Course Title: Agriculture Chemistry Date Adopted: **February 20, 2002**

Department: Agriculture UC/CSU Requirement: Yes

Pre-Requisite: Agriculture Biology with a C or Fulfills CSF Requirements: Yes

better Algebra, or instructors

permission

Length of Course: Two Semesters Fulfills H/S Graduation Credit As:

Physical Science Elective: Yes

Semester Units/Credit: 5 Grade Level: 10-12

Course Number: 01018

I. Course Description

Agriculture Chemistry is a laboratory science course designed for the college bound student with career interest in agriculture. Students will be involved in hands on laboratory study an receive in-depth look at various concepts in chemistry including: chemistry and its relationship to agriculture, matter and energy, the periodic table, bonding, chemical reactions, moles, gases and gas level.

II. Rationale

Chemistry is one of the building blocks upon which our technological society is based. An adequate understanding of the chemical nature of matter is necessary therefore to be an intelligent contributing member of our society. Chemistry is intended to provide an introductory foundation for those who intend to continue their study of chemistry and for those students who intend to study in related scientific, medical and agriculture fields. It is also intended to meet the needs of those students whose interest lies in other fields of study but required a knowledge of chemistry to function in that capacity.

Goals, Objectives, and Performance Indictors

Goal: Students will develop a knowledge of the basic concepts of the

structure of the atom and the Atomic Theory of Matter.

Obj: Students will develop a knowledge of the evidence for the

Atomic Theory of Matter.

1.1.1: Students will state the Law of Conservation of Mass, Constant

Proportions, and Multiple Proportions and indicate how they

relate to the atomic theory.

1.1.2: Given the results of Aristotle, Democritus, Dalton, Thomson,

Millikan, Rutherford, and Chadwick, students will relate each

scientists contribution to the atomic theory of matter.

Obj: Students will develop a knowledge of the basic atomic structu re

of the atom.

1.2.1: Given the Periodic Table of the Elements, students will identify

each element by symbol and name and identify each element’s

atomic mass and atomic number.

1.2.2: Given the Periodic Table students will relate the position of an

element to its atomic number and atomic mass.

1.2.3: Given the Periodic Table students will identify metals,

semimetals, nonmetals, and halogens.

1.2.4: Given the Periodic Table students will identify alkali metals,

alkaline earth metals, and transition metals, trends in

ionization energy, electronegativity, and the relative size of

ions and atoms.

1.2.5: Given the Periodic Table students will determine the number

of electrons available for bonding.

1.2.6: Given the Periodic Table students will relate the position of

an element in the periodic table to its quantum electron

configuration and to its reactivity with other elements in the

table.

1.2.7: Given the Atomic notion of any element and/or the Periodic

Table of the Elements, students will calculate the number of

subatomic particles (protons, neutrons, and electrons) present

in any element.

1.2.8: Given the percentage abundance and isotopic masses of an

element, students will calculate the average atomic mass of

any element.

1.3: Obj: Students will develop a knowledge of the nature of the

electromagnetic spectrum and its relationship to the distribution

of electron in the atom.

1.3.1: Given the complete electromagnetic spectrum, students will

relate the visible spectrum to the other major divisions of the

electromagnetic spectrum.

1.3.2: Given the wavelength, students will calculate the frequency

and its corresponding energy (E = hf and c = f \) and visa

versa.

1.3.3: Given Planck’s equation relating light and energy (E = hf),

students will recognize the duel nature of light and apply the

results to the distribution of energy level in the electron cloud

of a hydrogen –like atom.

1.3.4: Using the Bohr’s Equations (EN = -1312kj/n2) and the Bohr

theory of the distribution of principle energy levels in the

atom, students will calculate energy of the principal energy

levels of hydrogen and/or hydrogen-like atoms.

1.3.5: Given the results of Quantum Mechanics developed by

Schrodinger and applying Hund’s rule and the Pali exclusion

principle, students will translate these results, rules, and

principles into the principal energy levels in an atom’s

electron cloud, their sublevels, and related atomic orbital

(s,p,d,f) and the distribution of electrons in the electron cloud

in the atomic orbital.

1.3.6: Given the electron configuration of an element, students will

identify that element.

1.4: Obj: Students will develop a knowledge of the periodic relationship

inherent in the organization of the Periodic Table of the

Elements.

1.4.1: Given the Periodic Table of the Elements, students will

identify the main periods, subperiods, and families of the

table.

1.4.2: Given the periodic Table of the Elements. Students will relate

the periods, subperiods, and families of the periodic table to

the quantum mechanical atom.

1.4.3: Given the Periodic Table of the elements, students will

identify the valence electron of each family and the elements

in that family and express that distribution by writing correct

electron configurations for each element.

1.4.4: Given a Periodic Table of the elements and the Periodic Law,

students will predict periodic trends of a family of elements

and of a period of elements with respect to atomic mass,

atomic numbers, electron number, atomic radii, ionization

energy, electron affinity, melting point, chemical reactivity,

and electronegativity.

Obj: Students will develop a knowledge of the nature of nuclear

chemistry.

1.5.1: Given the identities of all but one of the reactants and products,

students will balance equations for nuclear decay.

1.5.2: Given the identities of all but one of the reactants and products,

students will identify the type of radioactive decay occurring:

alpha, beta, positron, fission, fusion.

Goal: Students will gain an understanding of the conservation of atoms in

chemical reactions leads to the principal of conservation of matter and

the ability to calculate the mass of products and reactants.

Obj: Students will develop a knowledge of the mole as a number and

as a mass.

2.1.1: Given the term mole, students will recognize that it as equal to

Avogadro’s number of particles ( 6.023 x 10).

2.1.2: Given the atomic mass of an element, students will recognize

it as the mass in grams equal to Avogadro’s number of

particles ( 1 mole).

2.1.3: Given the term molar mass, students will recognize it as the

mass in grams equal to ne mole of a substance ( atomic,

formula, or molecular).

2.1.4: Given the Periodic Table of the Elements, students will

identify each element and its molar mass.

2.1.5: Given the chemical formula for a compound and the

Periodic Table of the Elements, students will determine its

molar mass.

2.1.6: Given the chemical formulas for several compounds, students

will identify those which are empirical formulas and those

which are molecular formulas.

2.1.7: Given appropriate data, students will calculate the molecular

formula of a substance.

2.1.8: Students will understand the quantity one mole is set by

defining, one mole of carbon 12 atoms to have a mass of

exactly 12 grams.

2.2: Obj: Students will develop a knowledge of the importance of

balanced equations in chemistry.

2.2.1: Given a balanced equation, students will identify the reactants

and products.

2.2.2: Given an unbalanced equation. Students will balance the

equation by inspection.

2.2.3: Given the reactants, products, and chemical formulas for a

reaction, students will write and balance an equation for the

described reaction.

2.2.4: Given a balanced chemical equation, students will verify

that it obeys the Law of Conservation of Mass.

2.2.5: Given a balanced equation, students will identify the

equations as acid-base neutralization, precipitation,

synthesis, decomposition, etc.

2.2.6: Given a chemical reaction students will calculate percent

yield.

2.2.7: Given a chemical reaction students will identify reactions

that involve oxidation and reductions and how to balance

oxidation-reduction reactions.

2.2.8: Given a balanced equation and appropriate data, students

will calculate using the mole method the stoichiometric

relationships of reactants to reactants, reactants to

products, or products to products, ( weight/weight,

weight/volume, and volume/volume problems)

Goal: Students will gain an understanding of the biological, chemical, and

physical properties of matter result from the ability of atoms to form

bonds from electrostatic forces between electrons and protons and

between atoms and molecules, and the nomenclature of inorganic

compounds.

3.1: Obj: Students will develop a knowledge of the types of chemical bonds.

3.1.1: Given the terms ionic, covalent, metallic, hydrogen bonding, and

Van der Waals dispersion forces, students will describe how each

type of bond is formed.

3.1.2: Given the Periodic Table of the Elements and/or the

electronegativities of the elements, students will determine which

elements are likely to combine to for ionic bonds and which

elements are likely to combine to form covalent bonds.

3.1.3: Given the Periodic Table of the Elements and using the octet rule,

students will write the Lewis electron dot structure of the

representative elements.

3.1.4: Given the Periodic Table of the elements, students will write

Lewis electron dot structure for simple molecules and polyatomic

ions.

3.1.5: Given the Periodic Table of Elements, students will write the

repeating patterns of negative and positive ions held together by

electrostatic attraction.

3.1.6: Using only the Periodic Table, students will describe

electronegativity and ionization energy trends and compare the

relative polarity of different bonds,

Obj: Students will develop a knowledge of the structure and geometry

of molecules, ions, and complex ions.

3.2.1: Given or having derived the Lewis structure of a simple

molecule or polyatomic ion, students will use valence shell

electron pair repulsion (VSEPR) and/or valence bond theory

(Atomic orbital and orbital hybridization) to predict the

geometric arrangement of the elements of a molecule,

polyatomic ion, or complex ion, and describe its shape using a

descriptive term (linear, bent pyamidal, trigonal planer,

tetrahedral).

3.2.2: Given or having derived the molecular structure of a molecule

using VSEPR or the valence bond theory, students will identify

the type of bonding orbitals or hybridization of bonding

orbitals used by the combined atoms which result in the

determination of the shape of the molecule.

Obj: Students will develop a knowledge of the nomenclature of

inorganic compounds.

3.3.1: Given the definition of an acid, base, and salt, students will

identify each form-their formula or their name.

3.3.2: Given the rules (traditional and/or IUPAC) for naming binary

inorganic compounds, students will name and/or write the

formula for binary inorganic acids, bases, salts, complex ions,

and nonmetal compounds.

3.3.3: Given the rules (traditional and/or IUPAC) for naming ternary

inorganic compounds, students will name and/or write the

formula for ternary inorganic acids, salts, coordination

compounds, complex ions and polyatomic ions.

Obj: Students will develop a knowledge of the nomenclature and

structure of simple organic compounds. (optional)

3.4.1: Given the structural formula of a simple organic compound,

students will classify it as a hydrocarbon, aromatic, alkylhalide,

aldehyde, ketone, acid, amine, etc.

3.4.2: Given the molecular formula of a simple organic compound

students will write its structural formula.

3.4.3: Given the IUPAC name of a simple organic compound,

students will write its structural formula.

3.4.4: Given the structural formula of a simple organic compound,

students will give its IUPAC name.

Goal: Students will gain an understanding of the kinetic molecular theory

describes the motion of atom and molecules and explain the properties

of gases.

Obj: Students will develop a knowledge of the nature of the gaseous

state.

4.1.1: Given the physical characteristics of the gaseous state, students

will classify a substance as a gas.

4.1.2: Given the kinetic theory of matter, students will explain the

observed physical characteristics of the gaseous state.

4.1.3: Given appropriate data and the kinetic theory of matter,

students will recognize the significance of absolute zero.

4.1.4: Given appropriate data, students will use Graham’s Law to

calculate the relative velocities of gaseous species and relate

these to the kinetic theory of matter.

4.1.5: Given the Kelvin temperature scale, students will interconvert

Celsius and Kelvin temperatures.

4.1.6: Given observable pressure on the surface, students will

identify that random motion of molecules and their collisions

with a surface create that observable pressure on that surface.

4.1.7: Given appropriate data students will explain the random

motion of molecules in correlation with the diffusion of gases.

4.1.8: Given the appropriate data, students will recognize the

mathematical relationship between moles, pressure, volume,

and temperature for a gas (Boyles and Charles Laws,

Avogardro’s Hypothesis, etc).

4.1.9: Given the standard temperature and pressure ( STP) students

will define the values and meaning.

4.1.10: Given the ideal gas law in the form PVU=nRT students will

solve problems.

4.1.11: Given Daltons Laws of Partial Pressure, students will

calculate the partial pressure of each gas in the mixture

and/or total pressure of a mixture of gases.

Obj: Students will develop a knowledge of the condensed phases of

matter-liquids and solids.

4.2.1: Given the physical properties of the liquid and solid states,

students will identify a substance as a liquid or a solid.

4.2.2: Given the heat capacity of each state of matter and heats of

fusion and vaporization for a pure substance, students will

calculate the quantity of heat required for the conversion of a

substance form one state to another.

4.2.3: Given appropriate data, students will construct graphically

a cooling curve and/or heating curve and identify the

significant region of the graph: solid state, liquid state,

gaseous state, fusion curve, vaporization curve.

Obj: Students will develop a knowledge of the effect of chemical

bonds on the type of solid formed.

4.3.1: Given appropriate data, students will determine the type of

solid ( ionic, molecular, metallic, covalent network) formed

by a substance and relate its formation to the type of

intermolecular, interatomic, and interionic bonding ( ionic,

covalent, metallic, hydrogen, Van Der Waal’s).

4.3.2: Given the physical properties of various solids, students will

distinguish among ionic, molecular, covalent network, and

metallic solids with regard to particle structure ( molecular,

ion, or atomic).

4.3.3: Given the physical properties of various solids, students will

compare different molecular substances with respect to the

types of intermolecular forces ( dipole forces, hydrogen

bonding, dispersion (Van Der Waal’s).

Goal: Students will gain an understanding that acids, bases, and salts are three

classes of compounds that form ions in water solutions.

Obj: Students will develop a qualitative understanding of the concept

of chemical equilibrium.

5.1.1: Given the definition of equilibrium, students will relate the

definition to the reversibility of chemical reactions and reaction

rates.

5.1.2: Given the definition of equilibrium, students will recognize that

the process is dynamic.

5.1.3: Given La Chatelier’s principal, students will predict the effect

of changes in temperature, concentration and pressure will have

of the chemical state of equilibrium in homogeneous and in

heterogeneous systems.

Obj: Students will develop a quantitative understanding of

equilibrium in the gaseous state.

5.2.1: Given a balanced chemical equation, students will recognize

the relationship between equilibrium, the Law of Mass Action,

and La Chatelier’s principle.

5.2.2: Given balanced chemical equations, students will write a

equilibrium law expression for each equilibrium system.

5.2.3: Given appropriate data, students will calculate the value of the

equilibrium constant either as Kp or Kc of the concentrations

of the species in equilibrium using the equilibrium law

expression.

5.2.4: Given several sets of appropriate data of the same equilibrium

system, students will recognize the relationship between

shifting equilibria ( La Chatelier’s Principal), the equilibrium

law expression, and the value of the equilibrium constant.

Obj: Students will develop a quantitative understanding of solubility

equilibrium.

5.3.1: Given or having developed graphic data, students will

recognize the relationship of the solubility of a substance to

the Celsius temperature.

5.3.2: Given a solubility table, students will predict the solubility of

a variety of compounds.

5.3.3: Given a solubility table, students will predict whether a

precipitate will form when tow electrolytes are mixed and will

write a balanced net ionic equation expressing what they

believed to have occurred.

5.3.4: Given the formula for a slightly soluble ionic compound,

students will write an equation for its dissociation in water to

form ions.

5.3.5: Given the formula for a slightly soluble ionic compound and

the balance equation for its dissociation in water, students

will write the solubility law expression, Ksp.

5.3.6: Given appropriate data, students will calculate the value of

the Ksp or the concentrations (molarity or solubility) of the

ionic or formula species in solution using the solubility law

expression.

Obj: Students will develop a quantitative understanding of acid-base

chemistry and acid-base equilibrium.

5.4.1: Given the definition of an Arrhenius acid and base and/or a

Bronsted-Lowry acid and base, students will identify each

acid and base from a variety of inorganic compounds.

5.4.2: Given the equation of an acid-base reaction, students will

identify the Arrhenius acid and base and/or the Bronsted-

Lowry acid-base conjugate pairs.

5.4.3: Given the chemical properties of Arrhenius acids and bases,

students will predict the chemical behavior of several

Arrenius acids and bases.

5.4.4: Given an Arrhenius acid and base, students will write a

balanced chemical reaction for their neutralization forming

a salt water.

5.4.5: Given the definition of an acid-base titration, students will

recognize the relationship between reactants and products.

5.4.6: Given the definition and chemical characteristics of an

acid-base indicator, students will recognize their use in

acid-base titrations.

5.4.7: Given appropriate data for an acid-base titration, students

will calculate stoichiometrically using the mole method,

the molarity of a solution.

5.4.8: Given acids and bases students will know that acids are

hydrogen-ion-donating and bases are hydrogen-ion-

accepting substances.

5.4.9: Given the formula for an acid or a base, students will write

the equation for their dissociation in water.

5.4.10: Given the PH scale students will characterize acid and

base solutions.

5.4.11: Given the relationship between PH and the hydrogen ion

concentration of a solution (pH equation), students will

calculate the pH or the hydrogen ion concentration of a

solution.

5.4.12: Given the equation for the dissociation of water, students

will write the ion product expression for water, Kw.

5.4.13: Given the Kw for water, students will calculate the

hydroxide concentration of an acidic solution or the

hydrogen ion concentration of a basic solution.

5.4.14: Given the equation pH + pOH = 14 and appropriate data,

students will calculate the pH, the pOH, the hydrogen ion

concentration, and/or the hydroxide ion concentration of a

solution.

5.4.15: Given buffers students will stabilize pH in acid base

reactions.

5.4.16: Given an equation for the dissociation of a weak acid or

base in water, students will write the ion product

expression of an acid (ka) or a base (Kb).

Goal: Students will gain an understanding that solutions are homogenous

mixture of two or more substances and the nature of chemical

solutions.

Obj: Students will develop a knowledge of the chemical methods of

expressing the concentration of a solution.

6.1.1: Given the definition of a mixture, students will identify

solutions as mixtures.

6.1.2: Given the definition of the components of a mixture,

students will identify the solute and the solvent of several

solutions.

6.1.3: Given the appropriate data, students will describe how to

prepare a solution to a desired molarity, molality, mole

fraction, and/or mass percentage concentration.

6.1.4: Given the equation for the mole fraction of a solution and

appropriate data, students will calculate the fraction of a

solution that is solute and the fraction of a solution that is

solvent.

6.1.5: Given the equation for the molarity of a solution, and

appropriate data, students will calculate the molarity of the

solution, mass of solute, moles of solute, or volume of

solution/solvent required to prepare the solution.

6.1.6: Given the concept of random molecular motion students

will describe the dissolving process at the molecular level.

6.1.7: Given the equation of the molality of a solution and

appropriate data, students will calculate the molality of the

solution, mass of solute, moles of solute, or mass of solvent

required to prepare the solution.

6.1.8: Given the equation for the percentage by mass

concentration of a solution and appropriate data, students

will calculate the percentage concentration of the solution,

mass of solute, or mass of solvent required to prepare the

solution.

6.1.9: Given the appropriate data students will describe how

temperature, pressure, and surface area affect the dissolving

process.

6.1.10: Given the appropriate data students will describe how to

calculate the concentration of a solute in terms of grams

per liter, molarity, parts per million, and percent

composition.

6.1.11: Given the chemical formula of a solute, students will write

a balanced equation illustrating the formation of ions

(dissociation of the solute) in water.

6.1.12: Given a balanced equation of the dissolving of an ionic

compound in water, students will identify the steps on the

solution process: ionization and/or dissociation and

hydration.

6.1.13: Given the appropriate data students will describe how

molecules in a solution are separated or purified by the

methods of chromatography and distillation.

Obj: Students will develop a knowledge of the colligative properties

of solutions.

6.2.1: Given the definition of a colligative property of a solution,

students will recognize the following as colligative

behavior; freezing point depressions, boiling point

elevations, and vapor pressure depressions.

6.2.2: Given the definition and chemical properties of electrolytes,

students will identify several compounds as either

electrolytes or nonelectrolyte.

6.2.3: Given several solutes, students will compare the colligative

properties of electrolytes to those of nonelectrolyte.

6.2.4: Given appropriate data and freezing point depression

equation, students will calculate the freezing point of a

solution, the molar mass of the solute, or the molality of the

solution.

6.2.5: Given appropriate and the boiling point elevation equation,

students will calculate the boiling point of a solution, the

molar mass of the solute, or the molality of the solution.

Goal: Students will gain an understanding that energy is exchanged or

transformed in all chemical reactions and physical changes of matter.

Obj: Students will develop an understanding of chemical

thermodynamics.

7.1.1: Given the appropriate data, students will describe

temperature and heat flow in terms of the motion of

molecules or atoms.

7.1.2: Given the appropriate data, students will describe that

chemical processes can either release ( exothermic) or

absorb ( endothermic) thermal energy.

7.1.3: Given the appropriate data, students will describe energy is

released when a material condenses or freezes and is

absorbed when a material evaporates or melts.

7.1.4: Given the appropriate values for specific heat and heat of

phase change students will solve problems involving heat

flow and temperature changes.

7.1.5: Given Hess’s law students will calculate enthalpy change in

a reaction.

7.1.6: Given Gibbs free energy equation students will determine

whether a reaction would be spontaneous.

Goal: Students will gain an understanding of the concept of thermochemistry

and chemical thermodynamics.

Obj: Students will develop a knowledge of the relationship between

heat and chemical reaction.

8.1.1: Given the definition of heat, energy, and temperature

students will relate each to a chemical system.

8.1.2: Given the definition of kinetic and potential energy,

students will relate these definitions to chemical compounds

and chemical processes and differentiate between specific

examples of each.

8.1.3: Given the Law of Conservation of Energy, students will

apply the concept to chemical processes and verify its

conclusion.

8.1.4: Given the appropriate data and chemical formulas, students

will write a balanced thermochemical equation including the

enthalpy of reaction.

8.1.5: Given the terms of endothermic and exothermic, students

will relate the direction of heat flow to the chemical reaction

to the sign of ^H.

8.1.6: Given a thermochemical equation, students will express the

heat in ^H notation.

8.1.7: Given specific thermochemical equations and their ^H,

students will identify them as enthalphies of formation

and/or combustion.

8.1.8: Given a thermochemical equation, students will calculate

stoichiometrically using the mole method, the quantitative

relationship between mass, mole, and heat.

Goal: Students will gain an understanding that chemical reaction rates depend

on factors that influence the frequency of collision of reactant

molecules.

Obj: Students will develop knowledge of chemical reaction.

9.1.1: Given the appropriate data students will describe the rate of

reaction is the decrease in concentration of reactants or the

increase in concentration of products with time.

9.1.2: Given the appropriate data students will describe how

reaction rates depend on such factors as concentration,

temperature, and pressure.

9.1.3: Given the appropriate data students will describe the role a

catalyst plays in increasing the reaction rate.

9.1.4: Given the appropriate data students will know the

definition and role of activation energy in a chemical

reaction.

10.0 Goal: Students will gain an understanding of the concept of chemical kinetics.

Obj: Students will develop a knowledge of the Collision Theory and

its relationship to chemical kinetics.

10.1.1: Given the Collision Theory, students will relate each factor

in the theory to its effect on the rate of a chemical

reaction.

10.1.2: Given the Collision Theory, students will predict the effect

of temperature, pressure, and concentration changes and

catalysts.

10.1.3: Given appropriate data, students will construct a reaction

coordinate diagram and label the significant region of the

diagram: reactants products, activation energy forward

and reverse, activated complex, and enthalpy of reaction.

10.1.4: Given the chemical and physical characteristics of a

catalyst, students will relate a catalysts chemical activity to

the Collision Theory and reaction kinetics.

10.1.5: Given a reaction coordinate diagram, students will note

changes in the diagrams form with the addit ion of a

catalyst to the reaction.

Goal: Students will gain an understanding of chemical equilibrium is a

dynamic process at the molecular level.

Obj: Students will develop a knowledge of chemical equilibrium.

11.1.1: Given LeChatelier’s principal students will be able to

predict the effect of changes in concentration, temperature,

and pressure.

11.1.2: Given the appropriate data, students will describe forward

and reverse reaction rates are equal when equilibrium

established.

11.1.3: Given the appropriate data, students will write and

calculate an equilibrium constant expression for a reaction.

Goal: Students will gain an understanding of oxidation, reduction, and

electrochemical processes.

Obj: Students will develop a knowledge of oxidation numbers,

oxidation, and reduction and the process by which redox

reactions are balanced.

12.1.1: Given the rules for assigning oxidation numbers, students

will assign oxidation numbers to each elements of a

compound, ion, or polyatomic ion.

12.1.2: Given the definition of oxidation, students will identify the

reducing agent in a chemical reaction.

12.1.3: Given the definition of reduction, students will identify the

oxidizing agent in a chemical reaction.

12.1.4: Given the rules for balancing redox reactions, students will

balance redox reactions by inspection or by the half-

reaction method in acid, basic, and neutral solutions.

12.1.5: Given a balanced redox reaction and appropriate data from

a redox titration, students will calculate stoichiometrically

using the mole method, the molarity of a solution.

Obj: Students will develop knowledge of electrolytic cells.

12.2.1: Given a diagram of an electrolytic cell, students will label

the important compounds.

12.2.2: Given a diagram of an electrolytic cell, students will

compare and contrast it with a diagram of an electrochemical cells.

12.2.3: Given Faraday’s Law of Electrolysis, students will

recognize the relationship between a faraday of electrons

and a mole of electrons.

12.2.4: Given Faraday’s Laws of Electrolysis and appropriate

data, students will calculate the quantity of current

required, the time required, the number of faradays of

electrons, the number of moles of electrons, or the mass

(Volume) of substance oxidized or reduced during an

electrolytic process.

Obj: Students will develop a knowledge of standard electrode

potentials.

12.3.1: Given a table of standard electrode potentials, students will compare the relative strengths of substances as oxidizing and reducing agents.

12.3.2: Given a table of standard electrode potentials, students will predict the spontaneity of a redox reaction form the total

voltage of the reaction.

Obj: Students will develop a knowledge of electrochemical cells.

12.4.1: Given a diagram of an electrochemical cell, students will

label the importance components.

12.4.2: Given a diagram of an electrochemical cell, students will

compare and contrast it with an electrolytic cell.

12.4.3: Given a table of standard electrode potentials, students will

determine the anode and cathode and calculate the cell

voltage at standard conditions.

Goal: Students will gain understanding of bonding characteristics of carbon

allow the formation of many different organic molecules of varied

sizes, shapes, and chemical properties and provide the biochemical

basis of life.

Obj: Students will develop an understanding of the bonding

characteristics.

13.1.1: Given the structural formula of a large molecules

(Polymers) such as proteins, nucleic acids, and starch

students will write the repetitive combination of simple

subunits.

13.1.2: Given the appropriate data students will write the bonding

characteristics of carbon that results in the formation of a

large variety of structures ranging from simple

hydrocarbons to complex polymers and biological

molecules.

13.1.3: Given the appropriate data students will describe amino

acids are the building blocks of proteins.

13.1.4: Given the appropriate data students will describe the

system for naming the ten simplest liner hydrocarbons and

isomers that contain single bonds, simple hydrocarbons

with double and triple bounds, and simple molecules that

contain a benzene ring.

13.1.5: Given the functional groups students will identify that

which forms the basis of alcohols, ketones, ethers, amines,

esters, aldehydes, and organic acids.

13.1.6: Given the R-group structure of amino acids students will

combine them to form the polypeptide backbone structure

of proteins.

14.0 Goal: Students will develop an understanding of Nuclear processes those in

which an atomic nucleus changes, including radioactive decay of

naturally occurring and human-made isotopes, nuclear fission, and

nuclear fusion.

Obj: Students will develop an understanding of nuclear processes.

14.1.1: Given the appropriate data students will explain how

protons and neutrons in the nucleus are held together by

nuclear forces that overcome the electromagnetic repulsion

between the protons.

14.1.2: Given the appropriate data students will calculated by using

( EU = mc2) the energy released per gram of materials is

much larger in nuclear fusion or fission reactions than in

chemical reactions. The change in mass is small but

significant in nuclear reaction.

14.1.3: Given the appropriate data students will describe naturally

occurring isotopes of elements are radioactive, as are

isotopes formed in nuclear reactions.

14.1.4: Given the appropriate data students will describe the three

most common forms of radioactive decay (alpha, beta, and

gamma) and know how the nucleus change in each type of

decay.

14.1.5: Given the appropriate data students will describe alpha,

beta, and gamma radiation produce different amounts and

kinds of damage in matter and have different penetrations.

14.1.6: Given the appropriate data students will know how to

calculate the amount of a radioactive substance remaining

after an integral number of half lives have passed.

14.1.7: Given the appropriate data students will describe how

protons and neutrons have substructures and consist of

particles called quarks.

Goal: Students will gain an understanding of the basic concepts of

measurement and mass.

Obj: Students will develop an understanding of the system of

measurement.

15.1.1: Given the conversion (equivalent factors) between the

metric system of measurement and the English system of

measurement conversions in length, volume, and mass

between the two systems.

15.1.2: Given the formula expressing the relationship of Fahrenheit

and Celsius temperatures, students will make mathematical

conversions between the two temperature scales.

15.1.3: Given appropriate laboratory glassware and apparatus,

students will identify the items by name.

15.1.4: Given appropriate directions and rules for the use of

laboratory glassware and apparatus and for expected

laboratory behavior, students will conduct laboratory

experimentation in a safe and prudent manner.

Obj: Students will develop a knowledge of the basic nature of

matter.

15.2.1: Given the definition of homogeneous and heterogeneous,

students will differentiate between pure substances and

mixture.

15.2.2: Given specific properties of elements or compounds,

students will identify the properties as physical or

chemical.

15.2.3: Given the equation for density (D=M/V), students will

recognize the relationship between mass and volume.

Goal: Students will gain an understanding of the basic concepts of

Agriculture Chemistry.

Obj: Students will develop an understanding of what agriculture

chemistry is and why it is important.

16.1.1: Given the appropriate data students will describe the

importance of agriculture chemistry in out society.

16.1.2: Given the appropriate data students will describe how

agriculture chemistry impacts their live.

16.1.3: Given the appropriate data students will describe how

agriculture chemistry has career opportunities.

Obj: Students will incorporate scientific principals with modern

agriculture practices.

16.2.1: Given the appropriate data students will describe how

agriculture chemistry research is important.

16.2.2: Given the appropriate data students will conduct an

agriculture chemistry research project.

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