Curriculum: Chambersburg Area SD Curriculum #2

PENNSYLVANIA

Course: Science Chemistry 10-12

Date: July 21, 2014 ET

Topic: Aqueous Solutions

Days: 15

Subject(s): Science

Grade(s): 10th, 11th, 12th

Key Learning:

Aqueous solutions are those dissolved in water and the dissolution has many applications.

Unit Essential Question(s):

How are aqueous solutions made?

Concept:	Concept:
Properties of Solutions 3.1.12.B, 3.4.12.A	**Acids/Base Reactions** 3.1.12.B, 3.4.12.A
Lesson Essential Question(s): What is a solution? (A) What is a strong, weak, and non-electrolyte? (A) What is dissociation? (A) What is the difference between dissociate and dissolve? (A) What types of compounds dissociate in water? (A) What is molarity? (A)	Lesson Essential Question(s): What ions in solution makes an acid/base? (A) What is the pH of an acid and base solution? (A) What are the products of an acid and base reaction? (A) What is neutralization? (A)
Vocabulary: solute, solvent, saturated, unsaturated, super-saturated	Vocabulary: titration, hydronium ion, end point, salt

Additional Information:

Attached Document(s):

Vocab Report for Topic: Aqueous Solutions Days: 15
Subject(s): Science Grade(s): 10th, 11th, 12th

Concept:

Properties of Solutions

solute - The substance presence in smaller amount in a solution
solvent - The substance present in larger amoutn in a solution
saturated -
unsaturated -
super-saturated -

Concept: Acids/Base Reactions

titration - The gradual addition of a solution of accurately known concentration to another solution of unknown concentration until the chemical reaction betweent he two solutions is complete
hydronium ion - The hydrated proton, H3O+
end point -
salt - An ionic compound

Curriculum: Chambersburg Area SD Curriculum #2

PENNSYLVANIA

Course: Science Chemistry 10-12

Date: July 21, 2014 ET

Topic: Chemical Bonding

Days: 15

Subject(s): Science

Grade(s): 10th, 11th, 12th

Key Learning:

The number of valence electrons determines the properites and types of bonds formed between elements.

Unit Essential Question(s):

How are sodium chloride and sucrose different?

Concept:	Concept:
Ionic and Covalent Bonding 3.1.12.A, 3.1.12.C, 3.4.12.A	**Lewis Structures** 3.1.12.A, 3.1.12.C, 3.4.12.A
Lesson Essential Question(s): What is the difference between ionic and covalent bonds? (A) What types of elements are involved in each type of bond? (A) What are the properties of ionic and covalent compounds? (A)	Lesson Essential Question(s): How do you draw Lewis structures for elements and compounds? (A) What is the difference between single, double, and triple bonds? (A) What is the octet rule and why is it important? (A) What are shared pairs and lone pairs? (A)
Vocabulary:	Vocabulary: octet rule

Additional Information:

Attached Document(s):

Vocab Report for Topic: Chemical Bonding Days: 15
Subject(s): Science Grade(s): 10th, 11th, 12th

Concept:

Ionic and Covalent Bonding

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Concept: Lewis Structures

octet rule - An atom other than hydrogen tends to form bonds until it is surrounded by eight valence electrons

Curriculum: Chambersburg Area SD Curriculum #2

PENNSYLVANIA

Course: Science Chemistry 10-12

Date: July 21, 2014 ET

Topic: Chemical Equations and Reactions

Days: 10

Subject(s): Science

Grade(s): 10th, 11th, 12th

Key Learning:

There are different types of chemical reactions and they are all governed by the Law of Conservation of Mass.

Unit Essential Question(s):

Why is it important to be able to balance and classify chemical equations?

Concept:	Concept:
Balancing Chemical Equations 3.1.12.A	**Classifying Chemical Equations** 3.4.12.A, 3.1.12.A, 3.1.12.B, 3.1.12.C
Lesson Essential Question(s): Why must equations be balanced? (ET) What can be changed to balance a chemical equation? (A) What is meant by a "balanced equation"? (ET)	Lesson Essential Question(s): What are the types of chemical reactions? (A) What are the keys to identifying chemical reactions? (A) How are the products of a chemical reaction predicted? (ET)
Vocabulary: coefficient, subscript, superscript	Vocabulary: reactants, products, precipitate, combustion, combination (synthesis), decomposition, double displacement, single displacement

Additional Information:

Attached Document(s):

Vocab Report for Topic: Chemical Equations and Reactions Days: 10
Subject(s): Science Grade(s): 10th, 11th, 12th

Concept:

Balancing Chemical Equations

coefficient - The number in front of a chemical formula in a balanced equation
subscript -
superscript -

Concept: Classifying Chemical Equations

reactants - The starting substances in a chemical reaction
products - The substance formed as a result of a chemical reaction
precipitate - An insoluble solid that separates from the solution
combustion - A reaction with oxygen and air, often with release of heat and light
combination (synthesis) - A reaction in which two or more substances combine to form a single product
decomposition - The breakdown of a compound into two or more components
double displacement - A reaction in which two compounds producte two new compounds
single displacement - An element and a compound react to forma different element and compound

Curriculum: Chambersburg Area SD Curriculum #2

PENNSYLVANIA

Course: Science Chemistry 10-12

Date: July 21, 2014 ET

Topic: Energy Transfers

Days: 5

Subject(s): Science

Grade(s): 10th, 11th, 12th

Key Learning:

Energy transfer is essential to life processes.

Unit Essential Question(s):

How is energy transfer essential to everyday life?

Concept: Food Chemistry 3.1.12.C, 3.4.12.B	Concept: Petroleum Chemistry 3.1.12.C, 3.4.12.B	Concept: Nuclear Chemistry 3.1.12.C, 3.4.12.B
Lesson Essential Question(s): How much energy is stored in each type of food source (carbs, proteins, and fats)? (A) How do we determine the energy content of food? (A) Why is a balanced diet essential? (ET)	Lesson Essential Question(s): What are hydrocarbons? (A) How is crude oil refined? (A) What products are prodcued from petroleum? (A) Why is petroleum useful for energy production? (ET)	Lesson Essential Question(s): How is nuclear energy generated? (A) What is the difference between fission and fusion? (A) What is radioactive decay? (A)
Vocabulary:	Vocabulary:	Vocabulary:

Additional Information:

Attached Document(s):

Curriculum: Chambersburg Area SD Curriculum #2 PENNSYLVANIA

Course: Science Chemistry 10-12 Date: July 21, 2014 ET

Topic: Gas Laws Days: 10

Subject(s): Science Grade(s): 10th, 11th, 12th

Key Learning:

Relationships exist between pressure, volume, temperature, and the number of moles of a gas.

Unit Essential Question(s):

What are the primary relationships among volume, temperature, and pressure of a gas?

Concept:	Concept:
Gas Laws 3.1.12.B, 3.1.12.D	**Kinetic Molecular Theory** 3.1.12.A, 3.1.12.B
Lesson Essential Question(s): What are the relationships betweenpressure, volume, temperature, and moles of a gas? (A) What are Boyle's and Charles' Laws? (A) What is the Ideal Gas Law? (A) How are molar mass and density related to one another? (A) How can the Ideal Gas Law be applied to stoichiometry? (ET)	Lesson Essential Question(s): Why do gases behave the way they do? (A) How do gases behave differently than liquids and solids? (ET)
Vocabulary: barometer, manometer	Vocabulary:

Additional Information:

Attached Document(s):

Vocab Report for Topic: Gas Laws Days: 10
Subject(s): Science Grade(s): 10th, 11th, 12th

Concept:

Gas Laws

barometer - An instrument that measures atmospheric pressure
manometer - A device used to meaure the pressure of a gas in a laboratory experiment

Curriculum: Chambersburg Area SD Curriculum #2 PENNSYLVANIA

Course: Science Chemistry 10-12 Date: July 21, 2014 ET

Topic: Introduction to Matter Days: 10

Subject(s): Science Grade(s): 10th, 11th, 12th

Key Learning:

The number of protons and the number and location of electrons in an atom determine the properties of an element.

Unit Essential Question(s):

What is the difference between a chlorine atom and a chloride ion?

Concept: History of Atomic Structure 3.1.12.C, 3.4.12.A, 3.1.12.B	Concept: Atomic Structure/Arrangement 3.4.12.A, 3.1.12.C	Concept: Isotopes and Ions
Lesson Essential Question(s): What are the contributions of Democritus, Dalton, Thomson, Rutherford, and Bohr to atomic theory? (A) How did technology affect the development of Atomic theory? (ET) How is the wave model different than the previous models? (A)	Lesson Essential Question(s): What is the nucleus? (A) How are the three types of subatomic particles different from one another? (A) What is the location of each subatomic particle? (A) What is the mass and charge of each subatomic particle? (A) How is the identity of an atom affected by each subatomic particle? (ET)	Lesson Essential Question(s): What is an ion? (A) What is a cation? (A) What is an anion? (A) How are the isotopes of the same element different? (ET)
Vocabulary: cathode ray, alpha, beta, gamma, particles	Vocabulary: electron, proton, neutron, electron cloud, atomic mass unit (amu), atomic number, atomic mass number	Vocabulary: ion, cation, anion

Topic: Introduction to Matter
Days: 10
Subject(s): Science
Grade(s): 10th, 11th, 12th

Concept:	Concept:
Classification 3.1.12.A, 3.4.12.A	**Chemical and Physical Changes/ Properties** 3.4.12.A, 3.1.12.C
Lesson Essential Question(s): How are pure and impure substances different? (A) What types of matter are pure? (A) What types of matter are impure? (A) What is the difference between an element, mixture, and a compound? (ET)	**Lesson Essential Question(s):** What is the difference between physical and chemical properties/changes? (A) What are the signs of a chemical change? (A)
Vocabulary: matter, heterogeneous, homogeneous, chromatography, distillation, filtration	**Vocabulary:** intensive, extensive

Additional Information:

Attached Document(s):

Vocab Report for Topic: Introduction to Matter Days: 10
Subject(s): Science Grade(s): 10th, 11th, 12th

Concept:

History of Atomic Structure

cathode ray -
alpha -
beta -
gamma -
particles -

Concept: Atomic Structure/Arrangement

electron -
proton -
neutron -
electron cloud -
atomic mass unit (amu) -
atomic number -
atomic mass number -

Concept: Isotopes and Ions

ion -
cation -
anion -

Concept: Classification

matter -
heterogeneous -
homogeneous -
chromatography -
distillation -
filtration -

Concept: Chemical and Physical Changes/Properties

intensive -
extensive -

Curriculum: Chambersburg Area SD Curriculum #2

Course: Science Chemistry 10-12

PENNSYLVANIA

Date: July 21, 2014 ET

Topic: Lab Technique and Safety

Days: 5

Subject(s): Science

Grade(s): 10th, 11th, 12th

Key Learning:

Specific lab techniques are essential to a safe lab environment.

Unit Essential Question(s):

What specific lab techniques are essential to a safe lab environment?

Concept:	Concept:
Lab Practices 3.7.12.B, 3.2.12.B, 3.2.12.C	**Lab Safety** 3.7.12.B
Lesson Essential Question(s): What are correct techniques for handling glassware? (A) What are the proper procedures for heating and cooling lab equipment and materials? (A)	Lesson Essential Question(s): Where is the lab safety equipment located? (A) What are the emergency procedures for the lab? (A) What is the correct procedure for handling and disposing chemicals? (A)
Vocabulary:	Vocabulary:

Additional Information:

Attached Document(s):

Curriculum: Chambersburg Area SD Curriculum #2 PENNSYLVANIA

Course: Science Chemistry 10-12 Date: July 21, 2014 ET

Topic: Measurement Days: 5

Subject(s): Science Grade(s): 10th, 11th, 12th

Key Learning:

Chemistry requires a knowledge of various measurement techniques and data analysis.

Unit Essential Question(s):

Why are precise and accurate measurements important in chemistry?

Concept: SI Units of Measurement 3.1.12.A, 3.1.12.D	Concept: Measurement Analysis 3.2.12.B, 3.1.12.C	Concept: Measurement Equipment 3.7.12.B
Lesson Essential Question(s): What are the basic units of the SI system? (A) What are the prefixes and their values? (A)	**Lesson Essential Question(s):** How are precision and accuracy different? (A) How does precision affect significant figures? (A) How do significant figure rules affect calculations? (A) How is dimensional analysis used to make unit conversions? (A)	**Lesson Essential Question(s):** What are the basic pieces of equipment used in the chemistry lab? (A) What degree of precision can be used with each piece of equipment? (A) What are possible sources of error with each piece of equipment? (A)
Vocabulary:	**Vocabulary:**	**Vocabulary:** triple beam balance, flask, graduated cylinder, beaker, pipet, buret, rubber policeman

Additional Information:

Attached Document(s):

Vocab Report for Topic: Measurement
Days: 5
Subject(s): Science
Grade(s): 10th, 11th, 12th

Concept: Measurement Equipment

triple beam balance -
flask -
graduated cylinder -
beaker -
pipet -
buret -
rubber policeman -

Curriculum: Chambersburg Area SD Curriculum #2

Course: Science Chemistry 10-12

PENNSYLVANIA

Date: July 21, 2014 ET

Topic: Nomenclature

Days: 10

Subject(s): Science

Grade(s): 10th, 11th, 12th

Key Learning:

Chemical compounds are named using specific rules and a knowledge of this naming system is necessary.

Unit Essential Question(s):

What is the language of chemistry?

Concept:	Concept:	Concept:
Binary Molecular Compounds 3.4.12.A, 3.1.12.C	**Acids** 3.1.12.C, 3.4.12.A	**Ionic Compounds (salts)** 3.4.12.A, 3.1.12.C
Lesson Essential Question(s): What kinds of elements make up binary molecular compounds? (A) What are the prefixes and suffixes used in naming binary molecular compounds? (A)	**Lesson Essential Question(s):** What is an acid? (A) What is the difference between binary and oxyacids? (A) What is pH of an acid? (A) Where are acids found in every day life? (ET)	**Lesson Essential Question(s):** What type of elements make up ionic compounds? (A) When do ionic compounds need roman numerals in their name? (A) What are the names, formulas, and charge of polyatomic ions? (A)
Vocabulary:	Vocabulary:	Vocabulary:

Topic: Nomenclature
Days: 10
Subject(s): Science
Grade(s): 10th, 11th, 12th

Concept:
Organic
3.4.12.C, 3.4.12.A

Lesson Essential Question(s):
What is the difference between organic and inorganic compounds? (A)

What are the root prefixes used in organic nomenclature? (A)

What is the difference between alkanes, alkenes, alkynes? (A)

What are some common functional groups and how are they identified? (A)

Vocabulary:
ketone, alcohol, aldehyde, carboxylic acid, halogen, aromatic, ether, ester, amines

Additional Information:

Attached Document(s):

Vocab Report for Topic: Nomenclature Days: 10
Subject(s): Science Grade(s): 10th, 11th, 12th

Concept: Organic

ketone - Compounds with a carbonyl functional group and the general formula RR'CO, where R and R' are alkyl and/or aromatic groups
alcohol - An organic compound containd the hydroxyl group -OH
aldehyde - Compounds with a carbonyl functional group and the general formula RCHO, where R in an H atom, an alkyl, or an aromatic group
carboxylic acid - Acids that contain the carboxyl group OCOOH
halogen - The nonmetallic elements in Group 7A (F, Cl, Br, I, and At)
aromatic - A hydrocarbon that contins on or more benzene rings
ether - An organic compound containing the ROOOR' linkage, where R and R' are alkyl and/or aromatic groups
ester - Compounds that have the general formula R'Coor, where R' can be H or an alkyl group of an aromatic compound and R is an alkyl group or an aromatic group
amines - Organic bases that have the functional group ONR2, where R may be H, an alkyl group, or an aromatic group

Curriculum: Chambersburg Area SD Curriculum #2

PENNSYLVANIA

Course: Science Chemistry 10-12

Date: July 21, 2014 ET

Topic: Periodic Table

Days: 10

Subject(s): Science

Grade(s): 10th, 11th, 12th

Key Learning:

The Periodic Table is used to predict properties and relationships of the elements.

Unit Essential Question(s):

How is the Periodic Table organized?

Concept: History and Design	Concept: Groups and Periods	Concept: Periodic Trends
3.1.12.A, 3.1.12.C, 3.2.12.C	3.1.12.A, 3.1.12.C, 3.4.12.A	3.1.12.A, 3.1.12.C, 3.4.12.A
Lesson Essential Question(s): Who developed the first periodic table? (A) How has the Periodic Table been modified since its development? (A) How is the Periodic Table limited between metals and nonmetals? (ET)	**Lesson Essential Question(s):** What is the difference between a group and a period? (A) What are the names of the groups (families)? Where are they located? (A)	**Lesson Essential Question(s):** What are the trends related to: electron affinity, ionization energy, atomic radius, electronegativity, and metallic characteristics? (A) What is the trend for atomic number and mass? (A)
Vocabulary: metalloid	**Vocabulary:** group, period	**Vocabulary:**

Additional Information:

Attached Document(s):

Vocab Report for Topic: Periodic Table Days: 10
Subject(s): Science Grade(s): 10th, 11th, 12th

Concept:

History and Design

metalloid - An element with properties intermediate between those of metals and nonmetals

Concept: Groups and Periods

group - The elements in a vertical column of the periodic table
period - A horizontal row of the periodic table

Concept: Periodic Trends

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Curriculum: Chambersburg Area SD Curriculum #2 PENNSYLVANIA

Course: Science Chemistry 10-12 Date: July 21, 2014 ET

Topic: Stoichiometry and Quantitative Chemistry Days: 20

Subject(s): Science Grade(s): 10th, 11th, 12th

Key Learning:

Mole relationships are used to solve problems in chemistry.

Unit Essential Question(s):

How are problems quantitatively solved that involve chemical reactions?

Concept: **Quantitative Analysis from Equations** 3.1.12.D, 3.1.12.B, 3.1.12.A	Concept: **Empirical Molecular Formulas and % Composition** 3.4.12.A, 3.2.12.C	Concept: **Mole Concept** 3.1.12.A, 3.1.12.B, 3.1.12.D
Lesson Essential Question(s): How does the mole ration relate the components of a chemical equation? (A) Why is stoichiometry essential to chemistry? (A) What is the limiting reactant and how is it determined? (A) How is solution stoichiometry different? (ET)	Lesson Essential Question(s): What is the difference betwee an empirical and molecular formula? (A) How is empirical formula determined from percent composition? (A) What is percent composition and how is it calculated? (A)	Lesson Essential Question(s): What is a mole? (A) Who developed the mole concept? (A) Why are moles so important? (ET) How is the molar mass determined for elements and compounds? (A)
Vocabulary:	Vocabulary:	Vocabulary: atomic mass, Avagadro's number

Additional Information:

Attached Document(s):

Vocab Report for Topic: Stoichiometry and Quantitative Chemistry Days: 20
Subject(s): Science Grade(s): 10th, 11th, 12th

Concept:

Mole Concept

atomic mass -
Avagadro's number - 6.022 X 10x23 - the number of praticles in a mole