

Content Area: Science

Course Title: ChemCom

Grade Level: 11-12

Unit Plan 1

Water: Fish Kill

Unit Plan 2

Conserving Chemical Resources

Unit Plan 3

Nuclear Chemistry

Unit Plan 4

Petroleum and Petrochemicals

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Unit Overview

Content Area: ChemCom Unit 1

Unit Title: Water: Fish Kill

Target Course/Grade Level: 11-12

Unit Summary

This unit is designed to give students a clear understanding of how scientific thought, verbal and quantitative skills are applied to the study of matter through the study of the causes of a fish kill in a hypothetical location.

Primary interdisciplinary connections: infused within the unit are connections to the 2009NJCCCS for Mathematics, Language Arts Literacy and Technology

21st century themes: This unit integrates the 21st Century Life and Career strand 9.1 strands A-D which include: critical thinking and problem solving, creativity and innovation, collaboration, teamwork and leadership, and cross cultural understanding and interpersonal communication.

Learning Targets

Content Standards

This unit will assimilate the four strands of the Science Practices standard 5.1. These include: understanding scientific explanations, generating scientific evidence through active investigations, reflecting on scientific knowledge and participating productively in science.

CPI #	Cumulative Progress Indicator (CPI)
5.1.12A.1	Refine interrelationships among concepts and patterns of evidence found in different central scientific explanations.
5.1.12A.2	Develop and use mathematical, physical, and computational tools to build evidence-based models and pose theories.
5.1.12.A.3	Use scientific principles and theories to build and refine standards for data collection, posing controls, and presenting evidence.
5.1A-D	Science practices whereby students understand that science is both a body of knowledge and an evidence-based, model-building enterprise that continually extends, refines, and revises knowledge. The four Science practices strands encompass the knowledge and reasoning skills that students must acquire to be proficient in science.
5.2.12.A.1	Use atomic models to predict the behavior of atoms in interactions
5.2.12.A.2	Account for the differences in the physical properties of solids, liquids, and gases.
5.1.12.B.1	Design investigations, collect evidence, analyze data, and evaluate evidence to determine measures of central tendencies, causal/correlational relationships, and anomalous data.
5.1.12.B.2	Build, refine, and represent evidence-based models using mathematical, physical, and computational tools.
5.1.12.B.3	Revise predictions and explanations using evidence, and connect explanations/arguments to

	established scientific knowledge, models, and theories.
5.1.12.B.4	Develop quality controls to examine data sets and to examine evidence as a means of generating and reviewing explanations
5.1.12.C.3	Consider alternative theories to interpret and evaluate evidence-based arguments.
5.1.12.D.2	Represent ideas using literal representations, such as graphs, tables, journals, concept maps, and diagrams
Unit Essential Questions <ul style="list-style-type: none"> • What are the physical and chemical properties of water? • Why do some substances readily dissolve in water and others do not? • How do the properties of chlorine contribute to effective water treatment? 	Unit Enduring Understandings <i>Students will understand that...</i> <ul style="list-style-type: none"> • Students will understand the impact chemistry has on society. • Students will understand how to use chemical knowledge to think and make informed decisions about issues involving science technology • Develop a life- long awareness of the potential limitations of science and technology.
Unit Objectives <i>Students will know...</i> <ul style="list-style-type: none"> • Vocabulary and key terms • Procedures at the core of scientific methodology • Laboratory Safety procedures • Essential laboratory equipment • The difference between qualitative and quantitative measurements • How to convert measurements to scientific notation • Error analysis • How to use dimensional analysis to convert between units • How to classify matter • How to distinguish between chemical and physical properties • How to distinguish between chemical and physical changes • How to use chemical symbols • The historical development of the atom • Atomic Structure 	Unit Objectives <i>Students will be able to...</i> <ul style="list-style-type: none"> • Use the metric system • Discuss direct and indirect uses of water and the need for water conservation • Describe the hydrologic cycle • Discuss water's unique physical properties • Classify matter • Interpret a balanced equation • Use chemical symbols • Use solubility curves • Organize and interpret data • Classify solutions with regards to pH • Write chemical formulas of ionic compounds • Evaluate the risks of contamination

Formative Assessments

- observation
- homework
- Class participation
- Writing assignments
- Lab report
- notebook

Summative Assessments

- Chapter tests
- Presentations/projects
- Quarterly exams

Modifications (ELLs, Special Education, Gifted and Talented)

- Teacher tutoring
- Peer tutoring
- Cooperative Learning groups
- Differentiated instructions
- Follow all IEP modifications/504 plan

Curriculum development Resources/Instructional Materials/Equipment Needed Teacher Resources:

Teacher notes

Textbook

Lab sheets from manuals and textbook

Science websites

Unit Overview

Content Area: ChemCom Unit 2

Unit Title: Conserving Chemical Resource

Target Course/Grade Level: 11-12

Unit Summary

This unit is designed to give students a clear understand of the use of renewable and non-renewable resources. will explore the nature of metals as derived from ores and their impact on society.

Primary interdisciplinary connections: infused within the unit are connections to the 2009NJCCCS for Mathematics, Language Arts Literacy and Technology

21st century themes: This unit integrates the 21st Century Life and Career strand 9.1 strands A-D which include: critical thinking and problem solving, creativity and innovation, collaboration, teamwork and leadership, and cross cultural understanding and interpersonal communication.

Learning Targets

Content Standards

5.1.12A.1	Refine interrelationships among concepts and patterns of evidence found in different central scientific explanations.
5.1.12A.2	Develop and use mathematical, physical, and computational tools to build evidence-based models and pose theories.
5.1.12.A.3	Use scientific principles and theories to build and refine standards for data collection, posing controls, and presenting evidence.
5.1A-D	Science practices whereby students understand that science is both a body of knowledge and an evidence- based, model-building enterprise that continually extends, refines, and revised knowledge. The four Science practices strands encompass the knowledge and reasoning skills that students must acquire to be proficient in science.
5.2 12.A.1	Use atomic models to predict the behavior of atoms in interactions
5.2.12 A.2	Account for the differences in the physical properties of solids, liquids, and gases.
5.1.12.B.1	Design investigations, collect evidence, analyze data, and evaluate evidence to determine measures of central tendencies, casual/correlational relationships, and anomalous data.
5.1.12.B.2	Build, refine, and represent evidence-based models using mathematical, physical, and computational tools.

CPI #	
5.1.12A.1	Refine interrelationships among concepts and patterns of evidence found in different central scientific explanations.
5.1.12A.2	Develop and use mathematical, physical, and computational tools to build evidence-based models and pose theories.
5.1.12.A.3	Use scientific principles and theories to build and refine standards for data collection, posing controls, and presenting evidence.
5.1A-D	Science practices whereby students understand that science is both a body of knowledge and an evidence-based, model-building enterprise that continually extends, refines, and revises knowledge. The four Science practices strands encompass the knowledge and reasoning skills that students must acquire to be proficient in science.
5.2.12.A.1	Use atomic models to predict the behavior of atoms in interactions
5.2.12 A.2	Account for the differences in the physical properties of solids, liquids, and gases.
5.1.12.B.1	Design investigations, collect evidence, analyze data, and evaluate evidence to determine measures of central tendencies, casual/correlational relationships, and anomalous data.
5.1.12.B.2	Build, refine, and represent evidence-based models using mathematical, physical, and computational tools.
5.2.12.B.2	Describe oxidation and reduction reactions, and give examples of oxidation and reduction reactions that have an impact on the environment, such as corrosion and the burning of fuel.

<p>Unit Essential Questions</p> <ul style="list-style-type: none"> • Do we have enough resources to meet future human needs? • How can chemistry help create new alternatives for scarce materials? • How does chemistry explain the similarities and differences among substances? 	<p>Unit Enduring Understandings <i>Students will understand that...</i></p> <ul style="list-style-type: none"> • Chemical resources play a major role in a technological society
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<p>Unit Objectives <i>Students will know...</i></p> <ul style="list-style-type: none"> • The value of our chemical resources • How to modify properties and sources of resources • The difference between science and technology • Sources of waste and technology • The difference between chemical and 	<p>Unit Objectives <i>Students will be able to...</i></p> <ul style="list-style-type: none"> • Gain insight into the worldwide problem of limited chemical resources • State of the law of conservation of matter and energy • Discuss Spaceship Earth • List sources of waste • Distinguish between renewable and non-renewable
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<p>physical properties</p> <ul style="list-style-type: none">• To classify elements• How to contrast oxidation and reduction• How to differentiate between reuse, recycle, and other means of conservation	<p>resource</p> <ul style="list-style-type: none">• Classify elements• Use the periodic table to predict properties, write chemical formulas, identify elements, locate periods and families• Compare the reactions of various elements• Discuss the development of new materials• Describe the layers of the earth• Write a balanced equation• Define a molecule• Calculate molar mass• Describe the production of a metal from its ore• Calculate mass percent• Contrast oxidation and reduction• Discuss reuse, recycle, and substitution as a means of conservation.
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Formative Assessments

- observation
- homework
- Class participation
- Writing assignments
- Lab report
- notebook

Summative Assessments

- Chapter tests
- Presentations/projects
- Quarterly exams

Modifications (ELLs, Special Education, Gifted and Talented)

- Teacher tutoring
- Peer tutoring
- Cooperative Learning groups
- Differentiated instructions
- Follow all IEP modifications/504 plan

Curriculum development Resources/Instructional Materials/Equipment Needed Teacher Resources:

Teacher notes

Textbook

Lab sheets from manuals and textbook

Science websites

Unit Overview

Content Area: ChemCom Unit 3

Unit Title: Nuclear Chemistry in the World

Target Course/Grade Level: 11-12

Unit Summary: This unit confronts one of the most emotionally charged issues in modern society, the use of nuclear energy.

Primary interdisciplinary connections: infused within the unit are connections to the 2009NJCCCS for Mathematics, Language Arts Literacy and Technology

21st century themes: This unit integrates the 21st Century Life and Career strand 9.1 strands A-D which include: critical thinking and problem solving, creativity and innovation, collaboration, teamwork and leadership, and cross cultural understanding and interpersonal communication.

Learning Targets

Content Standards

CPI #	Cumulative Progress Indicator (CPI)
5.1.12.A.1	Refine interrelationships among concepts and patterns of evidence found in different central scientific explanations.
5.1.12.A.3	Develop and use mathematical, physical, and computational tools to build evidence-based models and to pose theories
5.1.12.A.4	Explain how the properties of isotopes, including half-lives, decay modes, and nuclear resonances, lead to useful applications of isotopes
5.1.12.B.2	Build, refine, and represent evidence-based models using mathematical, physical, and computational tools
5.1.12.B.4	Develop quality controls to examine data sets and to examine evidence as a means of generating and reviewing explanations.
5.1.12.C.1	Reflect on and revise understandings as new evidence emerges
5.1.12.D.1	Engage in multiple forms of discussion in order to process, make sense of, and learn from others' ideas, observations, and experiences.
5.2.12.D.3	Describe the products and potential applications of fission and fusion reactions.

<p>Unit Essential Questions</p> <ul style="list-style-type: none"> • Do nuclear energy and radiation risks outweigh their benefits? • What should be done with nuclear waste? 	<p>Unit Enduring Understandings <i>Students will understand that...</i></p> <ul style="list-style-type: none"> • Nuclear Energy is a viable alternative to fossil fuels to generate energy • That radiation is always present
<p>Unit Objectives <i>Students will know...</i></p> <ul style="list-style-type: none"> • How nuclear technology and natural radioactivity affect their lives • Radiation affects their bodies • How to interpret E/M spectrum • The difference between fission and fusion • The major components of a nuclear power plant • The factors that determine biological radiation damage 	<p>Unit Objectives <i>Students will be able to...</i></p> <ul style="list-style-type: none"> • Give examples of nuclear technology • Describe the biological effects of radiation • Describe the properties of waves • Describe the historical development of the atom • Describe the properties of subatomic particles • Understand the concept of isotopes • Use isotopic notation • Balance nuclear equations • Explain and utilize half-lives • Write the equations of fission and fusion • Describe a chain reaction • Discuss the problem with nuclear waste

Formative Assessments

- observation
- homework
- Class participation
- Writing assignments
- Lab report
- notebook

Summative Assessments

- Chapter tests
- Presentations/projects
- Quarterly exams

Modifications (ELLs, Special Education, Gifted and Talented)

- Teacher tutoring
- Peer tutoring
- Cooperative Learning groups
- Differentiated instructions
- Follow all IEP modifications/504 plan

Curriculum development Resources/Instructional Materials/Equipment Needed Teacher Resources:

Teacher notes

Textbook

Lab sheets from manuals and textbook
Science websites

Unit Overview

Content Area: ChemCom Unit 4

Unit Title: Petroleum: Breaking and Making Bonds

Target Course/Grade Level: 11-12

Unit Summary

This unit looks at petroleum use throughout the world and at some of the issues that result from society's heavy reliance on petroleum products.

Primary interdisciplinary connections: infused within the unit are connections to the 2009NJCCCS for Mathematics, Language Arts Literacy and Technology

21st century themes: This unit integrates the 21st Century Life and Career strand 9.1 strands A-D which include: critical thinking and problem solving, creativity and innovation, collaboration, teamwork and leadership, and cross cultural understanding and interpersonal communication.

Learning Targets

Content Standards

CPI #	Cumulative Progress Indicator (CPI)
5.1.12.C.3	Consider alternative theories to interpret and evaluate evidence-based arguments
5.1.12.D.1	Engage in multiple forms of discussion in order to process, make sense of, and learn from others' ideas, observations, and experiences
5.2.12.A.2	Account for the differences in the physical properties of solids, liquids, and gases.
5.2.12.B.2	Describe oxidation and reduction reactions, and give examples of oxidation and reduction reactions that have an impact on the environment, such as corrosion and the burning of fuel.
5.2.12.C.2	Account for any trends in the melting point and boiling points of various compounds
5.2.12.D.2	Describe the potential commercial application of exothermic and endothermic reactions.
5.3.12.A.1	Represent and explain the relationship between the structure and function of each class of complex molecules using a variety of models
5.3.12.B.6	Explain how the process of cellular respiration is similar to the burning of fossil fuels.

Unit Essential Questions

- What explains petroleum's dual role as a fuel and as a building material?
- How can we make best use of the petroleum still remaining?

Unit Enduring Understandings

Students will understand that...

- Our lifestyles will alter when global petroleum supplies are depleted?
- There are alternative to petroleum

<p>Unit Objectives <i>Students will know...</i></p> <ul style="list-style-type: none"> • The chemical and physical properties of hydrocarbons • That hydrocarbons make good fuels • That carbon-based molecules are very versatile • The properties that are needed to substitute for petroleum to be used as an energy alternative 	<p>Unit Objectives <i>Students will be able to...</i></p> <ul style="list-style-type: none"> • Compare the usages of petroleum(benefits and burdens) • Discuss the regions that contain the resource and discuss political and economic consequence • See how petroleum differs from other resources • Explain how the number of carbon atoms affects physical properties • The role of fractional towers • Write the names, structural and molecular formulas of the first ten alkanes. • Differentiate between ionic and covalent bonding • Explain the role of isomers and physical properties • Draw isomers • Trace history of energy sources in USA and how it relates to technological advances • Explain energy conversions • Differentiate between endothermic and exothermic reactions • Explain specific heats and heats of combustion • Balance combustion reaction • Discuss saturated and unsaturated compounds • Discuss the role of functional groups in identifying various organic compounds • Show how polymerization occurs and distinguish between addition polymers and condensation polymers
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Formative Assessments

- observation
- homework
- Class participation
- Writing assignments
- Lab report
- notebook

Summative Assessments

- Chapter tests
- Presentations/projects
- Quarterly exams

Modifications (ELLs, Special Education, Gifted and Talented)

- Teacher tutoring
- Peer tutoring
- Cooperative Learning groups
- Differentiated instructions
- Follow all IEP modifications/504 plan

Curriculum development Resources/Instructional Materials/Equipment Needed Teacher Resources:

Teacher notes

Textbook

Lab sheets from manuals and textbook

Science websites

Unit Overview

Content Area:

Unit Title:

Target Course/Grade Level:

Unit Summary

Primary interdisciplinary connections:

21st century themes:

Learning Targets

Content Standards

CPI #	Cumulative Progress Indicator (CPI)

Unit Essential Questions

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Unit Enduring Understandings

Students will understand that...

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Unit Objectives

Students will know...

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Unit Objectives

Students will be able to...

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Formative Assessments

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Summative Assessments

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Modifications (ELLs, Special Education, Gifted and Talented)

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- Follow all IEP modifications/504 plan

Curriculum development Resources/Instructional Materials/Equipment Needed Teacher Resources:

Teacher Notes: