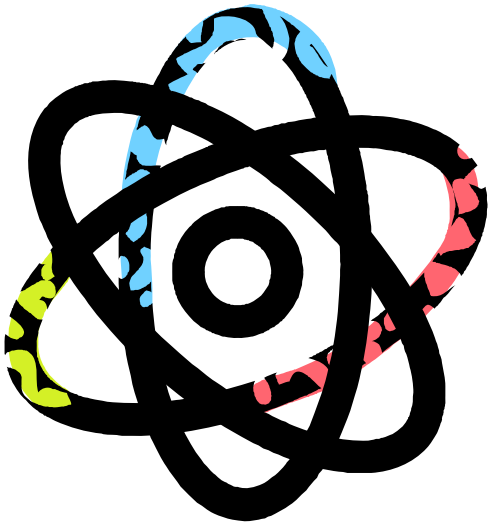
11th Grade Chemistry Curriculum



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COURSE: Chemistry
UNIT 1: Introduction to Chemistry
CONTACT: athompson@bridgeportedu.net
TIME FRAME: 4 Weeks

CODE:
MAP LEVEL: 4
GRADE: 11

PERFORMANCE STANDARDS

SCIENCE - SCIENTIFIC INQUIRY (I)

27.1.1.0.1 Students will make observations and ask questions about objects, organisms and the environment.
27.1.1.6.5 Students will use appropriate tools and techniques to make observations and gather data.
27.1.1.0.7 Students will use standard tools to measure and describe physical properties such as weight, length and temperature.
27.1.1.3.4 Students will employ simple equipment and measuring tools to gather data and extend the senses.
27.1.1.3.9 Students will use measurement tools and standard units (e.g., centimeters, meters, grams, kilograms) to describe objects and materials.
27.1.1.3.10 Students will use mathematics to analyze, interpret and present data.

SCIENCE - SCIENTIFIC INQUIRY (I)

27.1.1.6.7 Students will identify and present relationships between variables in appropriate graphs.
27.1.1.6.1 Students will identify questions that can be answered through scientific investigation.
27.1.1.6.4 Students will identify independent and dependent variables, and those variables that are kept constant, when designing an experiment.

SCIENCE - PHYSICAL SCIENCE (II, III, IV)

27.2.2.6.2 Students will describe how the properties of simple compounds, such as water and table salt, are different from the properties of the elements of which they are made.
27.2.2.6.3 Students will explain how mixtures can be separated by using the properties of the substances from which they are made, such as particle size, density, solubility and boiling point.

ESSENTIAL/FOCUS QUESTIONS

Essential Questions:

What is the scientific method and how is it used for problem solving?
How is dimensional analysis used to solve problems in chemistry?

Focus Questions:

What is the definition of chemistry?
What are the basic lab safety rules?
What are the steps of the scientific method?
What units are used in science for measuring length, mass, and volume?
What are metric prefixes and how are they used?
What are significant digits and how are they used?
What is the difference between precision and accuracy?
How do you calculate percent error?
How do you calculate density?
What are the characteristics of each of the states of matter?
What is the difference between physical and chemical change/properties?
What are two basic types of mixtures?
What is the difference between a mixture and a pure substance?
What is the difference between an element and a compound?

CONTENT

Scientific Method
Numerical Problems
Metric Units
Dimensional Analysis
Classification of Matter

SKILLS

Students Will Be Able To:

Define Chemistry (1-1)
List the Basic Safety Rules for Lab (1-3 & handout)
Explain the scientific method and why it is important (1-2 and lab)
List the basic SI units and the quantities they describe (1-4)
Use metric prefixes to convert metric units (1-4, 7)
Use significant figures and scientific notations (1-6)
Explain the difference between accuracy and precision (1-5)
Calculate the percent error (1-6)
Determine the density of liquids and solids (1-6 and lab)
Use dimensional analysis for converting between units (1-7)
Classify matter (2-3 through 5)

ASSURED EXPERIENCES

Density Lab

ASSESSMENTS

Tests
Quizzes
Lab Reports
Homework

OPTIONAL ACTIVITIES

Graphing Activity

Making measurements

Mathematical manipulations

RESOURCES

Textbook: “Chemistry – connections to our changing world” chapters 1& 2
Teacher Handouts

ADDITIONAL NOTES

Instructional Strategies:

Create a climate for learning
Assess prior knowledge
Practice effective questioning techniques
Vary the structure of lessons
Vary the way students work
Use warm-up activities
Create and embed STS (science, technology, and society) activities
Strengthen comprehension for content-area text
Common assessments within and across all disciplines
Allow opportunities for peer review
Direct instruction
Classroom discussion
Graphic organizers
Cooperative learning strategies
Higher order thinking skills

VOCABULARY

accuracy	heterogeneous mixture	observation
base unit	homogeneous mixture	percent error
chemical change	hypothesis	physical change
chemical property	International System of Units (SI)	physical property
chemistry	law of conservation of matter	precision
compound	liquid	pure substance
density	mass	scientific method
dimensional analysis	matter	significant digit
element	metric prefix	solid
experiment	metric system	theory
gas	mixture	variable
		volume

COURSE: Chemistry
UNIT 2: 2 Atomic Structure and Periodic Properties
CONTACT: athompson@bridgeportedu.net
TIME FRAME: 6 Weeks

CODE:
MAP LEVEL: 4
GRADE: 11

PERFORMANCE STANDARDS

SCIENCE - SCIENTIFIC INQUIRY (I)

27.1.1.0.7 Students will use standard tools to measure and describe physical properties such as weight, length and temperature.
27.1.1.3.3 Students will design and conduct simple investigations.
27.1.1.3.6 Students will analyze, critique and communicate investigations using words, graphs and drawings.
27.1.1.3.10 Students will use mathematics to analyze, interpret and present data.
27.1.1.6.4 Students will identify independent and dependent variables, and those variables that are kept constant, when designing an experiment.
27.1.1.9.9 Students will articulate conclusions and explanations based on the results of the research, and assess their validity based on the design of the investigation.

SCIENCE - PHYSICAL SCIENCE (II, III, IV)

27.2.2.2.18 Students will describe differences in the physical properties of solids and liquids.
27.2.2.3.2 Students will describe the effect of heating on the melting, evaporation, condensation and freezing of water.
27.2.2.6.1 Students will describe the properties of common elements such as oxygen, hydrogen, carbon, iron and aluminum.
27.2.2.6.2 Students will describe how the properties of simple compounds, such as water and table salt, are different from the properties of the elements of which they are made.
27.2.2.6.3 Students will explain how mixtures can be separated by using the properties of the substances from which they are made, such as particle size, density, solubility and boiling point.
27.2.2.9.10 Students will describe the general structure of the atom, and explain how the properties of the first 10 elements in the Periodic Table are related to their atomic structure.

ESSENTIAL/FOCUS QUESTIONS

Essential Questions:

What is the structure of the atom and how was this model developed?
How is the structure of an atom related to the properties of matter?

Focus Questions:

1. What are atoms?
2. What are the postulates of Dalton's atomic theory?
3. What did cathode rays reveal about atoms?
4. What did Rutherford's gold foil experiment reveal about the atom?
5. What are the names and properties of the three subatomic particles?
6. How can the number of protons, neutrons, and electrons in an atom or ion be determined?
7. What is atomic mass?
8. What is an isotope?
9. What is the law of conservation of mass?
10. What are the laws of definite and multiple proportions?
11. What is a line spectrum and how does the Bohr model explain it?
12. What is an atomic orbital?
13. How do s,p,d,and f orbitals compare in size, shape, and energy?
14. How is an atoms electron configuration determined?
15. What is the periodic law?
16. How did Dobereiner, Newlands, Mendeleev, and Moseley each help to develop the modern periodic table?
17. Why do elements in a group have similar properties?
18. What are the four blocks of the periodic table?
19. What are the properties of metals, non-metals, and metalloids?
20. How can metals, non-metals and metalloids be determined from their position on the periodic chart?
21. What is a periodic trend?
22. What are four important periodic trends and how are they related to the electronic configuration of the element?
23. What are the names of some common families of elements?

CONTENT

Atomic Structure
Electron Configuration
Periodic Table

SKILLS

(Atomic Structure) Students Will Be Able To:

1. Discuss the history of the atom, including the contributions of Dalton, Thomson, Rutherford, and Bohr. (3-1-3; 5-1)
2. Name and describe the subatomic particles and list the number of protons, neutrons and electrons in an atom or ion. (3-3)
3. Define isotopes and give examples. (3-3)
4. Define atomic mass. (3-3)
5. State the laws of conservation of mass, definite proportions and multiple proportions. Explain the basis of each. (3-1)
6. Define atomic number and mass number and their relationship to isotopes. (3-3)
7. Given the number of particles, determine the atomic number and mass number. (3-3)
8. Define what is meant by a quantum of energy. (4-2)
9. Develop a model of the atom involving charge clouds.(4-2)

(Electron Configurations) Students Will Be Able To:

1. Explain the relationships among electrons, orbitals, energy levels, and sublevels.(4-4)
2. State the maximum number of electrons in any given energy level or sublevel. (4-4)
3. Define the Pauli exclusion principle and Hund's Rule as it relates to electron configuration .(4-4)
4. Write an electron configuration for any atom and determine the number of valence electrons, (4-5)

(Periodic Table) Students Will Be Able To:

1. Discuss the contributions of Mendeleev and Mosley to the periodic table.(5-1)
2. State the periodic law. *(5-1)
3. Explain why elements in a group have similar properties. (5-2)
4. Distinguish between metals, nonmetals, and metalloids (include conductivity/super conductions). (5-2)
5. Identify an element as an alkali metal, alkaline earth metal, halogen or noble gas.(5-2)
6. Name and locate the four orbital blocks on the periodic table. (5-2)
7. Define the term periodic trend and explain how each trend reflects electron configuration. (5-3)
8. Explain trends in ionization energy and electronegativity, and atomic radii. .(5-3)
9. State the general reactivity trends for elements in a period and in a group. (5-3)

ASSURED EXPERIENCES

Flame Test Lab

ASSESSMENTS

Tests
Quizzes
Lab reports
Homework

OPTIONAL ACTIVITIES

Electron level filling
Lewis dot structures
Periodic trend lab
Reactivity trends demo

RESOURCES

Textbook:
Chemistry – connections to our changing world, Chapters 3-5

Teacher handouts

ADDITIONAL NOTES

Instructional Strategies:

Create a climate for learning
Assess prior knowledge
Practice effective questioning techniques
Vary the structure of lessons
Vary the way students work
Use warm-up activities
Create and embed STS (science, technology, and society) activities
Strengthen comprehension for content-area text
Common assessments within and across all disciplines
Allow opportunities for peer review
Direct instruction
Classroom discussion
Graphic organizers
Cooperative learning strategies
Higher order thinking skills
Outlines/drawings
Internet research
Integrate technology lessons/activities
Library research
Hands-on laboratory research skills
Laboratory activities

Audio-visual enhancements

VOCABULARY

abbreviated electron configuration	group	periodic law
alkali metal	halogen	periodic table
alkaline earth metal	ion	photoelectric effect
atom	ionization energy	periodic trend
atomic mass	isotope	photon
atomic mass unit	law of constant composition	proton
atomic number	line spectrum	Planck's constant
atomic radius	mass number	principal energy level
atomic theory of matter	metal	quantum
cathode ray	noble gas	quantum-mechanical model
cathode ray tube	noble gas inner core	quantum number
electron	nonmetal	radioactivity
electron affinity	neutron	semimetal/metaloid
electron configuration	nucleus	sublevel
electron density	orbital	uncertainty principle
electronegativity	orbital diagram	valence electron
excited state	period	
family		
ground state		

COURSE: Chemistry
UNIT 3: Chemical Compounds & Mole Calculations
CONTACT: athompson@bridgeportedu.net
TIME FRAME: 5 Weeks

CODE:
MAP LEVEL: 4
GRADE: 11

PERFORMANCE STANDARDS

SCIENCE - SCIENTIFIC INQUIRY (I)

27.1.1.0.2 Students will use senses and simple measuring tools to collect data.
27.1.1.0.4 Students will read, write, listen and speak about observations of the natural world.
27.1.1.0.7 Students will use standard tools to measure and describe physical properties such as weight, length and temperature.
27.1.1.3.6 Students will analyze, critique and communicate investigations using words, graphs and drawings.
27.1.1.3.9 Students will use measurement tools and standard units (e.g., centimeters, meters, grams, kilograms) to describe objects and materials.

SCIENCE - SCIENTIFIC INQUIRY (I)

27.1.1.6.5 Students will use appropriate tools and techniques to make observations and gather data.
27.1.1.6.8 Students will draw conclusions and identify sources of error.
27.1.1.9.1 Students will identify questions that can be answered through scientific investigation.
27.1.1.9.3 Students will formulate a testable hypothesis and demonstrate logical connections between the scientific concepts guiding the hypothesis and the design of the experiment.
27.1.1.9.8 Students will use mathematical operations to analyze and interpret data, and present relationships between variables in appropriate forms.

SCIENCE - PHYSICAL SCIENCE (II, III, IV)

27.2.2.9.11 Students will describe how atoms combine to form new substances by transferring electrons (ionic bonding) or sharing electrons (covalent bonding).

27.2.2.9.13 Students will explain how the structure of the carbon atom affects the type of bonds it forms in organic and inorganic molecules.

ESSENTIAL/FOCUS QUESTIONS

Essential Questions

How are chemical compounds named?
What is a mole and why is it important in chemistry?

Focus Questions

1. What is an ionic bond?
2. What is a covalent bond?
3. What is the difference between a polar and non-polar bond?
4. How are ionic compounds, molecular compounds and acids named?
5. What is Avogadro's number and how is it related to a mole?
6. What is molar mass?
7. What is the molar volume of a gas?
8. What is percentage composition of a substance?
9. How are empirical formulas calculated?
10. What is a molecular formula and how is it found?

CONTENT

Chemical Bonding
Chemical Nomenclature
Mole Concept

SKILLS

(Chemical Compounds & Nomenclature)Students Will Be Able to:

1. Name ionic and molecular compounds. (7- 3)
2. Write the formula for binary compounds, distinguishing between anions, cations, and polyatomic ions. (7 – 1)
3. Write the formula and charge of polyatomic ions. (7 – 1&3)
4. Know and apply numerical prefixes. (7 – 3)
5. Define hydrate and explain how to name a hydrate. (lab)
6. List common acids and bases. (7- 3)

(The Mole & Stoichiometry) Students Will Be Able to:

1. Define a mole and explain its importance. (10- 1)
2. Identify and use Avogadro's number. (10- 1)

3. Define molar mass and explain its relation to the number of particles. (10- 1)
4. Distinguish between molar mass and formula mass. (10- 1)
5. Convert among moles, mass and number of particles. (10- 2)
6. Describe molar volume of a gas and use it to solve problems. (10- 2)
7. Determine the number of particles in a given volume of gas at STP. (10-2)
8. Find the percentage composition from a given formula. (10-3)
9. Use the percentage composition to determine the empirical formula. (10- 3)
10. Recognize and explain the differences between the empirical and molecular formulas. (10- 3)

ASSURED EXPERIENCES

Hydrate Lab

ASSESSMENTS

Tests
Quizzes
Lab Reports
Homework

OPTIONAL ACTIVITIES

Charge Balancing in Ionic Compounds

Percentage of Water in Food Items

Visualizing Avogadro's Number

RESOURCES

Textbook:
"Chemistry – connections to our changing world" Ch 7&10

Teacher Handouts

United Streaming – Compounds and Reactions

ADDITIONAL NOTES

Instructional Strategies:

Create a climate for learning

Assess prior knowledge
Practice effective questioning techniques
Vary the structure of lessons
Vary the way students work
Use warm-up activities
Create and embed STS (science, technology, and society) activities
Strengthen comprehension for content-area text
Common assessments within and across all disciplines
Allow opportunities for peer review
Direct instruction
Classroom discussion
Graphic organizers
Cooperative learning strategies
Higher order thinking skills

VOCABULARY

anhydrous substance	ionic bond	octet rule
anion	ionic compound	percentage composition
atomic mass	Lewis structure	polar
Avogadro's number	molar mass	polyatomic ion
binary ionic compound	molar volume	single covalent bond
cation	mole	structural formula
covalent bond	molecular formula	triple covalent bond
double covalent bond	molecular formula	unshared pair
empirical formula	molecular substance	
empirical formula	molecule	
formula mass	monatomic ion	
hydrate	nonpolar	

COURSE: Chemistry
UNIT 4: Equations & Stoichiometry
CONTACT: athompson@Bridgeportedu.net
TIME FRAME: 5 Weeks

CODE:
MAP LEVEL: 4
GRADE: 11

PERFORMANCE STANDARDS

SCIENCE - SCIENTIFIC INQUIRY (I)

27.1.1.0.1 Students will make observations and ask questions about objects, organisms and the environment.
27.1.1.0.3 Students will make predictions based on observed patterns.
27.1.1.0.7 Students will use standard tools to measure and describe physical properties such as weight, length and temperature.
27.1.1.3.6 Students will analyze, critique and communicate investigations using words, graphs and drawings.
27.1.1.3.9 Students will use measurement tools and standard units (e.g., centimeters, meters, grams, kilograms) to describe objects and materials.
27.1.1.6.3 Students will design and conduct appropriate types of scientific investigations to answer different questions.

SCIENCE - PHYSICAL SCIENCE (II, III, IV)

27.2.2.9.14 Students will describe combustion reactions of hydrocarbons and their resulting by-products.

ESSENTIAL/FOCUS QUESTIONS

Essential Questions

1. What is the importance of a balanced chemical equation?
2. How is a chemical equation used for quantitative problem solving?

Focus questions

1. How does a balanced equation demonstrate the law of conservation of matter?
2. What are five general types of chemical reactions?
3. What characteristics identify each type of chemical reaction?
4. What is stoichiometry?
5. How are molar relationships represented in a balanced chemical equation?
6. What determines the amount of products formed in a chemical reaction?
7. How is the percent yield in a chemical reaction determined?

Content

Chemical reactions

Equation stoichiometry

CONTENT

Chemical Reactions
Equation Stoichiometry

SKILLS

(Chemical Reactions)Student Will Be Able To:

1. Describe the characteristics of a chemical reaction and explain why they occur.(9-1)
2. Explain how a balanced chemical equation illustrates the law of conservation of matter. (9:-2)
3. Name the five general types of reactions and identify and balance each type of chemical reaction. (9:-3)

(Equation Stoichiometry) Student Will Be Able To:

1. Define stoichiometry and describe its importance. (11-1)
2. Relate stoichiometry to balanced chemical equations. (11-2)
3. Convert and solve mole-mole problems. (11- 2)
4. Solve mass-mass, mass-volume, and volume-volume problems. (11-2)
5. Define and calculate limiting reactant and the percent yield of a reaction (11-3)

ASSURED EXPERIENCES

Equation Stoichiometry Lab

ASSESSMENTS

Tests
Quizzes
Lab Reports
Homework

OPTIONAL ACTIVITIES

Types of Reactions Lab

Limiting Reagent Lab

RESOURCES

Textbook:
"Chemistry – connections to our changing world" chapters 9&11

Teacher Handouts

ADDITIONAL NOTES

Instructional Strategies:

Create a climate for learning
Assess prior knowledge
Practice effective questioning techniques
Vary the structure of lessons
Vary the way students work
Use warm-up activities
Create and embed STS (science, technology, and society) activities
Strengthen comprehension for content-area text
Common assessments within and across all disciplines
Allow opportunities for peer review
Direct instruction
Classroom discussion
Graphic organizers
Cooperative learning strategies
Higher order thinking skills

VOCABULARY

actual yield	direct combination reaction	percent yield
balanced chemical equation	double-replacement reaction	product

chemical equation chemical reaction coefficient combustion reaction decombustion reaction	expected yield limiting reactant mass-mass problem mass-volume problem mole-mole problem	reactant single-replacement reaction stoichiometry volume-volume problem

COURSE: Chemistry
UNIT 5: Gases
CONTACT: athompson@bridgeportedu.net
TIME FRAME: 5 Weeks

CODE:
MAP LEVEL: 4
GRADE: 11

PERFORMANCE STANDARDS

SCIENCE - SCIENTIFIC INQUIRY (I)

27.1.1.0.1 Students will make observations and ask questions about objects, organisms and the environment.
27.1.1.0.2 Students will use senses and simple measuring tools to collect data.
27.1.1.0.7 Students will use standard tools to measure and describe physical properties such as weight, length and temperature.
27.1.1.3.3 Students will design and conduct simple investigations.
27.1.1.3.6 Students will analyze, critique and communicate investigations using words, graphs and drawings.
27.1.1.3.10 Students will use mathematics to analyze, interpret and present data.

SCIENCE - PHYSICAL SCIENCE (II,III,IV)

27.2.2.2.18 Students will describe differences in the physical properties of solids and liquids.
27.2.2.3.2 Students will describe the effect of heating on the melting, evaporation, condensation and freezing of water.
27.2.2.6.1 Students will describe the properties of common elements such as oxygen, hydrogen, carbon, iron and aluminum.
27.2.3.9.1 Students will describe the effects of adding energy to matter, in terms of the motion of atoms and molecules, and the resulting phase changes.

ESSENTIAL/FOCUS QUESTIONS

Essential Questions

1. What are the components of a model that accounts for observed gas behavior?
2. How can the behavior of gases under varying conditions be predicted?

Focus Questions

1. What is the kinetic molecular theory of gases?
2. What are some distinctive properties of gases?
3. What are four gas variables and how are they expressed?
4. How is gas pressure measured?
5. How do the gas laws relate to the variables P,V,n, and T?
6. What is the ideal gas equation and how is it applied?
7. What is a real gas?

CONTENT

Properties of Gases
Gas Laws

SKILLS

Students Will Be Able To:

1. Describe the kinetic-molecular theory of gases.(13-1)
2. Name the four gas variables and state the unit in which they are expressed.(13-2)
3. Convert unit used for the gas state.(13-2)
4. Define atmospheric pressure and list the units in which it is measured.(13-2)
5. Explain how a barometer and a manometer work.(13-2)
6. Define STP(Standard Temperature & Pressure) and explain its importance.(13-2)
7. Correctly state the gas laws of Boyle, Charles, Dalton and Avagadro.(13-3)
8. Solve problems using each gas law.(13-3)
9. Differentiate between a real gas and an ideal gas.(13-4)
10. State the ideal gas equation and explain each of its variables.(13-4)
11. Solve problems utilizing the ideal gas equation.(13-4)

ASSURED EXPERIENCES

Molar Mass/ Volume of a Gas Lab

ASSESSMENTS

Tests
Quizzes
Lab Reports
Homework

OPTIONAL ACTIVITIES

Boyle Law Lab

Charles' Law Lab

Grahams Law Demo

Air Pressure Demo

RESOURCES

Textbook:
"Chemistry – connections to our changing world" chapter 13

Teacher handouts

United Streaming

ADDITIONAL NOTES

Instructional Strategies:

Create a climate for learning
Assess prior knowledge
Practice effective questioning techniques
Vary the structure of lessons
Vary the way students work
Use warm-up activities
Create and embed STS (science, technology, and society) activities
Strengthen comprehension for content-area text
Common assessments within and across all disciplines
Allow opportunities for peer review
Direct instruction
Classroom discussion

VOCABULARY

absolute zero
atmospheric pressure
barometer
diffusion
effusion
elastic
gas constant

ideal gas
kinetic molecular theory
molar volume
nanometer
partial pressure
real gas
STP

COURSE: Chemistry
UNIT 6: Solutions
CONTACT: athompson@bridgeportedu.net
TIME FRAME: 5 Weeks

CODE:
MAP LEVEL: 4
GRADE: 11

PERFORMANCE STANDARDS

SCIENCE - SCIENTIFIC INQUIRY (I)

27.1.1.0.7 Students will use standard tools to measure and describe physical properties such as weight, length and temperature.
27.1.1.3.6 Students will analyze, critique and communicate investigations using words, graphs and drawings.
27.1.1.3.9 Students will use measurement tools and standard units (e.g., centimeters, meters, grams, kilograms) to describe objects and materials.
27.1.1.3.10 Students will use mathematics to analyze, interpret and present data.
27.1.1.6.3 Students will design and conduct appropriate types of scientific investigations to answer different questions.
27.1.1.6.8 Students will draw conclusions and identify sources of error.

SCIENCE - PHYSICAL SCIENCE (II, III, IV)

27.2.2.2.18 Students will describe differences in the physical properties of solids and liquids.
27.2.2.3.1 Students will sort and classify materials based on properties such as dissolving in water, sinking and floating, conducting heat and attraction to magnets.
27.2.2.6.2 Students will describe how the properties of simple compounds, such as water and table salt, are different from the properties of the elements of which they are made.
27.2.2.9.11 Students will describe how atoms combine to form new substances by transferring electrons (ionic bonding) or sharing electrons (covalent bonding).

ESSENTIAL/FOCUS QUESTIONS

Essential Questions

1. What are the characteristics of solutions?
2. How are solution concentrations expressed?

Focus Questions

1. What is a solution?
2. How does a saturated solution differ from a supersaturated solution?
3. What is molarity of a solution and how is it calculated?
4. What is molality of a solution and how is it calculated?
5. What is mole fraction of a solution and how is it calculated?
6. What is solubility?
7. What factors affect solubility?
8. What factors affect the rate of solution formation?
9. What are four colligative properties of solutions?

CONTENT

Characteristics of Solutions
Solution Concentration
Colligative Properties

SKILLS

Student will be able to:

1. 1.Distinguish between solute and solvent. (15-1)
2. List the characteristics of a solution. (15-1)
3. Define Solubility. (15-3)
4. Distinguish among dilute, concentrated, saturated, unsaturated and super saturated solutions. (15-2)
5. Calculate solution concentration in molarity and molality.(15-2)
6. Explain gas solubility in liquid solutions. (15-3)
7. Explain liquid and solid solubility in liquid solutions. (15-3)
8. Describe factors that affect solubility. (15-3)
9. List and explain the factors that affect the rate of solute dissolution.(15-3)
10. Explain and calculate freezing point depression and boiling point elevation (15-4)

ASSURED EXPERIENCES

Supersaturation Demo

ASSESSMENTS

Tests
Quizzes

Lab Reports
Homework

OPTIONAL ACTIVITIES

Mentos Demo
Solubility of KNO3 Lab
Molarity of K2Cr2O7 Lab
Freezing Point Depression Lab
Solubility of Gas Demo

RESOURCES

Textbook:
"Chemistry – connections to our changing world" ch15

Teacher Handouts

United Streaming

ADDITIONAL NOTES

Instructional Strategies:

Create a climate for learning
Assess prior knowledge
Practice effective questioning techniques
Vary the structure of lessons
Vary the way students work
Use warm-up activities
Create and embed STS (science, technology, and society) activities
Strengthen comprehension for content-area text
Common assessments within and across all disciplines
Allow opportunities for peer review
Direct instruction
Classroom discussion
Graphic organizers
Cooperative learning strategies
Higher order thinking skills

VOCABULARY

alloy	insoluble	soluble
aqueous solution	miscible	solute
boiling point elevation	molarity	solution
colligative property	mole fraction	solvation

concentration freezing point depression hydration immiscible	osmosis osmotic pressure saturated solubility	solvent supersaturated unsaturated vapor pressure reduction

COURSE: Chemistry
UNIT 7: Acids and Bases
CONTACT: athompson@bridgeportedu.net
TIME FRAME: 6 Weeks

CODE:
MAP LEVEL: 4
GRADE: 11

PERFORMANCE STANDARDS

SCIENCE - SCIENTIFIC INQUIRY (I)

27.1.1.3.2 Students will seek relevant information in books, magazines and electronic sources of information.
27.1.1.3.3 Students will design and conduct simple investigations.
27.1.1.3.6 Students will analyze, critique and communicate investigations using words, graphs and drawings.
27.1.1.3.9 Students will use measurement tools and standard units (e.g., centimeters, meters, grams, kilograms) to describe objects and materials.
27.1.1.3.10 Students will use mathematics to analyze, interpret and present data.
27.1.1.6.4 Students will identify independent and dependent variables, and those variables that are kept constant, when designing an experiment.

SCIENCE - PHYSICAL SCIENCE (II, III, IV)

27.2.2.9.12 Students will explain the chemical composition of acids and bases, and explain the change of pH in neutralization reactions.

ESSENTIAL/FOCUS QUESTIONS

Essential Questions

1. What is an acid?
2. What is pH and what does it indicate about a solution?
3. What is a neutralization reaction?

Focus Questions

1. What are the properties of acid and bases?
2. What is the Arrhenius concept of acids and bases?
3. What is the Bronsted-Lowry concept of acids and bases?
4. What do dissociation constants indicate about an acid or base?
5. What is the difference between a strong and weak acids or bases?
6. What is the difference between strength and concentration for an acid or base?
7. What are the ion concentrations in pure water?
8. What is the pH scale?
9. What is a buffer?
10. How do buffers work?
11. What is an acid base titration?
12. Why are indicators used in titration?

CONTENT

Acid Characteristics
Base Characteristics
pH Concentration
Ion Concentration
Neutralization Reactions

SKILLS

Students Will Be Able To:

1. Distinguish between strong and weak electrolytes.(15-1)
2. Explain the difference between an electrolyte and a nonelectrolyte.(15-1)
3. Identify the components in Arrhenius theory of acids and bases.(18-1)
4. Define and identify the Bronsted-Lowry theory of acids and bases.(18-1)
5. Write dissociation equations for ionic solids(17-1)
6. Write ionization equations for covalently bonded electrolytes.(18-2)
7. Derive and interpret ionization constants of acids.(18-2)
8. Describe the properties of acids and bases.(18-1)
9. Identify conjugate acid and base pairs. (18-1)
10. Compare relative strength of acids and bases.(18-2)
11. Identify amphoteric substances.(18-1)
12. Calculate the hydrogen and hydroxide ion concentrations in any aqueous solution.(19-1)
13. Define pH and calculate its values for solutions (19-1)
14. Explain the action of buffer solutions. (19-2)
15. Explain why indicators change color. (19-2)
16. Describe neutralization reactions. (19-2)
17. Perform an acid base titration. (19-2)
18. Use MaVa=MbVb formula for problem solving. (19-2)

ASSURED EXPERIENCES

Acid Base Titration

ASSESSMENTS

Tests
Quizzes
Lab Reports
Homework

OPTIONAL ACTIVITIES

Standardization of an Acid or Base Lab

Buffer Effect in Lemonade Lab

Cabbage Juice Indicator Demo

Capacity of Antacids Lab

Titration of Aspirin

pH of Household Chemicals Demo

RESOURCES

Textbook:
“Chemistry – Connections to our Changing World” Ch 15

Teacher Handouts

United Streaming:
– acids, bases, and salts
-acid base stoichiometry
-acid base indicators
-acid base calculations

ADDITIONAL NOTES

Instructional Strategies

Create a climate for learning
Assess prior knowledge
Practice effective questioning techniques
Vary the structure of lessons
Vary the way students work
Use warm-up activities

Create and embed science, technology and society (STS) activities
Strengthen comprehension for content area text
Common assessments within and across all disciplines
Allow opportunities for peer review
Direct instruction
Classroom discussion
Graphic organizers
Cooperative learning strategies
Higher order level thinking skills
Outlines/drawings
Internet research
Integrate technology lessons/activities
Library research
Hands-on laboratory research skills
Laboratory activities
Audio-visual enhancements

VOCABULARY

acid acid dissociation constant acid-base titration acidic hydrogen amphoteric bae	base dissociation constant buffer conjugate acid conjugate base end point equivalence point	indicator ion-product constant neutralization reaction salt self-ionization standard solution titration curve

COURSE: Chemistry
UNIT 8: Chemical Equilibrium
CONTACT: AThompson@Bridgeportedu.net
TIME FRAME: 4 weeks

CODE:
MAP LEVEL: 4
GRADE: 11

PERFORMANCE STANDARDS

SCIENCE - SCIENTIFIC INQUIRY (I)

27.1.1.0.7 Students will use standard tools to measure and describe physical properties such as weight, length and temperature.
27.1.1.3.2 Students will seek relevant information in books, magazines and electronic sources of information.
27.1.1.3.6 Students will analyze, critique and communicate investigations using words, graphs and drawings.
27.1.1.3.9 Students will use measurement tools and standard units (e.g., centimeters, meters, grams, kilograms) to describe objects and materials.
27.1.1.3.10 Students will use mathematics to analyze, interpret and present data.
27.1.1.6.1 Students will identify questions that can be answered through scientific investigation.

SCIENCE - PHYSICAL SCIENCE (II, III, IV)

27.2.2.9.11 Students will describe how atoms combine to form new substances by transferring electrons (ionic bonding) or sharing electrons (covalent bonding).

ESSENTIAL/FOCUS QUESTIONS

Essential Questions:

1. What influences the speed of a chemical reaction?
2. What is equilibrium and how is it affected by changes in conditions?

Focus Questions:

1. How is the rate of a reaction described?
2. How does collision theory explain chemical reactions?
3. Why is the activation energy of a reaction important?
4. What is an activated complex?
5. What factors affect the rate at which a reaction proceeds?
6. What is the difference between an endothermic and exothermic reaction?
7. What is a reversible reaction?
8. How is chemical equilibrium characterized?
9. What is an equilibrium constant and what does it indicate?
10. What is LeChatelier's principle?

CONTENT

Chemical Reaction Rates
Chemical Equilibrium

SKILLS
Student Will Be Able To:

1. Describe the collision theory of chemical reactions (22-2)
2. Distinguish between endothermic and exothermic reactions (22-2)
3. Describe the factors that affect reaction rates (22-3)
4. Describe the role of a catalyst in a chemical reaction (22-3)
5. Describe a reversible reaction. (16-1)
6. Define chemical equilibrium and explain how it is achieved. (16-1)
7. Explain the Law of Mass Action. (16-2)
8. Write equilibrium expressions for many chemical reactions (16-2)
9. Describe the factors that affect a reaction at equilibrium. (16-3)
10. Apply Le Chatelier's principle. (16-3)

ASSURED EXPERIENCES

Establishing Equilibrium Lab

ASSESSMENTS

Tests
Quizzes
Lab Reports
Homework

OPTIONAL ACTIVITIES

LeChatelier's Principle Lab

CoCl2 Demo

RESOURCES

Textbook:
"Chemistry – Connections to Our Changing World" Ch's 16 & 22

Teacher Handouts

United Streaming:
Maintaining equilibrium
Dynamic equilibrium
Introduction to equilibrium
Rates of chemical reactions

ADDITIONAL NOTES

Instructional Strategies

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Internet research
Integrate technology lessons/activities
Library research
Hands-on laboratory research skills
Laboratory activities
Audio-visual enhancements

VOCABULARY

activated complex	heterogeneous equilibria
activation energy	heterogeneous reaction
catalyst	homogeneous equilibria

chemical equilibrium chemical kinetics collision theory effective collision equilibrium constant equilibrium expression equilibrium position	homogeneous reaction ineffective collision law of mass action Le Chatelier's Principle reaction rate reversible reaction

COURSE: Chemistry
UNIT 9:9 Organic Chemistry and Biochemistry
CONTACT: athompson@bridgeportedu.net
TIME FRAME: 1 week

CODE:
MAP LEVEL: 4
GRADE: 11

PERFORMANCE STANDARDS

SCIENCE - SCIENTIFIC INQUIRY (I)

27.1.1.0.7 Students will use standard tools to measure and describe physical properties such as weight, length and temperature.
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27.1.1.3.9 Students will use measurement tools and standard units (e.g., centimeters, meters, grams, kilograms) to describe objects and materials.
27.1.1.3.10 Students will use mathematics to analyze, interpret and present data.

SCIENCE - PHYSICAL SCIENCE (II, III, IV)

27.2.2.2.18 Students will describe differences in the physical properties of solids and liquids.
27.2.2.6.1 Students will describe the properties of common elements such as oxygen, hydrogen, carbon, iron and aluminum.
27.2.2.6.2 Students will describe how the properties of simple compounds, such as water and table salt, are different from the properties of the elements of which they are made.
27.2.2.9.13 Students will explain how the structure of the carbon atom affects the type of bonds it forms in organic and inorganic molecules.
27.2.2.9.15 Students will explain the general formation and structure of carbon-based polymers, including synthetic polymers such as polyethylene and biopolymers such as carbohydrate.

ESSENTAIL/FOCUS QUESTIONS

Essential Question:

1. Why is carbon the building block of life?

Focus Questions:

1. What characteristics of carbon give it its unique bonding properties?
2. Why can carbon form long chain molecules?
3. What are three types of molecules important to life that contain long chains of carbon atoms?
4. What are the characteristics of organic compounds?
5. What are polymers?
6. How can amino acids combine to form proteins?

CONTENT

Organic Chemistry
Biochemistry

SKILLS
Student Will Be Able To:

1. Define an organic compound (25-2)
2. Explain the characteristics that give carbon its unique bonding properties (25-1)
3. Explain how long chains of carbon compounds are in most of the molecules that living organisms make or use (25-1)
4. Define the term polymer and list some examples of polymers (25-5)
5. Identify that most biological molecules such as proteins, nucleic acids and starches are polymers. (25-2)
6. Describe how amino acids are the building blocks of proteins (27-4)

ASSURED EXPERIENCES

Synthetic Polymer Lab/Demo

ASSESSMENTS

Tests
Quizzes
Lab Reports
Homework

OPTIONAL ACTIVITIES

Evaporation Rate Lab

RESOURCES

Textbook:
"Chemistry – Connections to our Changing World" Ch's 16 & 22

Teacher Handouts

ADDITIONAL NOTES

Instructional Strategies

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Outlines/drawings
Internet research
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Library research
Hands-on laboratory research skills
Laboratory activities
Audio-visual enhancements

VOCABULARY
amino acid
carbohydrate
monomer
nucleic acid
organic chemistry
polymer
protein

starch