

# Managed Curriculum



## Chemistry

2011-2012 School Year



**John White, RSD Superintendent**

Chemistry  
High School



2011-2012  
The Managed Curriculum

GEE Science Test Specification		
Strand	Multiple Choice	Short Answer (2 pts each)
Science as Inquiry	8	0
Physical Science	10	1
Life Science	10	1
Earth and Space	6	1
Science and the Environment	6	1
Comprehensive Science Task		
1 Extended Response from 1 of 4 strands for 4 points (not from Earth and Space Science or Science and the Environment)		
Science as Inquiry Dimension 1	1	
Science as Inquiry Dimension 2	2	

**Opening of School Introductory Unit**

**Focus on Pacing**

There is a natural tendency, when using new materials, to begin more slowly. However, because there is so much mathematics content to review and teach in the course of a year, it is expected that you set the pace at the beginning of the school year. Students generally adjust to the pace of the teacher. This will ensure that ALL of the concepts will be covered prior to testing (GLEs).

There may be times when it will seem difficult to maintain the pace. But it is important to understand that a slow pace can make it too easy to lose perspective and difficult to relate ideas. If you spend too much time on certain lessons, you will find that your slowest students may have learned more by having gone through content slowly, but the other students may have learned less. The wise teacher strikes a balance, goes quickly enough to keep things interesting but slowly enough to have time for explanations. Make adjustments for students with special needs: individualized lessons, learner center activities, additional homework and/or extended day/week/year opportunities.

**Teachers should use this unit to:**

- develop classroom culture and establish classroom routines
- administer Pre test to determine students' strengths and weaknesses
- practice and use test taking strategies
- discuss , model and reinforce *Science Safety*

**Teaching NOTE:** *It is expected that Student Assessments will provide feedback regarding students' understanding and/or mastery of required concepts. This information should be utilized for re teaching and provide input to make ongoing adjustments to lesson plans.*

**Suggested Resources**

- CHAMP Module 4
- Review science safety contract
- Review Test Taking Strategies
- Louisiana Guide to Statewide Assessment

## Unit 1: Measurements and Problem Solving

### Unit Description

This unit focuses on measurements and problem solving with an emphasis on applying these skills in the laboratory.

### Student Understandings

Students understand how to record mathematical data correctly and to solve problems utilizing significant digits, scientific notation, unit conversions and the factor-label (dimensional analysis) method in calculations.

### Guiding Questions

Can students...

- use lab safety procedures correctly and consistently?
- explain the importance of standard units of measurement?
- determine the precision of a measuring instrument and relate the number of significant figures to that precision?
- explain how measurements may be precise but not accurate?
- demonstrate their knowledge of expressing numbers in correct scientific notation and significant figures in experimental calculations and other problem-solving situations?
- use the factor-label method of solving problems to perform metric conversions?
- convert measured quantities into other standard units?

Teaching Objectives	GLEs	LCC Activities	Suggested Resources
<b>Students will:</b> <ul style="list-style-type: none"> <li>• differentiate between accuracy and precision.</li> <li>• determine significant figures &amp; use scientific notation.</li> <li>• identify appropriate safety measures for lab.</li> <li>• conduct an investigation with multiple trials &amp; display &amp; analyze results.</li> <li>• use mathematics to solve problems.</li> <li>• use factor-label method to convert units.</li> </ul>	<b>SI:</b> 4, 5  <b>PS:</b> 3, 4,	LCC Activity 1  LCC Activity 2	Glencoe – Chemistry Chapter 1 <a href="http://www.labsafety.org/pdf/Students_Safety_Contract.pdf">http://www.labsafety.org/pdf/Students_Safety_Contract.pdf</a>  <i>Specific Assessment Rubric BLM</i> EPIC – Chemistry Module 1- Lessons 2, 3, and 4
<b>Students will:</b> <ul style="list-style-type: none"> <li>• conduct an investigation with multiple trials &amp; display &amp; analyze results</li> <li>• utilize mathematics, organizational tools, and graphing to solve problems</li> <li>• use factor-label method to convert metric units</li> <li>• utilize mathematics, organizational tools, and graphing to solve problems</li> <li>• choose appropriate models to explain results</li> </ul>	<b>SI:</b> 1, 3, 4, 5, 7, 10, 15  <b>PS:</b> 1, 2,3, 4,	LCC Activity 3 LCC Activity 4 LCC Activity 5	Glencoe – Chemistry Chapter 2 EPIC – Chemistry Module 1- Lessons 5 & 6  <i>Accuracy and Precision BLM</i>

### Teacher Reflection on Content Coverage

Can students...

- use lab safety procedures correctly and consistently?
- explain the importance of standard units of measurement?
- determine the precision of a measuring instrument and relate the number of significant figures to that precision?
- explain how measurements may be precise but not accurate?
- demonstrate their knowledge of expressing numbers in correct scientific notation and significant figures in experimental calculations and other problem-solving situations?
- use the factor-label method of solving problems to perform metric conversions?
- convert measured quantities into other standard units?

## Unit 2: Matter

### Unit Description

This unit focuses on the classification, properties, and changes of matter.

### Student Understandings

Students understand the organization of matter, its chemical and physical properties, and the chemical and physical changes it undergoes. Students will demonstrate their understanding by molecular level drawings, classifying various properties and changes as either chemical or physical, and providing evidence to support their decisions.

### Guiding Questions

Can students...

- describe, differentiate, and provide examples of elements, compounds, and mixtures?
- describe, differentiate, and provide examples of physical properties, physical changes, chemical properties, and chemical changes?
- use their knowledge of physical properties and changes to separate an unknown mixture
- describe, differentiate, and provide examples of solids, liquids, and gases

Teaching Objectives	GLEs	LCC Activities	Suggested Resources
<p><b>Students will:</b></p> <ul style="list-style-type: none"> <li>- plan and conduct an investigation, choose appropriate models to display data, and draw conclusions</li> <li>- predict physical &amp; chemical properties of an element</li> <li>- separate substances in a mixture</li> <li>- describe chemical changes</li> <li>- identify unknowns as elements, compounds, or mixtures</li> <li>- predict physical &amp; chemical properties of an element</li> </ul>	<p><b>SI:</b> 1, 3, 4, 5, 7, 9, 10, 15</p> <p><b>PS:</b> 15*, 21*, 31*</p>	<p>LCC Activity 1 LCC Activity 2 LCC Activity 3 LCC Activity 4 LCC Activity 5 LCC Activity 6</p>	<p>Glencoe – Chemistry Chapter 3 EPIC – Chemistry Module 2 - Lesson 1, 2 &amp; 6 Module 4 – Lesson 6 <i>Copy Card Sort Template 1 &amp; 2 BLM</i> <i>Sample Word Grid BLM</i> <i>Three Worlds of Chemistry BLM</i> <i>Density BLM</i> <i>Split-page Notetaking BLM</i></p>

### Teacher Reflection on Content Coverage

Can students...

- describe, differentiate, and provide examples of elements, compounds, and mixtures?
- describe, differentiate, and provide examples of physical properties, physical changes, chemical properties, and chemical changes?
- use their knowledge of physical properties and changes to separate an unknown mixture
- describe, differentiate, and provide examples of solids, liquids, and gases



*Teacher Reflection on Content Coverage*

Can students...

- trace the development of the atomic theory through modern times?
- represent the structure of the atom using a variety of models?
- predict the physical properties, chemical properties, and bonding potential of an element based on its location on the periodic table and provide the rationales for the predictions?
- differentiate between mass number and atomic mass and relate these terms to isotopes of elements?
- identify the types of radiation and radioactive decay and give an example of each?
- explain what is meant by *half-life* of a radioactive substance?
- describe the benefits of using radioactive substances?

## Unit 4: Chemical Bonding and the Formation of Compounds

### Unit Descriptions

This unit focuses on bonding, molecular shape, intermolecular forces, and chemical formulas.

### Students Understandings

Students will understand how to predict the type of chemical bond in a compound by using the periodic table and Lewis dot structures to model bond type. The student will be able to understand how to predict the shape of simple molecules by drawing Lewis Structures showing the correct molecular geometry. The student will understand intermolecular forces of attraction and their impact on the physical and chemical properties of substances.

### Guiding Questions

Can students...

- predict the bond type of a compound?
- predict the molecular geometry of simple compounds?
- predict the physical and chemical properties of a substance based on the type of bond and intermolecular forces present in the substance?
- write formulas and compounds?

Teaching Objectives	GLEs	LCC Activities	Suggested Resources
<p><b>Students will:</b></p> <ul style="list-style-type: none"> <li>- draw accurate valence electron configurations and Lewis dot structures.</li> <li>- identify the number of bonds an atom can form.</li> <li>- predict the stable ions an element is likely to form when it reacts with other specified elements.</li> <li>- utilize mathematics, organizational tools, and graphing to solve problems.</li> <li>- express concentrations in terms of molarity, molality &amp; normality.</li> <li>- compute % composition, empirical formulas, &amp; molecular formulas of compounds.</li> <li>- write &amp; name formulas for ionic &amp; covalent compounds.</li> <li>- write &amp; name the chemical formula for products formed.</li> <li>- write a balanced chemical equation from a word equation.</li> <li>- write &amp; name formulas for ionic &amp; covalent compounds.</li> <li>- write &amp; name the chemical formula for products formed.</li> <li>- write a balanced chemical equation from a word equation.</li> <li>- describe chemical changes by developing word equations, balanced formula equations, and net ionic equations.</li> <li>- relate the law of conservation of matter to the rearrangement of atoms in a balanced formula.</li> </ul>	<p><b>SI:</b> 5, 7</p> <p><b>PS:</b> 5*, 6*, 7*, 9*, 13*, 16*, 20*, 34*, 38*, 40*</p>	<p>Glencoe – Chemistry Chapter 8, 9 and 11;</p> <p>LCC Activity 1 LCC Activity 2 LCC Activity 3 LCC Activity 4 LCC Activity 5 LCC Activity 6</p>	<p>EPIC – Chemistry</p> <p>Module 6 – Lesson 4</p> <p>Module 5 – Lesson 2</p>

***Teacher Reflection on Content Coverage***

Can students...

- predict the bond type of a compound?
- predict the molecular geometry of simple compounds?
- predict the physical and chemical properties of a substance based on the type of bond and intermolecular forces present in the substance?
- write formulas and compounds?

## Unit 5: Moles, Reactions and Stoichiometry

### Unit Descriptions

This unit focuses on chemical changes, the mole, the law of conservation of matter, writing, interpreting and balancing chemical equations.

### Students Understandings

Student will understand the mole concept and its relationship to formulas and equations by examining data and solving mathematical problems. They will also be able to write, balance, classify, and interpret chemical equations.

### Guiding Questions

Can students...

- describe the mole as a counting word/quantity and demonstrate the ability to solve mole conversion problems?
- experimentally determine a chemical formula of a compound?
- express chemical reactions using correct, balanced formula equations?
- Identify the basic types of chemical reactions and write balanced chemical equations?
- predict the products of simple reactions, oxidation/reduction, and formation of precipitates?
- explain the law of conservation of matter?
- use balanced equations to solve mass/mass, mass/volume, volume/volume, and mole/mole problems?
- discuss environmental issues related to the use and storage of chemicals?

Teaching Objectives	GLEs	LCC Activities	Suggested Resources
<b>Students will:</b> <ul style="list-style-type: none"> <li>- predict the bond type by using periodic table.</li> <li>- model chemical bond formation using Lewis dot diagrams.</li> <li>- predict the bond type by using periodic table.</li> <li>- model chemical bond formation using Lewis dot diagrams.</li> </ul>	<b>SI:</b> 5, 7, 9, 10, 15  <b>PS:</b> : 22*, 23*	LCC – Activity 1 LCC – Activity 2 LCC – Activity 3 LCC – Activity 4	Glencoe – Chemistry Chapter 8 and 9  EPIC – Chemistry Module 5 – Lesson 3, 4, & 5
<b>Student will:</b> <ul style="list-style-type: none"> <li>- graph and compute the energy changes that occur during phase change</li> <li>- measure and graph energy changes during chemical reactions</li> <li>- predict products (with phase notations) of simple reactions, including acid/base</li> </ul>	<b>SI:</b> 1, 4, 7, 9,10  <b>PS:</b> 35*, 42*, 44*	LCC – Activity 7 LCC – Activity 8 Glencoe – Chemistry p. 409  LCC – Activity 1	EPIC – Chemistry  Module 6 (part B) lesson 3 Module 5 (part B) lesson 1 Glencoe – Chemistry Chapter 19

Teaching Objectives	GLEs	LCC Activities	Suggested Resources
<p><b>Students will:</b></p> <ul style="list-style-type: none"> <li>- describe chemical changes and reactions using diagrams.</li> <li>- describe chemical changes by developing word equations, balanced formula equations &amp; net ionic equations.</li> <li>- predict products of simple reactions.</li> <li>- relate the law of conservation of matter to the rearrangement of atoms in a balanced chemical equation.</li> <li>- identify the substances gaining and losing electrons in simple oxidation-reduction reactions.</li> <li>- apply knowledge of stoichiometry to solve mass/mass, mass/volume, volume/volume, and mole/mole problems .</li> </ul>	<p><b>SI:</b> 3, 5, 6, 9, 10, 15</p> <p><b>PS:</b> 31*,34*, 35*,36*, 38*, 39*, 41*</p>	<p>LCC- Activity 2 LCC- Activity 3 LCC-Activity 4 LCC – Activity 5</p> <p>Glencoe – Chemistry p. 63-65, Chapter 12 &amp; 20</p>	<p>EPIC – Chemistry Module 6 (part A) – Lessons 2 , 3, and 4</p> <p>Module 3 (part B) – lesson 5 and 6</p>
<p><b>Students will:</b></p> <ul style="list-style-type: none"> <li>- identify unknowns as elements, compounds, or mixtures.</li> <li>- describe the influence of intermolecular forces on the physical &amp; chemical properties of covalent compounds.</li> <li>- identify unknowns as elements, compounds, or mixtures.</li> <li>- express concentrations in terms of molarity, molality &amp; normality.</li> <li>- design and conduct a lab in which physical properties are used to separate mixtures.</li> </ul>	<p><b>SI:</b> 1, 3, 5, 9, 15</p> <p><b>PS:</b> 14*, 20*, 21*,24*, 46*</p>	<p>LCC – Activity 5 LCC- Activity 6 LCC- Activity 7 LCC- Activity 8</p> <p>Glencoe – Chemistry p. 259-261; 393-395; 476-480, p.69; 462-470</p>	<p>EPIC – Chemistry</p> <p>Module 5 – Lesson 5</p> <p>Module 6 – Lesson 5</p>
<p><b>Teacher Reflection on Content Coverage</b></p> <p>Can students...</p> <ul style="list-style-type: none"> <li>• describe the mole as a counting word/quantity and demonstrate the ability to solve mole conversion problems?</li> <li>• experimentally determine a chemical formula of a compound?</li> <li>• express chemical reactions using correct, balanced formula equations?</li> <li>• Identify the basic types of chemical reactions and write balanced chemical equations?</li> <li>• predict the products of simple reactions, oxidation/reduction, and formation of precipitates?</li> <li>• explain the law of conservation of matter?</li> <li>• use balanced equations to solve mass/mass, mass/volume, volume/volume, and mole/mole problems?</li> <li>• discuss environmental issues related to the use and storage of chemicals?</li> </ul>			

## Unit 6: States of Matter, Energy Changes, and LeChatelier's Principle

### Unit Descriptions

This unit focuses on developing a quantitative understanding of the behavior of gases and energy changes that occur during the substance phase changes and chemical reactions. Additional focus is placed on understanding the shift in equilibrium and LeChatelier's Principle.

### Students Understandings

Students develop an understanding of the relationships between temperature, pressure, volume and moles of gases and skill in solving gas law problems. Students also comprehend state changes at the molecular level and exothermic and endothermic processes. Students will be able to predict the direction of a shift in equilibrium in a system as a result of stress by using LeChatelier's Principle

### Guiding Questions

Can students...

- predict the behavior of a known quantity of gas using Boyle's law, Charles's Law, Gay Lussac's Law, Avogadro's Law, and the Ideal Gas Law?
- describe the experimental study known as calorimetry and how it incorporates specific heat and latent heat of fusion or vaporization?
- compare the amount of activation energy for an endothermic reaction and an exothermic reaction?
- produce and interpret a temperature-time graph as a substance passes through phase changes?
- Can students predict the direction of a shift in equilibrium in a system as a result of stress by using LeChatelie's Principle?

Teaching Objectives	GLEs		Suggested Resources
<b>Students will:</b> <ul style="list-style-type: none"> <li>- predict the properties of a gas based on gas laws.</li> <li>- solve problems involving heat flow and temperature changes by using known values of specific heat and latent heat of phase change.</li> <li>- graph and compute the energy changes that occur during phase change.</li> </ul>	<b>SI:</b> 1,5,6,7,9,10, 11, 15  <b>PS:</b> 29*, 30*, 43*	LCC – Activity 1-3 LCC – Activity 4 LCC – Activity 5 LCC – Activity 6	EPIC – Chemistry Module 2 (part B) – lessons 1 & 2 Module 1 (part B) – lesson 2 Module 1 (part B) – lesson 5  Module 6 – (part B) lesson 4 Glencoe – Chemistry Chapter 14 & 16 , p.404-409
<b>Students will:</b> <ul style="list-style-type: none"> <li>- assess environmental issues .</li> <li>- predict the direction of a shift in equilibrium in a system as a result of stress by using Lechatelier's principle.</li> </ul>	<b>SI:</b> 4, 9, 10, 15  <b>PS:</b> 37*, 47*	LCC – Activity 8,9,6	EPIC – Chemistry Module 4 (part B) – lesson 3 Glencoe – Chemistry Chapter 26 Glencoe – Chemistry p. 569-571; p. 584

### Teacher Reflection on Content Coverage

Can students...

- predict the behavior of a known quantity of gas using Boyle's law, Charles's Law, Gay Lussac's Law, Avogadro's Law, and the Ideal Gas Law?
- describe the experimental study known as calorimetry and how it incorporates specific heat and latent heat of fusion or vaporization?
- compare the amount of activation energy for an endothermic reaction and an exothermic reaction?
- produce and interpret a temperature-time graph as a substance passes through phase changes?
- predict the direction of a shift in equilibrium in a system as a result of stress by using LeChatelie's Principle?

## Unit 7: Solutions, and Acids and Bases

### Unit Description

The focus of this unit is solutions, colligative properties, and acid-base chemistry.

### Student Understandings

The student will understand solutions, including the effect of the action of solute particles on the properties of the solvent, by solving math problems and investigating the change in freezing points and boiling points of sugar and salt water solutions. The student will understand the relationship between acids, bases, salts, pH, and titration by investigating the properties of acids and bases and their reactions with various acid-base indicators. Titrations, both experimentally and mathematically, will be used to explain the connection between acids, bases, and pH.

### Guiding Question

Can students ...

- explain the difference between mixtures and solutions?
- demonstrate their knowledge of various concentration units through problem solving that involves real and hypothetical solutions?
- predict and determine the conductivity, freezing point, and boiling point from the known concentration of a solution?
- explain the chemical and physical properties of acids and bases?
- explain the meaning and use of pH?
- demonstrate knowledge in calculations involving pH, pOH, [H<sup>+</sup>], and/or [OH<sup>-</sup>]?
- describe the process of acid-base titrations and demonstrate knowledge application through experimental calculations?
- describe the role of indicators in acid-base titrations?

Teaching Objectives	GLEs		Suggested Resources
<b>Students will:</b> <ul style="list-style-type: none"> <li>- determine the concentration of an unknown acid or base by using data from a titration</li> <li>- calculate pH of acids and bases and salt solutions based on the concentration of hydronium and hydroxide ions</li> </ul>	<b>SI:</b> 4,5, 6, 9, 10, 15  <b>PS:</b> 32*, 33*	LCC – Activity 2 LCC – Activity 3  Glencoe – Chemistry Chapter 19	EPIC – Chemistry Module 5 (part B) lesson 2 and 5
<b>Students will:</b> <ul style="list-style-type: none"> <li>- calculate the predicted change in a solutions boiling and freezing points.</li> <li>- predict the conductivity of a solution.</li> <li>- write &amp; name chemical formula for products formed in a reaction.</li> <li>- write a balanced symbolic equation.</li> <li>- describe chemical changes and reactions using diagrams.</li> <li>- give examples of common chemical reactions.</li> </ul>	<b>SI:</b> 1, 4, 5, 6, 9, 10  <b>PS:</b> 6*, 7*, 18*, 19*, 31*, 45*	LCC – Activity 9 LCC – Activity 10 LCC- Activity 11  Glencoe – Chemistry p. 471-473;  LCC- Activity 1  Glencoe - Chemistry p.277-283:	EPIC – Chemistry Module 6 – Lesson 5  Module 1 (part B) – lesson 6  Module 4 (part B) – lesson 1

*Teacher Reflection on Content Coverage*

Can students...

- explain the difference between mixtures and solutions?
- demonstrate their knowledge of various concentration units through problem solving that involves real and hypothetical solutions?
- predict and determine the conductivity, freezing point, and boiling point from the known concentration of a solution?
- explain the chemical and physical properties of acids and bases?
- explain the meaning and use of pH?
- demonstrate knowledge in calculations involving pH, pOH,  $[H^+]$ , and/or  $[OH^-]$ ?
- describe the process of acid-base titrations and demonstrate knowledge application through experimental calculations?
- describe the role of indicators in acid-base titrations?

## Unit 8: Carbon and its Compounds

### Unit Description

This unit focuses on a basic understanding of organic compounds. The unit allows students to explore how carbon forms bonds, the structural formulas of carbon compounds, and how carbon compounds are classified based on their functional groups and structures.

### Student Understandings

The student understands that carbon-based substances or organic materials form the basic compounds that are found in living systems, energy sources (oil and gas), alcohols, etc. The student demonstrates his/her understanding of the basics by classifying, naming, and drawing simple carbon compounds and the reactions they undergo.

### Guiding Questions

Can students...

- explain the differences between diamonds and graphite?
- describe the hybridization of the carbon atom to explain single, double, and triple bonds as well as molecular shapes?
- classify, name, and draw structural formulas for carbon compound molecules?
- classify, name, and draw structural formulas for carbon compounds with different functional groups?

Teaching Objectives	GLEs		Suggested Resources
<b>Student will:</b> <ul style="list-style-type: none"> <li>- name selected structural formulas of organic compounds.</li> <li>- differentiate common biological molecules.</li> </ul>	<b>SI:</b> 6, 7, 14  <b>PS:</b> 25*, 26*	LCC – Activity 1 LCC – Activity 2  Glencoe – Chemistry Chapter 22	EPIC – Chemistry Module 5 (part A) Lesson 5
<b>Students will:</b> <ul style="list-style-type: none"> <li>- investigate and model hybridization in carbon compounds.</li> <li>- name, classify, and diagram alkanes, alkenes, and alkynes.</li> </ul>	<b>SI:</b> 7  <b>PS:</b> 25, 26, 27*, 28*	LCC – Activity 3  Glencoe – Chemistry Chapter 22	Glencoe- Chemistry, Chapter 22 EPIC- Chemistry Module 5 (Part A) Lesson 5