation, whether they are enrolled in a fall or spring science course**.

**PRE-AP Chemistry Fall Semester Year 2004-2005 Timeline**  
**1<sup>st</sup> 6 weeks (29 days)**

**Chapter 1 (1 week)**

- Safety
- Equipment
- What is Chemistry?
- Scientific Method

**Chapter 2 (2 weeks)**

- Scientific Notation
- Units and Prefixes (SI)
- Measurements (length, volume, mass)
- Uncertainty in Measurement
- Significant Figures
- Accuracy vs Precision
- Density
- Temperature Conversions
- Graphing Skills

**Chapter 3 (2 weeks)**

- Phases of Matter
- Phase Changes
- Elements and Compounds
- Mixtures and Pure Substances
- Introduction to Solutions (basic terminology and colligative properties)
- Separation of Mixtures
- Physical and Chemical Properties and Changes

**2<sup>nd</sup> 6 weeks (29 days)**

**Chapter 4 & 25 (1 week)**

- The Elements and Their Symbols
- History of the Atomic Theory
- The Structure of the Atom
- Isotopes
- Introduction to Nuclear Chemistry (basic terminology)

**Chapter 5 (1 week)**

- Light and Quantized Energy
- Quantum Theory
- Electron Configurations

**Chapters 6 and 7 (2 weeks)**

- History of the Modern Periodic Table
- Groups and Periods
- Periodic Trends
- Valence Electrons
- Electron Dot Structures (Lewis Dot)
- Oxidation Numbers

- Electronegativity

### Chapter 8 (1 week)

- Ionic and Metallic Bonds
- Stable Electron Configurations and Charges on Ions
- Ionic Bonding and Structure of Ionic Compounds

## **3<sup>rd</sup> 6 weeks (26 days)**

### Chapters 8 & 9 (2 weeks)

- Ionic Bonding and Structure of Ionic Compounds.....continued
- Covalent Bonds
- Bond Polarity and Dipole Moments
- Intermolecular Forces (Pgs 393 - 395)
- Molecular Structure
- VSEPR
- Nomenclature

### Chapters 10 & 17 (2 weeks)

- Evidence of a Chemical Reaction
- Chemical Equations
- Conditions that affect reaction rate (pgs 536 - 541)
- Balancing Chemical Equations
- Predicting Products
- Reactions in Which a Solid Forms (Solubility Rules)
- Net Ionic Equations

### Chapter 25 (1 week)

- Radioactive Decay
- Nuclear Energy
- Nuclear Fission
- Nuclear Reactors
- Nuclear Fusion
- Effects of Radiation

## **Spring Semester Year 2004-2005** **4<sup>th</sup> 6 weeks (29 days)**

### Chapters 11 & 15 (4 weeks)

- Dimensional Analysis (Pgs 34 - 35)
- Atomic Mass and the Mole
- Molar Mass
- Review of Solutions (Pgs 453 - 457)
- Solubility (Pgs 457 - 461)
- % by Mass (Pgs 462 - 463)
- Molarity (Pgs 464 - 465)
- Review of Dilutions (Pgs 466 - 468)
- Review of Colligative Properties (Pgs 471 - 474)
- Percent Composition
- Empirical & Molecular Formulas

### Chapter 19 (2 weeks)

- Acids and Bases
- Acid Strength
- The pH Scale
- Buffered Solutions
- Neutralization & Titration

### 5<sup>th</sup> 6 weeks (33 days)

### Chapter 12 (22 weeks)

- Stoichiometric Calculations
- Limiting Reactants
- Percent Yield

### Chapter 13 & 14 (22 weeks)

- Kinetic Theory
- Gases (Pgs 385 - 390)
- Dalton=s Law of Partial Pressure (Pgs 391 - 392)
- The Gas Laws (Boyle=s law, Charles= Law, Gay-Lussac=s law )
- The Combined Gas Law
- Volume and the Mole (Avogadro=s Law)
- The Ideal Gas Law
- Gas Stoichiometry

### 6<sup>th</sup> 6 weeks (32 days)

### Chapter 16 (2 weeks)

- Evaporation and Vapor Pressure (Pgs 404 - 409)
- Energy
- Heat
- Thermochemical Equations
- Calculating Enthalpy Change
- Reaction Spontaneity

### Chapter 17 (2 week)

- How Chemical Reactions Occur
- Reaction Rate Laws

### Chapter 18 (1 week)

- Equilibrium
- The Equilibrium Constant
- Le Châtelier=s Principle

### Chapters 20 &21 (2 weeks)

- Oxidation-Reduction Reactions
- Balancing Redox Reactions
- Half-Reactions

## SECONDARY SCIENCE PRE-AP CHEMISTRY SCOPE AND SEQUENCE

| <b>Six-Week Chapters</b>   | <b>Exemplar Lab(s)* and Unit Content</b>  | <b>Concepts TEKS</b>   | <b>Processes TEKS</b>   |
|--|---|--|---|
| <b>1<sup>st</sup> Six Weeks</b><br>Glencoe: <i>Chemistry: Matter &amp; Change</i><br>Chapters 1-3, 15              | <b>“Density of Pennies (and Atomic Weights)”</b><br>Nature of Science, Safety, Measurements in Science, Characteristics of Matter, Science Project  | <b>4 A, B, C, D</b>  | <b>1 A, B</b><br><b>2 A, B, C, D, E</b><br><b>3 A, B, C, D, E</b> |
| <b>2<sup>nd</sup> Six Weeks</b><br>Glencoe: <i>Chemistry: Matter &amp; Change</i><br>Chapters 4-7, 25              | <b>“Periodicity”</b><br>Atomic History & Structure, Intro to Nuclear Chemistry, Periodic Table History & Trends, Ionic Bonding, Science Project   | <b>4D</b><br><b>6A, B, C</b><br><b>8A-C</b><br><b>11B</b>    | <b>1 A, B</b><br><b>2 A, B, C, D, E</b><br><b>3 A, B, C, D, E</b> |
| <b>3<sup>rd</sup> Six Weeks</b><br>Glencoe: <i>Chemistry: Matter &amp; Change</i><br>Chapters 8-10, 17, 25         | <b>“Conductivity”, “Concentration &amp; Reaction Rates”, “Eating M&amp;M’s Causes Decay”</b><br>Bonding, Nomenclature, Chemical & Nuclear Reactions, Factors of Reaction Rates<br>Science Project | <b>8A-D</b><br><b>9A-D</b><br><b>11A-C</b><br><b>15A-B</b>   | <b>1 A, B</b><br><b>2 A, B, C, D, E</b><br><b>3 A, B, C, D, E</b> |
| <b>4<sup>th</sup> Six Weeks</b><br>Glencoe: <i>Chemistry: Matter &amp; Change</i><br>Chapters 11, 15, 19           | <b>“Hydrated Crystals”, Beer’s Law”, “Acid-Base Titration”</b><br>Dimensional Analysis, Molar Conversions, Solutions, Acids & Bases   | <b>11A-C</b><br><b>12A-C</b><br><b>13A-C</b><br><b>14A-D</b> | <b>1 A, B</b><br><b>2 A, B, C, D, E</b><br><b>3 A, B, C, D, E</b> |
| <b>5<sup>th</sup> Six Weeks</b><br>Glencoe: <i>Chemistry: Matter &amp; Change</i><br>Chapters 12-14                | <b>“Gay-Lussac’s Law”</b><br>Stoichiometric Calculations, Gas Laws  | <b>7A-B</b><br><b>11A-C</b>                                  | <b>1 A, B</b><br><b>2 A, B, C, D, E</b><br><b>3 A, B, C, D, E</b> |
| <b>6<sup>th</sup> Six Weeks</b><br>Glencoe: <i>Chemistry: Matter &amp; Change</i><br>Chapters 16, 17.2, 18, 20, 21 | <b>“Calorimetry”, “Small Scale Redox”,</b><br>Energy, Rates of Reaction, Oxidation-Reduction, Equilibrium   | <b>5A-C</b><br><b>10A-B</b><br><b>15A-B</b>                  | <b>1 A, B</b><br><b>2 A, B, C, D, E</b><br><b>3 A, B, C, D, E</b> |

\*Required Lab as part of 40% TEKS Lab Requirement

## Pre-AP Chemistry

**Time Frame: 1<sup>st</sup> Six Weeks—weeks 1-6 (page 1 of 5)**

| <b>Unit Concepts:</b>   |  | <b>Chapters</b>  |   |
|---|--|--|---|
| Nature of Science<br>Safety<br>Scientific Measurements<br>Characteristics of Matter<br>Science Project (optional) |  | Chapter 1: Introduction to Chemistry<br>Chapter 2: Data Analysis<br>Chapter 3: Matter – Properties and Changes<br>Chapter 15: Solutions  |   |
| <b>T<br/>A<br/>K<br/>S<br/>Objective(s)</b>   | <b>Concept and Process TEKS<br/>4 A, B, C, D<br/>1 A, B<br/>2 A, B, C, D, E<br/>3 A, B, C, D, E</b>  | <b>Required Exemplar Labs, “Density of Pennies (and Atomic Weights)” and<br/>Instructional Objectives and Suggested Activities Integrating Concepts &amp; Processes</b>  | <b>Suggested Resources</b><br>(Use of additional & various resources from multiple sources is necessary to meet the TEKS)   |
| 1<br>1<br>1   | <b>Scientific Processes:</b><br><b>1 A, B</b><br><b>2 A, B, C, D, E</b><br><b>3 A, B, C, D, E</b><br>(40% Course Requirement minimum)<br>Ongoing / Integrated with concepts throughout unit. | <b>Objectives and Activities:</b> <ul style="list-style-type: none"> <li>• Associate symbols for safety in Lab Manuals with specific safety procedures and cautions.</li> <li>• Relate units used in the metric system to describe mass, volume, linear measure, temperature, time.</li> <li>• Perform measurement labs which require student to make measurements in the metric system, and measure to the limits of accuracy of the measuring device. (metric ruler, graduated cylinder, triple-beam balance)</li> </ul> | ISEF Science Fair:<br><a href="http://www.sciserv.org/isef">http://www.sciserv.org/isef</a><br><br>Snapshot Activities 4A, 4B, 4C, 4D:<br><a href="http://www.tenet.edu/teks/science/instruction/teksports.html">http://www.tenet.edu/teks/science/instruction/teksports.html</a><br><br>TEXTTEAMS<br>Chemistry Institute Activities.<br><br>Graphs, Charts and Tables Activities:<br><a href="http://www.tenet.edu/teks/science/instruction/tutorial.html">http://www.tenet.edu/teks/science/instruction/tutorial.html</a> |

# Pre-AP Chemistry

Time Frame: 1<sup>st</sup> Six Weeks—*weeks 1-6* (page 2 of 5)

| T A K S<br>Objective(s) | Concept and Process TEKS<br>4 A, B, C, D<br>1 A, B<br>2 A, B, C, D, E<br>3 A, B, C, D, E | Required Exemplar Labs,<br>“Density of Pennies (and Atomic<br>Weights and<br>Instructional Objectives and<br>Suggested Activities Integrating<br>Concepts & Processes  | Suggested<br>Resources<br>(Use of additional &<br>various resources from<br>multiple sources is<br>necessary to meet the<br>TEKS)   |
|-------------------------|--|--|---|
|                         |  | <ul style="list-style-type: none"> <li>• Perform density calculations.</li> <li>• Labs: measurement, volume, area, density, mass.</li> <li>• Apply knowledge of laboratory safety.</li> <li>• Explain why chemists are interested in a microscopic description of matter.</li> <li>• Explain the uses of the scientific methods.</li> <li>• Apply the scientific methods.</li> <li>• Compare and contrast pure research, applied research and technology research.</li> <li>• Describe the SI Base Units for time, length, mass and temperature.</li> <li>• Express numbers in scientific notation.</li> <li>• Use significant figures (digits) and rounding to reflect the certainty of data.</li> <li>• Compare and contrast accuracy and precision.</li> <li>• Compare the derived units for volume and density.</li> <li>• Construct data tables.</li> </ul> | <p>Vista: “Things That Make You Go Hmmm”<br/><a href="http://www.tenet.edu/teks/science/instruction/vistas/index.html">http://www.tenet.edu/teks/science/instruction/vistas/index.html</a></p> <p>“Newton’s Law of Cooling”<br/>Texas Instruments<br/>T<sup>3</sup> Chem-Bio<br/>Institute © (2000).<br/>p. 2-13 to 2-18. <i>Get this lab from your department chair.</i></p> <p><a href="http://www.webelements.com">http://www.webelements.com</a></p> <p><a href="http://www.schoolnotes.com">http://www.schoolnotes.com</a></p> <p><a href="http://www.chemtutor.com">http://www.chemtutor.com</a></p> <p><a href="http://hw.utexas.edu">http://hw.utexas.edu</a></p> <p><a href="http://www.sciencenetlinks.com">http://www.sciencenetlinks.com</a></p> <p><a href="http://qphs.org/chem.htm">http://qphs.org/chem.htm</a></p> |

# Pre-AP Chemistry

Time Frame: 1<sup>st</sup> Six Weeks—*weeks 1-6* (page 3 of 5)

| T A K S<br>Objective(s) | Concept and Process TEKS<br>4 A, B, C, D<br>1 A, B<br>2 A, B, C, D, E<br>3 A, B, C, D, E  | Required Exemplar Labs,<br>“Density of Pennies (and Atomic<br>Weights)” and<br>Instructional Objectives and<br>Suggested Activities Integrating<br>Concepts & Processes  | Suggested<br>Resources<br>(Use of additional &<br>various resources from<br>multiple sources is<br>necessary to meet the<br>TEKS)   |
|-------------------------|---|--|---|
| 4<br><br>4<br><br>4     | <p>(4) Science concepts.<br/>The student knows the characteristics of matter.<br/>The student is expected to:</p> <p>(A) differentiate between physical and chemical properties of matter;</p> <p>(B) analyze examples of solids, liquids, and gases to determine their compressibility, structure, motion of particles, shape, and volume;</p> <p>(C) investigate and identify properties of mixtures and pure substances; and</p> | <ul style="list-style-type: none"> <li>• Compare and contrast types of data and variables.</li> <li>• Create graphs to reveal patterns in data.</li> <li>• Interpret graphs.</li> <li>• Analyze, review and critique past, present and current scientific literature.</li> <li>• Apply knowledge to everyday situations.</li> <li>• Explain the connection between chemistry and real world situations.</li> </ul> <p><b>Objectives &amp; Activities:</b></p> <ul style="list-style-type: none"> <li>• Define chemical change and list several indications that a chemical change has taken place.</li> <li>• Define physical change and list several indications that physical change has taken place.</li> <li>• Distinguish between physical and chemical properties.</li> <li>• List the characteristics among the physical states of matter.</li> <li>• Differentiate among the physical states of matter.</li> </ul> | <p><a href="http://www.vanderkrogt.net/elements">http://www.vanderkrogt.net/elements</a></p> <p><a href="http://dbhs.wvusd.k12.ca.us/webdocs/ChemTeamIndex.html">http://dbhs.wvusd.k12.ca.us/webdocs/ChemTeamIndex.html</a></p> <p><a href="http://www.chemistrycoach.com/tutorial.htm">http://www.chemistrycoach.com/tutorial.htm</a></p> <p><a href="http://www.education.ti.com">http://www.education.ti.com</a></p> |

# Pre-AP Chemistry

Time Frame: 1<sup>st</sup> Six Weeks—*weeks 1-6* (page 4 of 5)

| T A K S<br>Objective(s) | Concept and Process TEKS<br>4 A, B, C, D<br>1 A, B<br>2 A, B, C, D, E<br>3 A, B, C, D, E  | Required Exemplar Labs,<br>“Density of Pennies (and Atomic<br>Weights)” and<br>Instructional Objectives and<br>Suggested Activities Integrating<br>Concepts & Processes  | Suggested<br>Resources<br>(Use of additional &<br>various resources from<br>multiple sources is<br>necessary to meet the<br>TEKS) |
|-------------------------|---|--|---|
| 4                       | (D) describe the physical and chemical characteristics of an element using the periodic table and make inferences about its chemical behavior | <ul style="list-style-type: none"> <li>• Compare and contrast mixtures and pure substances.</li> <li>• Classify mixtures as homogeneous and heterogeneous.</li> <li>• Describe the characteristics of solutions.</li> <li>• Describe dilutions and concentrations of solutions.</li> <li>• Explain the nature of colligative properties and describe their properties.</li> </ul> <p><b>Science Project: (optional)</b></p> <ul style="list-style-type: none"> <li>• Choose a limited subject, ask a question; identify or originate/define a problem to study.</li> <li>• Review published materials related to problem or question.</li> <li>• Evaluate possible solutions and make hypothesis.</li> </ul> <p><b>Exemplar Labs:</b></p> <p>“Density of Pennies (and Atomic Weights)” —Use graphing calculator and experimental data to prepare scatter plot and make a prediction based on analysis of data.</p> |   |

STUDENT PRODUCTS may include (but are not limited to): • Models • Projects • Labs • Research Papers • Presentations

# Pre-AP Chemistry

## Alignment and Correlations Charts

Time Frame: 1<sup>st</sup> Six Weeks (page 5 of 5)

### TEKS/TAKS Correlations\*

| Chemistry<br>TEKS   | Prior<br>Knowledge (IPC &<br>Biology) TEKS                   | Subsequent Knowledge<br>(Physics) TEKS         | Exit level TAKS<br>Correlation |
|---|--|--|--------------------------------|
| Concepts:<br>4 a, b, c, d                                 | IPC: 7a, d, e  |  | Objective 4                    |
| Processes:<br>1a, b<br>2 a, b, c, d, e<br>3 a, b, c, d, e | IPC: 1 a-b, 2 a-d, 3 a-e<br><br>Biology: 1 a-b, 2 a-d, 3 a-f | 1a, b<br>2 a, b, c, d, e, f<br>3 a, b, c, d, e | Objective 1                    |

*\*Refer to Appendix for complete TEKS and TAKS objectives.*

### Pre-AP Course Curricular Requirements\*\*

*\*\*See Appendix for Pre-AP/AP Alignment Chart*

### TEKS/National Science Education Standards Correlations\*\*\*

| TEKS   | National Science Education Standards   |
|--|--|
| Concepts:<br>4 a, b, c, d  | Physical Science Standard B  |
| Processes:<br>1 a, b<br>2 a<br>2 b<br>2 c, d<br>2 e<br>3 a<br>3 b<br>3 c, d, e | Science as Inquiry Standard A<br>Science in Personal and Social Perspectives Standard F<br>Science as Inquiry Standard A<br>Science and Technology Standard E<br>Science and Technology Standard E<br>Science as Inquiry Standard A<br>Science and Technology Standard E<br>Science and Technology Standard E<br>Science as Inquiry Standard A<br>History and Nature of Science Standard G<br>Science as Inquiry Standard A<br>Science as Inquiry Standard A<br>History and Nature of Science Standard G |

*\*\*\*Refer to Appendix for complete TEKS Objectives and National Science Education Standards*

# Pre-AP Chemistry

Time Frame: 2<sup>nd</sup> Six Weeks—weeks 7-12 (page 1 of 4)

| Unit Concepts:  | Chapters  |
|---|---|
| Atomic Structure<br>Intro to Nuclear Chem<br>Periodic Table<br>Chemical Bonding<br>Science Project (optional) | Chapter 4: The Structure of the Atom & Chap 25: Nuclear Chemistry<br>Chapter 5: Electrons in Atoms<br>Chapter 6: The Periodic Table and Periodic Law<br>Chapter 7: The Elements<br>Chapter 8: Ionic Compounds |

| TEKS Objective(s) | Concept and Process TEKS   | Required Exemplar Labs, “Periodicity” and Instructional Objectives and Suggested Activities Integrating Concepts & Processes  | Suggested Resources<br>(Use of additional & various resources from multiple sources is necessary to meet the TEKS)  |
|-------------------|--|---|---|
| 1<br>1<br>1       | <b>4 D</b><br><b>6 A, B, C</b><br><b>8 A, B, C</b><br><b>11 B</b><br><b>1-3</b>  | <b>Objectives &amp; Activities:</b> <ul style="list-style-type: none"> <li>Compare and contrast the atomic models of Democritus, Dalton, Thomson and Rutherford.</li> <li>Distinguish between the subatomic particles in terms of relative charge and mass.</li> <li>Calculate the number of electrons, protons, and neutrons in an atom given its mass number and atomic number.</li> <li>Identify different isotopes and provide examples.</li> <li>Identify alpha, beta, and gamma radiation in terms of composition and key properties.</li> <li>Explain why certain nuclei are radioactive.</li> <li>Understand the concept of half-life.</li> </ul> | ISEF Science Fair:<br><a href="http://www.sciserve.org/isef/teachers/index.asp">http://www.sciserve.org/isef/teachers/index.asp</a><br><br>Snapshot Activities:<br>6A, 6B, 6C, 8A, 8B, 8C, 8D, 11A, 11B.<br><a href="http://www.tenet.edu/teks/science/instruction/teksper.html">http://www.tenet.edu/teks/science/instruction/teksper.html</a><br><br>TEXTTEAMS<br>Chemistry Institute Activities.<br><br>Graphs, Charts and Tables Activities:<br><a href="http://www.tenet.edu/teks/science/instruction/tutorial.html">http://www.tenet.edu/teks/science/instruction/tutorial.html</a> |
| 1<br>4<br>4       | <b>Scientific Processes:</b><br><b>1 A, B,</b><br><b>2 A, B, C, D, E</b><br><b>3 A, B, C, D, E</b><br>(40% Course Requirement minimum)<br><br>Ongoing / Integrated with concepts throughout unit.<br><br><b>(4) Science concepts.</b><br>The student knows the characteristics of matter.<br>The student is expected to:<br><br>(D) describe the physical and chemical characteristics of an element using the periodic table and make inferences about its chemical behavior<br><br><b>(6) Science concepts.</b> The student knows that atomic structure is determined by nuclear composition, allowable electron cloud, and subatomic particles. The student is expected to: |   |   |

# Pre-AP Chemistry

**Time Frame: 2<sup>nd</sup> Six Weeks—weeks 7-12 (page 2 of 4)**

| T A K S<br>Objective(s) | Concept and Process TEKS<br>4 D<br>6 A, B, C<br>8 A, B, C<br>11 B<br>1-3   | Required Exemplar Labs,<br>“Periodicity” and<br>Instructional Objectives and<br>Suggested Activities Integrating<br>Concepts & Processes   | Suggested<br>Resources<br>(Use of additional &<br>various resources from<br>multiple sources is<br>necessary to meet the<br>TEKS) |
|-------------------------|--|--|---|
| 4                       | <p>(A) describe the existence and properties of subatomic particles; and</p> <p>(B) analyze stable and unstable isotopes of an element to determine the relationship between the isotope’s stability and its application;</p> <p>(C) summarize the historical development of the periodic table to understand the concept of periodicity.</p> <p><b>(11) Science concepts.</b> The student knows that balanced chemical equations are used to interpret and describe the interactions of matter. The student is expected to:</p> <p>(B) demonstrate the use of symbols, formulas, and equations in describing interactions of matter such as chemical and nuclear reactions; and</p> | <ul style="list-style-type: none"> <li>• Name the energy levels, sublevels, orbitals and number of electrons.</li> <li>• Describe the shape of the <i>s</i> and <i>p</i> orbitals.</li> <li>• Write orbital and electron configuration notation for atoms and ions.</li> <li>• Draw electron dot diagrams</li> <li>• Recognize the filling order of electron orbitals.</li> <li>• Trace the historical development and identify key features of the periodic table.</li> <li>• Compare period and group trends of several periods.</li> <li>• Relate period and group trends in atomic radii, ionization energy, electrostatic attraction.</li> <li>• Explain how elements in a given group are both similar and different.</li> <li>• Identify characteristics for metals, nonmetals, metalloids, inner transitional metals and transitional metals.</li> <li>• Identify the different properties of the elements.</li> </ul> | <p>“Periodicity”<br/><i>Get this lab from your department chair.</i></p>  |

# Pre-AP Chemistry

Time Frame: 2<sup>nd</sup> Six Weeks—*weeks 7-12* (page 3 of 4)

| T A K S<br>Objective(s) | Concept and Process TEKS<br>4 D<br>6 A, B, C<br>8 A, B, C<br>11 B<br>1-3   | Required Exemplar Labs,<br>“Periodicity” and<br>Instructional Objectives and<br>Suggested Activities Integrating<br>Concepts & Processes  | Suggested<br>Resources<br>(Use of additional &<br>various resources from<br>multiple sources is<br>necessary to meet the<br>TEKS) |
|-------------------------|--|---|---|
| 4                       | <p>(8) Science concepts. The student knows how atoms form bonds to acquire a stable arrangement of electrons. The student is expected to:</p> <p>(A) identify characteristics of atoms involved in chemical bonding;</p> <p>(B) investigate and compare the physical and chemical properties of ionic and covalent compounds;</p> <p>(C) compare the arrangement of atoms in molecules, ionic crystals, polymers, and metallic substances; and</p> | <p><b>Activities:</b></p> <ul style="list-style-type: none"> <li>• Identify characteristics for ionic bonding.</li> <li>• Describe the formation of ionic bonds.</li> <li>• Compare and contrast the physical and chemical properties of chemical bonding.</li> </ul> |   |

# Pre-AP Chemistry

## Alignment and Correlations Charts

**Time Frame: 2<sup>nd</sup> Six Weeks (page 4 of 4)**

### TEKS/TAKS Correlations\*

| Chemistry<br>TEKS   | Prior<br>Knowledge (IPC<br>& Biology)<br>TEKS                      | Subsequent<br>Knowledge (Physics)<br>TEKS      | Exit level TAKS Correlation |
|---|--|--|-----------------------------|
| Concepts:<br>6 a, b, c<br>8 a, b, c, d<br>11 a, b, c      | IPC: 7e, 8c  |  | Objective 4                 |
| Processes:<br>1a, b<br>2 a, b, c, d, e<br>3 a, b, c, d, e | IPC: 1 a-b, 2 a-d,<br>3 a-e<br><br>Biology: 1 a-b, 2<br>a-d, 3 a-f | 1a, b<br>2 a, b, c, d, e, f<br>3 a, b, c, d, e | Objective 1                 |

*\*Refer to Appendix for complete TEKS and TAKS objectives.*

### Pre-AP Course Curricular Requirements\*\*

*\*\*See Appendix for Pre-AP/AP Alignment Chart*

### TEKS/National Science Education Standards Correlations\*\*\*

| TEKS   | National Science Education Standards   |
|--|--|
| Concepts:<br>6 a, b, c<br>8 a, b, c, d<br>11 a, b, c                           | Physical Science Standard B<br>Physical Science Standard B<br>Physical Science Standard B  |
| Processes:<br>1 a, b<br>2 a<br>2 b<br>2 c, d<br>2 e<br>3 a<br>3 b<br>3 c, d, e | Science as Inquiry Standard A<br>Science in Personal and Social Perspectives Standard F<br>Science as Inquiry Standard A<br>Science and Technology Standard E<br>Science and Technology Standard E<br>Science as Inquiry Standard A<br>Science and Technology Standard E<br>Science and Technology Standard E<br>Science as Inquiry Standard A<br>History and Nature of Science Standard G<br>Science as Inquiry Standard A<br>Science as Inquiry Standard A<br>History and Nature of Science Standard G |

*\*\*\*Refer to Appendix for complete TEKS Objectives and National Science Education Standards*

# Pre-AP Chemistry

Time Frame: 3<sup>rd</sup> Six Weeks—weeks 13-18 (page 1 of 4)

| Unit Concepts:  | Chapters   |
|---|--|
| Bonding<br>Chemical Reactions<br>Rates of Reaction<br>Nuclear Chemistry<br>Science Project (optional) | Chapter 8: Ionic Compounds<br>Chapter 9: Covalent Bonding<br>Chapter 10: Chemical Reactions<br>Chapter 17: Reaction Rates<br>Chapter 25: Nuclear Chemistry |

| TAKS Objective(s) | Concept and Process TEKS<br>8 A, B, C, D<br>9 A, B, C, D<br>11 A, B, C<br>15 A, B<br>1-3   | Required Exemplar Labs,<br>“Conductivity”, “Concentration and Reaction Rates”, “Eating M&M’s Causes Decay”, and<br>Instructional Objectives and Suggested Activities Integrating Concepts & Processes  | Suggested Resources<br>(Use of additional & various resources from multiple sources is necessary to meet the TEKS) |
|-------------------|--|--|--|
| 4                 | <p>(8) Science concepts. The student knows how atoms form bonds to acquire a stable arrangement of electrons. The student is expected to:</p> <p>(A) identify characteristics of atoms involved in chemical bonding;</p> <p>(B) investigate and compare the physical and chemical properties of ionic and covalent compounds;</p> <p>(C) compare the arrangement of atoms in molecules, ionic crystals, polymers, and metallic substances; and</p> | <p><b>Activities:</b></p> <ul style="list-style-type: none"> <li>Identify characteristics for covalent bonding.</li> <li>Describe the formation of ionic bonds.</li> <li>Compare and contrast the physical and chemical properties of chemical bonding.</li> <li>Construct molecular and geometric molecules to demonstrate arrangement of molecules, ionic crystals, polymers and metallic substances.</li> <li>Differentiate between intermolecular forces on the physical and chemical properties of covalent compounds.</li> </ul> |  |

# Pre-AP Chemistry

Time Frame: 3<sup>rd</sup> Six Weeks—*weeks 13-18* (page 2 of 4)

| T A K S<br>Objective(s) | Concept and Process TEKS<br>8 A, B, C, D<br>9 A, B, C, D<br>11 A, B, C<br>15 A, B<br>1-3  | Required Exemplar Labs,<br>“Conductivity”, “Concentration and<br>Reaction Rates”, “Eating M&M’s Causes<br>Decay”, and<br>Instructional Objectives and<br>Suggested Activities Integrating<br>Concepts & Processes   | Suggested<br>Resources<br>(Use of additional &<br>various resources from<br>multiple sources is<br>necessary to meet the<br>TEKS) |
|-------------------------|---|---|---|
| 4                       | <p>(D) describe the influence of intermolecular forces on the physical and chemical properties of covalent compounds.</p> <p>(11) Science concepts. The student knows that balanced chemical equations are used to interpret and describe the interactions of matter. The student is expected to:</p> <p>(A) identify common elements and compounds using scientific nomenclature.</p> <p>(B) demonstrate the use of symbols, formulas, and equations in describing interactions of matter such as chemical and nuclear reactions; and</p> <p>(C) explain and balance chemical and nuclear equations using number of atoms, masses, and charge.</p> <p>(15) Science concepts: The student knows factors involved in chemical reactions. The student is expected to:</p> | <p><b>Objectives &amp; Activities:</b></p> <ul style="list-style-type: none"> <li>• write formulas for ionic, molecular and acid compounds.</li> <li>• name ionic, molecular and acid compounds.</li> <li>• Using an Oxidation Number Handout, write correct names from the formulas of compounds.</li> <li>• Using the forms of the 5 main chemical reactions, predict products when given the reactants.</li> <li>• Identify different parts of an equation.</li> <li>• Balance chemical equations.</li> </ul> <p><b>Objectives &amp; Activities:</b></p> <ul style="list-style-type: none"> <li>• Identify factors that affect the rates of chemical reactions.</li> </ul> |   |



## Pre-AP Chemistry Alignment and Correlations Charts

Time Frame: 3<sup>rd</sup> Six Weeks (page 4 of 4)

### TEKS/TAKS Correlations\*

| Chemistry<br>TEKS  | Prior<br>Knowledge (IPC &<br>Biology) TEKS                      | Subsequent<br>Knowledge (Physics)<br>TEKS      | Exit level TAKS<br>Correlation |
|--|---|--|--------------------------------|
| Concepts:<br>8 a, b, c, d<br>9 a, b, c, d<br>11 a, b, c<br>15 a, b |   |  |                                |
| Processes:<br>1a, b<br>2 a, b, c, d, e<br>3 a, b, c, d, e          | IPC: 1 a-b, 2 a-d, 3 a-e<br><br>Biology: 1 a-b, 2 a-d,<br>3 a-f | 1a, b<br>2 a, b, c, d, e, f<br>3 a, b, c, d, e | Objective 1                    |

*\*Refer to Appendix for complete TEKS and TAKS objectives.*

### Pre-AP Course Curricular Requirements\*\*

*\*\*See Appendix for Pre-AP/AP Alignment Chart*

### TEKS/National Science Education Standards Correlations\*\*\*

| TEKS   | National Science Education Standards   |
|--|--|
| Concepts:<br>9 a, b<br>8 a, b, c, d  | Physical Science Standard B<br>Physical Science Standard B   |
| Processes:<br>1 a, b<br><br>2 a<br><br>2 b<br>2 c, d<br><br>2 e<br>3 a<br><br>3 b<br>3 c, d, e | Science as Inquiry Standard A<br>Science in Personal and Social Perspectives Standard F<br>Science as Inquiry Standard A<br>Science and Technology Standard E<br>Science and Technology Standard E<br>Science as Inquiry Standard A<br>Science and Technology Standard E<br>Science and Technology Standard E<br>Science as Inquiry Standard A<br>History and Nature of Science Standard G<br>Science as Inquiry Standard A<br>Science as Inquiry Standard A<br>History and Nature of Science Standard G |

# Pre-AP Chemistry

**Time Frame: 4<sup>th</sup> Six Weeks—weeks 19-24 (page 1 of 5)**

| Unit Concepts:   | Chapters   |
|--|--|
| Molar Conversions<br>Solutions and Their Concentrations<br>Acids and Bases | Chapter 11: The Mole<br>Chapter 15: Solutions<br>Chapter 19: Acids and Bases |

| T A K S<br>Objective(s)       | Concept and Process TEKS<br>11 A, B, C<br>12 A, B, C<br>13 A, B, C<br>14 A, B, C, D<br>1-3   | Required Exemplar Labs,<br>“Hydrated Crystals”, “Beer’s Law”,<br>“Acid-Base Titration” and<br>Instructional Objectives and<br>Suggested Activities Integrating<br>Concepts & Processes  | Suggested<br>Resources<br>(Use of additional &<br>various resources from<br>multiple sources is<br>necessary to meet the<br>TEKS) |
|-------------------------------|--|---|---|
| <p>1<br/>1<br/>1</p> <p>4</p> | <p><b>Scientific Processes:</b><br/>1 A, B,<br/>2 A, B, C, D, E<br/>3 A, B, C, D, E<br/>(40% Course Requirement minimum)<br/>Ongoing / Integrated with concepts throughout unit.</p> <p><b>(11)</b> Science concepts. The student knows that balanced chemical equations are used to interpret and describe the interactions of matter. The student is expected to:</p> <p>(A) identify common elements and compounds using scientific nomenclature.</p> <p>(B) demonstrate the use of symbols, formulas, and equations in describing interactions of matter such as chemical and nuclear reactions; and</p> | <p><b>Objectives &amp; Activities:</b></p> <ul style="list-style-type: none"> <li>• Describe how a mole is used in chemistry.</li> <li>• Convert moles to number of representative particles and number of representative particles to moles.</li> <li>• Recognize the mole relationships shown by a chemical formula.</li> <li>• Calculate the molar mass of a compound.</li> <li>• Calculate the percent composition, empirical and molecular formulas for any given compound from data provided.</li> <li>• Determine the mole ratios from a balanced chemical equation;</li> <li>• Evaluate the results of experiment and reach conclusions based on data.</li> </ul> |   |



# Pre-AP Chemistry

Time Frame: 4<sup>th</sup> Six Weeks—*weeks 19-24* (page 3 of 5)

| T A K S<br>Objective(s) | Concept and Process TEKS<br>11 A, B, C<br>12 A, B, C<br>13 A, B, C<br>14 A, B, C, D<br>1-3  | Required Exemplar Labs,<br>“Hydrated Crystals”, “Beer’s Law”,<br>“Acid-Base Titration” and<br>Instructional Objectives and<br>Suggested Activities Integrating<br>Concepts & Processes   | Suggested<br>Resources<br>(Use of additional & various<br>resources from multiple<br>sources is necessary to meet<br>the TEKS)   |
|-------------------------|---|--|--|
| 4                       | <p>(12) Science concepts. The student knows the factors that influence the solubility of solutes in a solvent. The student is expected to:</p> <p>(A) demonstrate and explain effects of temperature and the nature of solid solutes on the solubility of solids;</p> <p>(B) develop general rules for solubility through investigations with aqueous solutions; and</p> <p>(C) evaluate the significance of water as a solvent in living organisms and in the environment.</p> | <p><b>Objectives &amp; Activities:</b></p> <ul style="list-style-type: none"> <li>Identify physical and chemical properties of acids and bases.</li> <li>Classify solutions as acidic, basic, or neutral.</li> <li>Compare the Arrhenius and Brønsted-Lowry models of acids and bases.</li> <li>Relate the strength of an acid or base to its degree of ionization.</li> </ul> | <p>“Solubility”: Graphs, Charts and Tables<br/>Activities:<br/><a href="http://www.tenet.edu/teks/science/instruction/tutorial.html">http://www.tenet.edu/teks/science/instruction/tutorial.html</a></p> |
| 4                       | <p>(14) Science concepts. The student knows the properties and behavior of acids and bases. The student is expected to:</p> <p>(A) analyze and measure common household products using a variety of indicators to classify the products as acids or bases;</p>  | <p><b>Objectives &amp; Activities:</b></p> <ul style="list-style-type: none"> <li>Identify physical and chemical properties of acids and bases.</li> <li>Classify solutions as acidic, basic, or neutral.</li> <li>Compare the Arrhenius and Brønsted-Lowry models of acids and bases.</li> <li>Relate the strength of an acid or base to its degree of ionization.</li> </ul> |  |

# Pre-AP Chemistry

Time Frame: 4<sup>th</sup> Six Weeks—*weeks 19-24* (page 4 of 5)

| T A K S<br>Objective(s) | Concept and Process TEKS<br>11 A, B, C<br>12 A, B, C<br>13 A, B, C<br>14 A, B, C, D<br>1-3   | Required Exemplar Labs,<br>“Hydrated Crystals”, “Beer’s Law”,<br>“Acid-Base Titration” and<br>Instructional Objectives and<br>Suggested Activities Integrating<br>Concepts & Processes  | Suggested<br>Resources<br>(Use of additional & various<br>resources from multiple<br>sources is necessary to meet<br>the TEKS)   |
|-------------------------|--|---|--|
|                         | <p>(B) demonstrate the electrical conductivity of acids and bases;</p> <p>(C) identify the characteristics of a neutralization reaction; and</p> <p>(D) describe effects of acids and bases on an ecological system.</p> | <ul style="list-style-type: none"> <li>• Explain the relationship between the strengths of acids and bases and the values of their ionization constants.</li> <li>• Write chemical equations for neutralization reaction.</li> <li>• Explain how neutralization reactions are used in acid-base titration.</li> <li>• Compare the properties of buffered and unbuffered solutions.</li> <li>• Explain the application of buffers in an ecological system.</li> <li>• Describe the effects of acids and bases on an ecological system.</li> </ul> <p><b>Exemplar Labs:</b></p> <p>“Acid-Base Titration”—determine unknown concentration of an acid solution through titration.</p> | <p>“Acid-Base Titration”:<br/><u>Texas Instruments T<sup>3</sup> Chem-Bio Institute</u> © (2000). p. 6-39 to 6-41. <i>Get this lab from your department chair.</i></p> <p>“Chemical Kinetics of Bleach”—study reaction of bleach as an oxidizer.</p> |

## Pre-AP Chemistry Alignment and Correlations Charts

Time Frame: 4<sup>th</sup> Six Weeks (page 5 of 5)

### TEKS/TAKS Correlations\*

| Chemistry<br>TEKS   | Prior<br>Knowledge (IPC &<br>Biology) TEKS                   | Subsequent Knowledge<br>(Physics) TEKS         | Exit level TAKS<br>Correlation |
|---|--|--|--------------------------------|
| Concepts:<br>15 a, b<br>12 a, b, c<br>14 a, b, c, d       | IPC: 6A, 9A, D<br><br>Bio: 4b                                | 5d, 7a   | Objectives 2, 4, 5             |
| Processes:<br>1a, b<br>2 a, b, c, d, e<br>3 a, b, c, d, e | IPC: 1 a-b, 2 a-d, 3 a-e<br><br>Biology: 1 a-b, 2 a-d, 3 a-f | 1a, b<br>2 a, b, c, d, e, f<br>3 a, b, c, d, e | Objective 1                    |

*\*Refer to Appendix for complete TEKS and TAKS objectives.*

### Pre-AP Course Curricular Requirements\*\*

*\*\*See Appendix for Pre-AP/AP Alignment Chart*

### TEKS/National Science Education Standards Correlations\*\*\*

| TEKS   | National Science Education Standards   |
|--|--|
| Concepts:<br>15 a, b<br>12 a, b, c<br>14 a, b, c<br>14 d                                       | Physical Science Standard B<br>Physical Science Standard B<br>Physical Science Standard B<br>Physical Science Standard B<br>Science in Personal and Social Perspectives Standard F   |
| Processes:<br>1 a, b<br><br>2 a<br><br>2 b<br>2 c, d<br><br>2 e<br>3 a<br><br>3 b<br>3 c, d, e | Science as Inquiry Standard A<br>Science in Personal and Social Perspectives Standard F<br>Science as Inquiry Standard A<br>Science and Technology Standard E<br>Science and Technology Standard E<br>Science as Inquiry Standard A<br>Science and Technology Standard E<br>Science and Technology Standard E<br>Science as Inquiry Standard A<br>History and Nature of Science Standard G<br>Science as Inquiry Standard A<br>Science as Inquiry Standard A<br>History and Nature of Science Standard G |

*\*\*\*Refer to Appendix for complete TEKS Objectives and National Science Education Standards*

# Pre-AP Chemistry

Time Frame: 5<sup>th</sup> Six Weeks—weeks 25-30 (page 1 of 4)

| Unit Concepts:   | Chapters   |
|--|--|
| Stoichiometric Calculations<br>Kinetic Theory<br>Gas Laws<br>Gas Stoichiometry | Chapter 12: Stoichiometry<br>Chapter 13: States of Matter<br>Chapter 14: Gases |

| TEKS Objective(s)   | Concept and Process TEKS<br>7 A, B<br>11 A, B, C<br>1-3   | Required Exemplar Labs, “Gay-Lussac’s Law” )” and Instructional Objectives and Suggested Activities Integrating Concepts & Processes   | Suggested Resources<br>(Use of additional & various resources from multiple sources is necessary to meet the TEKS) |
|---|---|--|--|
| <p><b>1</b> 1 A, B,</p> <p><b>1</b> 2 A, B, C, D, E</p> <p><b>1</b> 3 A, B, C, D, E<br/>(40% Course Requirement minimum)</p> <p>Ongoing / Integrated with concepts throughout unit.</p> <p><b>4</b> (11) Science concepts. The student knows that balanced chemical equations are used to interpret and describe the interactions of matter. The student is expected to:</p> <p>(A) identify common elements and compounds using scientific nomenclature.</p> <p>(B) demonstrate the use of symbols, formulas, and equations in describing interactions of matter such as chemical and nuclear reactions; and</p> | <p><b>Scientific Processes:</b></p> <p><b>1</b> 1 A, B,</p> <p><b>1</b> 2 A, B, C, D, E</p> <p><b>1</b> 3 A, B, C, D, E<br/>(40% Course Requirement minimum)</p> <p>Ongoing / Integrated with concepts throughout unit.</p> <p><b>4</b> (11) Science concepts. The student knows that balanced chemical equations are used to interpret and describe the interactions of matter. The student is expected to:</p> <p>(A) identify common elements and compounds using scientific nomenclature.</p> <p>(B) demonstrate the use of symbols, formulas, and equations in describing interactions of matter such as chemical and nuclear reactions; and</p> | <p><b>Objectives &amp; Activities:</b></p> <ul style="list-style-type: none"> <li>• Explain the sequence of steps used in solving stoichiometric problems when calculating for moles; mass; and molarity;</li> <li>• Use the sequence of stoichiometric steps to calculate mole; mass and molarity;</li> <li>• Identify the limiting reactant in a chemical equation;</li> <li>• Identify the excess reactant and calculate the amount remaining after the reaction is complete;</li> <li>• Calculate the theoretical yield of a chemical reaction from data; and</li> <li>• Determine the percent yield for a chemical reaction.</li> </ul> |  |

# Pre-AP Chemistry

Time Frame: 5th Six Weeks—*weeks 25-30* (page 2 of 4)

| T A K S<br>Objective(s) | Concept and Process TEKS<br>7 A, B<br>11 A, B, C<br>1-3  | Required Exemplar Labs, “Gay-Lussac’s Law”)” and<br>Instructional Objectives and<br>Suggested Activities Integrating<br>Concepts & Processes   | Suggested<br>Resources<br>(Use of additional & various<br>resources from multiple<br>sources is necessary to meet<br>the TEKS)   |
|-------------------------|--|--|--|
| 4                       | <p>(C) explain and balance chemical and nuclear equations using number of atoms, masses, and charge.</p> <p>(7) Science concepts. The student knows the variables that influence the behavior of gases. The student is expected to:</p> <p>(A) describe interrelationships among temperature, particle number, pressure, and volume of gases contained within a closed system; and</p> | <p><b>Objectives &amp; Activities:</b></p> <ul style="list-style-type: none"> <li>• Apply Boyle’s Law, Charles’ Law, Dalton’s Law and Gay-Lussac’s law.</li> <li>• Apply the combined gas to problems involving the pressure, temperature and volume of a gas.</li> <li>• Relate numbers of particles and volumes by using Avogadro’s principle.</li> <li>• Relate the amount of gas present to its pressure, temperature, and volume by using the ideal gas law.</li> <li>• Apply Standard Temperature and Pressure (STP).</li> </ul> | <p>Snapshot Activities:<br/>7A, 7B, 5A, 5B, 5C,<br/>13A, 13B, 13C</p> <p><a href="http://www.tenet.edu/teks/science/instruction/teksperthtml">http://www.tenet.edu/teks/science/instruction/teksperthtml</a></p> <p>TEXTEAMS<br/>Chemistry Institute<br/>Activities.</p> |

# Pre-AP Chemistry

Time Frame: 5<sup>th</sup> Six Weeks—*weeks 25-30* (page 3 of 4)

| T A K S<br>Objective(s) | Concept and Process TEKS<br>7 A, B<br>11 A, B, C<br>1-3   | Required Exemplar Labs, “Gay-Lussac’s Law” and<br>Instructional Objectives and<br>Suggested Activities Integrating<br>Concepts & Processes   | Suggested<br>Resources<br>(Use of additional & various<br>resources from multiple<br>sources is necessary to meet<br>the TEKS)   |
|-------------------------|---|--|--|
|                         | (B) illustrate the data obtained from investigations with gases in a closed system and determine if the data are consistent with the Universal Gas Law. | <ul style="list-style-type: none"> <li>Use Charles’s and Boyle’s Laws formulas to perform volume, pressure and temperature calculations.</li> </ul> <p><b>Exemplar Labs:</b><br/>“Gay-Lussac’s Law”—</p> | Graphs, Charts and Tables Activities:<br><a href="http://www.tenet.edu/teks/science/instruction/tutorial.html">http://www.tenet.edu/teks/science/instruction/tutorial.html</a> |

## Pre-AP Chemistry Alignment and Correlations Charts

Time Frame: 5<sup>th</sup> Three Weeks (page 4 of 4)

### TEKS/TAKS Correlations\*

| Chemistry<br>TEKS   | Prior<br>Knowledge (IPC &<br>Biology) TEKS                      | Subsequent Knowledge<br>(Physics) TEKS         | Exit level TAKS<br>Correlation |
|---|---|--|--------------------------------|
| Concepts:<br>10 a, b<br>9 c, d<br>11 c                    | IPC: 6d, 8c   | 7b   | Objectives 4, 5                |
| Processes:<br>1a, b<br>2 a, b, c, d, e<br>3 a, b, c, d, e | IPC: 1 a-b, 2 a-d, 3 a-e<br><br>Biology: 1 a-b, 2 a-d,<br>3 a-f | 1a, b<br>2 a, b, c, d, e, f<br>3 a, b, c, d, e | Objective 1                    |

*\*Refer to Appendix for complete TEKS and TAKS objectives.*

### Pre-AP Course Curricular Requirements\*\*

*\*\*See Appendix for Pre-AP/AP Alignment Chart*

### TEKS/National Science Education Standards Correlations\*\*\*

| TEKS   | National Science Education Standards   |
|--|--|
| Concepts:<br>10 a, b<br>9 c, d<br>11 c   | Physical Science Standard B<br>Physical Science Standard B<br>Science in Personal and Social Perspectives Standard F<br>Physical Science Standard B  |
| Processes:<br>1 a, b<br>2 a<br>2 b<br>2 c, d<br>2 e<br>3 a<br>3 b<br>3 c, d, e | Science as Inquiry Standard A<br>Science in Personal and Social Perspectives Standard F<br>Science as Inquiry Standard A<br>Science and Technology Standard E<br>Science and Technology Standard E<br>Science as Inquiry Standard A<br>Science and Technology Standard E<br>Science and Technology Standard E<br>Science as Inquiry Standard A<br>History and Nature of Science Standard G<br>Science as Inquiry Standard A<br>Science as Inquiry Standard A<br>History and Nature of Science Standard G |

*\*\*\*Refer to Appendix for complete TEKS Objectives and National Science Education Standards*

# Pre-AP Chemistry

**Time Frame: 6<sup>th</sup> Six Weeks—weeks 31-36 (page 1 of 4)**

| Unit Concepts:   | Chapters  |
|--|---|
| Energy and Chemical Reactions<br>Chemical Reaction Rate Laws<br>Equilibrium<br>Oxidation-Reduction Reactions<br>Electrochemistry | Chapter 16: Energy and Chemical Change<br>Chapter 17: Reaction Rates<br>Chapter 18: Chemical Equilibrium<br>Chapter 20: Redox Reactions<br>Chapter 21: Electrochemistry |

| T A K S<br>Objective(s)             | Concept and Process TEKS<br>5 A, B, C<br>10 A, B<br>15 A, B<br>1-3  | Required Exemplar Labs,<br>“Calorimetry” and<br>Instructional Objectives and<br>Suggested Activities Integrating<br>Concepts & Processes   | Suggested<br>Resources<br>(Use of additional & various<br>resources from multiple<br>sources is necessary to meet<br>the TEKS)  |
|-------------------------------------|---|--|---|
| <p>1</p> <p>1</p> <p>1</p> <p>4</p> | <p><b>Scientific Processes:</b><br/> <b>1 A, B,</b><br/> <b>2 A, B, C, D, E</b><br/> <b>3 A, B, C, D, E</b><br/>                     (40% Course Requirement minimum)<br/>                     Ongoing / Integrated with concepts throughout unit.</p> <p><b>(5) Science concepts.</b> The student knows that energy transformations occur during physical or chemical changes in matter. The student is expected to:</p> <p>(A) identify changes in matter, determine the nature of the change, and examine the forms of energy involved;</p> <p>(B) identify and measure energy transformations and exchanges involved in chemical reactions; and</p> | <p><b>Objectives &amp; Activities:</b></p> <ul style="list-style-type: none"> <li>• List different changes in matter.</li> <li>• Determine cause of changes in matter.</li> <li>• Identify forms of energy transformations during physical and/or chemical changes in matter.</li> <li>• Examine energy conversions, specific heat and enthalpy of phase changes.</li> </ul> | <p>Graphs, Charts and Tables Activities:<br/> <a href="http://www.tenet.edu/teks/science/instruction/tutorial.html">http://www.tenet.edu/teks/science/instruction/tutorial.html</a></p> |

## Pre-AP Chemistry

Time Frame: 6<sup>th</sup> Six Weeks—*weeks 31-36* (page 2 of 4)

| T A K S<br>Objective(s) | Concept and Process TEKS<br>5 A, B, C<br>10 A, B<br>15 A, B<br>1-3   | Required Exemplar Labs,<br>“Calorimetry” and<br>Instructional Objectives and<br>Suggested Activities Integrating<br>Concepts & Processes  | Suggested<br>Resources<br>(Use of additional & various<br>resources from multiple<br>sources is necessary to meet<br>the TEKS)  |
|-------------------------|--|---|---|
| 4                       | <p>(D) measure the effects of the gain or loss of heat energy on the properties of solids, liquids, and gases.</p> <p><b>(15) Science concepts:</b><br/>The student knows factors involved in chemical reactions. The student is expected to:</p> <p>(A) verify the law of conservation of energy by evaluating the energy exchange that occurs as a consequence of a chemical reactions; and</p> <p>(B) relate the rate of a chemical reaction to temperature, concentration, surface area, and presence of a catalyst.</p> | <p><b>Objectives &amp; Activities:</b></p> <ul style="list-style-type: none"> <li>• Distinguish between potential and kinetic energy.</li> <li>• Relate chemical potential energy to the heat lost/ gained in chemical reactions.</li> <li>• Relate rates of chemical reactions to collisions between reaction particles.</li> <li>• Identify factors that affect the rates of chemical reactions.</li> <li>• Express the relationship between reaction rate to its concentration, temperature; surface areas and catalyst.</li> <li>• Recognize the characteristics of chemical equilibrium.</li> <li>• Write equilibrium expressions for systems that are at equilibrium.</li> <li>• Describe how Le Chatelier’s principle applies to equilibrium systems.</li> </ul> | <p>Snapshot Activities:<br/>15A, 15B, 12A, 12B, 12C, 14A, 14B, 14C, 14D</p> <p><a href="http://www.tenet.edu/teks/science/instruction/teksper.html">http://www.tenet.edu/teks/science/instruction/teksper.html</a></p> <p>TEXTTEAMS<br/>Chemistry Institute<br/>Activities.</p> |

## Pre-AP Chemistry

Time Frame: 6<sup>th</sup> Six Weeks—*weeks 31-36* (page 3 of 4)

| T A K S<br>Objective(s) | Concept and Process TEKS<br>5 A, B, C<br>10 A, B<br>15 A, B<br>1-3  | Required Exemplar Labs,<br>“Calorimetry” and<br>Instructional Objectives and<br>Suggested Activities Integrating<br>Concepts & Processes  | Suggested<br>Resources<br>(Use of additional & various<br>resources from multiple<br>sources is necessary to meet<br>the TEKS)   |
|-------------------------|---|---|--|
| 4                       | <p>(10) Science concepts. The student knows common oxidation-reduction reactions. The student is expected to:</p> <p>(A) identify oxidation-reduction processes; and</p> <p>(B) demonstrate and document the effects of a corrosion process and evaluate the importance of electroplating metals.</p> | <p><b>Objectives &amp; Activities:</b></p> <ul style="list-style-type: none"> <li>• Describe the process of oxidation and reduction.</li> <li>• Interpret redox reactions in terms of change in oxidation state.</li> <li>• Derive oxidation and reduction half-reactions from a redox equation.</li> <li>• Balance redox equations by the half-reaction method.</li> </ul> | <p>Snapshot Activities:<br/>10A, 10B, 9C, 9D,<br/>11C<br/><a href="http://www.tenet.edu/teks/science/instruction/teksperts.html">http://www.tenet.edu/teks/science/instruction/teksperts.html</a></p> <p>TEXTTEAMS<br/>Chemistry Institute<br/>Activities.</p> |

## Pre-AP Chemistry Alignment and Correlations Charts

Time Frame: 6<sup>th</sup> Six Weeks (page 4 of 4)

### TEKS/TAKS Correlations\*

| Chemistry<br>TEKS   | Prior<br>Knowledge (IPC &<br>Biology) TEKS                      | Subsequent Knowledge<br>(Physics) TEKS         | Exit level TAKS<br>Correlation |
|---|---|--|--------------------------------|
| Concepts:<br>10 a, b<br>9 c, d<br>11 c                    | IPC: 6d, 8c   | 7b   | Objectives 4, 5                |
| Processes:<br>1a, b<br>2 a, b, c, d, e<br>3 a, b, c, d, e | IPC: 1 a-b, 2 a-d, 3 a-e<br><br>Biology: 1 a-b, 2 a-d,<br>3 a-f | 1a, b<br>2 a, b, c, d, e, f<br>3 a, b, c, d, e | Objective 1                    |

*\*Refer to Appendix for complete TEKS and TAKS objectives.*

### Pre-AP Course Curricular Requirements\*\*

*\*\*See Appendix for Pre-AP/AP Alignment Chart*

### TEKS/National Science Education Standards Correlations\*\*\*

| TEKS   | National Science Education Standards   |
|--|--|
| Concepts:<br>10 a, b<br>9 c, d<br>11 c   | Physical Science Standard B<br>Physical Science Standard B<br>Science in Personal and Social Perspectives Standard F<br>Physical Science Standard B  |
| Processes:<br>1 a, b<br>2 a<br>2 b<br>2 c, d<br>2 e<br>3 a<br>3 b<br>3 c, d, e | Science as Inquiry Standard A<br>Science in Personal and Social Perspectives Standard F<br>Science as Inquiry Standard A<br>Science and Technology Standard E<br>Science and Technology Standard E<br>Science as Inquiry Standard A<br>Science and Technology Standard E<br>Science and Technology Standard E<br>Science as Inquiry Standard A<br>History and Nature of Science Standard G<br>Science as Inquiry Standard A<br>Science as Inquiry Standard A<br>History and Nature of Science Standard G |

*\*\*\*Refer to Appendix for complete TEKS Objectives and National Science Education Standards*

# APPENDIX

Texas Essential Knowledge and Skills (<http://www.tea.state.tx.us/teks/index.html>)  
Integrated Physics and Chemistry  
Biology  
Chemistry  
Physics

Texas Assessment of Knowledge and Skills Objectives  
(<http://www.tea.state.tx.us/student.assessment/taks/booklets/index.html>)  
Tenth Grade and Exit Level (10<sup>th</sup> and 11<sup>th</sup> Grade)

National Science Education Standards  
Science TEKS Toolkit Excerpts (<http://www.tenet.edu/teks/science/instruction/index.html>)  
Materials and Safety Equipment List  
Checklist for Science Field Investigations  
Science Facility Safety Checklist  
Laboratory Safety Survey  
Assessment Methods  
Web-Based Resources

Texas Environmental Education Advisory Committee Contact Information  
(<http://www.tea.state.tx.us/curriculum/teeac.html>)

Pre-AP and AP Science Scope and Sequence Grades 6-12

Required Exemplar Labs:

- \*\*\*"Density of Pennies (and Atomic Weights)" (CHEM-BIO)
- \*\*\*"Periodicity" (TI InterACTIVE Lab)
- "Conductivity" (Glencoe textbook)
- "Concentration & Reaction Rates" (Glencoe textbook)
- \*\*\*"Eating M&M's Causes Decay"
- "Hydrated Crystals" (Glencoe textbook)
- "Beer's Law" (Glencoe textbook)
- \*\*\*"Acid-Base Titration" (CHEM-BIO)
- "Gay-Lussac's Law" (Glencoe textbook)
- "Calorimetry" (Glencoe textbook)
- "Small Scale Redox" (J. Sada)

*\*\*\* These labs are **available from your Science Department Chair** and are **not** located in this document. (We do not have permission to print them in this document)*

## Chemistry Exemplar Labs

| Number | TEKS   | Exemplar Lab                            | Source   |
|--------|--------|---|--|
| 1.     | 4      | Density of Pennies (and Atomic Weights) | Adapted from T <sup>3</sup> CHEM_BIO Institute. Texas Instruments © 2000 p. 6-5 to 6-6 |
| 2.     | 6      | Periodicity                             | Adapted from TI-Interactive!, T. Morstein  |
| 3.     | 8      | Conductivity                            | Glencoe<br><i>Chemistry: Matter and Change</i><br><b>CHEMLAB 8</b>                     |
| 4.     | 17     | Concentration and Reaction Rates        | Glencoe<br><i>Chemistry: Matter and Change</i><br><b>CHEMLAB 17</b>                    |
| 5.     | 9      | Eating M&M's Causes Decay               | Adapted from K. Posio, Lopez High School   |
| 6.     | 11     | Hydrated Crystals                       | Glencoe<br><i>Chemistry: Matter and Change</i><br><b>CHEMLAB 11</b>                    |
| 7.     | 12, 13 | Beer's Law                              | Glencoe<br><i>Chemistry: Matter and Change</i><br><b>CHEMLAB 15</b>                    |
| 8.     | 14     | Acid-Base Titration                     | T <sup>3</sup> CHEM_BIO Institute. Texas Instruments © 2000 p. 6-39 to 6-41            |
| 9.     | 7      | Gay-Lussac's Law                        | Glencoe<br><i>Chemistry: Matter and Change</i><br><b>CBL LAB Manual 5</b>              |
| 10.    | 5      | Calorimetry                             | Glencoe<br><i>Chemistry: Matter and Change</i><br><b>CBL LAB Manual 7</b>              |
| 11.    | 10     | Small Scale Redox                       | J. Sada, Rivera High School  |

T<sup>3</sup> CHEM-BIO labs were distributed during the T<sup>3</sup> Training Institutes. Please see your Department Chair if you do not have copies.

# National Science Education Content Standards for Grades 9 - 12

| <b>Content Standard</b>                        |   |
|--|---|
| A: Science As Inquiry                          | Abilities to do scientific inquiry<br>Understandings about scientific inquiry   |
| B: Physical Science                            | Structure of atoms<br>Structure and properties of matter<br>Chemical reactions<br>Motions and forces<br>Conservation of energy and increase in disorder<br>Interactions of energy and matter              |
| C: Life Science                                | The cell<br>Molecular basis of heredity<br>Biological evolution<br>Interdependence of organisms<br>Matter, energy, and organization in living systems<br>Behavior of organisms                            |
| D: Earth and Space Science                     | Energy in the earth system<br>Geochemical cycles<br>Origin and evolution of the earth system<br>Origin and evolution of the universe  |
| E: Science and Technology                      | Abilities of technological design<br>Understandings about science and technology  |
| F: Science in Personal and Social Perspectives | Personal and community health<br>Population growth<br>Natural resources<br>Environmental quality<br>Natural and human-induced hazards<br>Science and technology in local, national, and global challenges |
| G: History and Nature of Science               | Science as a human endeavor<br>Nature of scientific knowledge<br>Historical perspectives  |