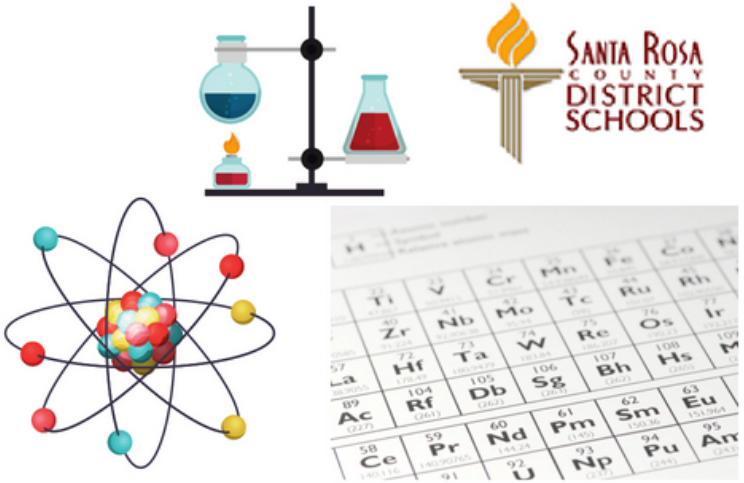

SCOPE & SEQUENCE
CREATED BY TEACHERS, FOR
THE TEACHERS OF SRC

"Give the pupils something to do; not something to learn; and if the doing is of such a nature as to demand thinking; learning naturally results."

~John Dewey

Santa Rosa County School District

Chemistry

Chapter 1: MATTER AND CHANGE

- 1.1 Chemistry is a Physical Science
- 1.2 Matter and Its Properties*
- 1.3 Elements

Chapter 2: MEASUREMENTS AND CALCULATIONS

- 2.1 Scientific Method
- 2.2 Units of Measurement
- 2.3 Using Scientific Measurements

Chapter 3: ATOMS; THE BUILDING BLOCKS OF MATTER

- 3.1 The Atom: From Philosophical Ideas to Scientific Theory
- 3.2 The Structure of the Atom**
- 3.3 Counting Atoms

Chapter 4: ARRANGEMENT OF ELECTRONS IN ATOMS

- 4.1 The Development of a New Atomic Model
- 4.2 The Quantum Model of the Atom
- 4.3 Electron Configurations

Chapter 5: THE PERIODIC LAW

- 5.1 History of the Periodic Table
- 5.2 Electron Configuration and the Periodic Table
- 5.3 Electron Configuration and the Periodic Properties

Chapter 6: CHEMICAL BONDING

- 6.1 Introduction to Chemical Bonding
- 6.2 Covalent Bonding and Molecular Compounds

6.3 Ionic Bonding and Ionic Compounds
6.4 Metallic Bonding***
6.5 Molecular Geometry

Chapter 7: CHEMICAL FORMULAS AND CHEMICAL COMPOUNDS

7.1 Chemical Names and Formulas
7.2 Oxidations Numbers
7.3 Using Chemical Formulas
7.4 Determining Chemical Formulas

Chapter 8: CHEMICAL EQUATIONS AND REACTIONS

8.1 Describing Chemical Reactions
8.2 Types of Chemical Reactions
8.3 Activity Series of the Elements***

Chapter 9: STOICHIOMETRY

9.1 Introduction to Stoichiometry
9.2 Ideal Stoichiometric Calculations
9.3 Limiting Reactants and Percentage Yield

Chapter 10: STATES OF MATTER

10.1 The Kinetic-Molecular Theory of Matter
10.2 Liquids
10.3 Solids
10.4 Changes of State
10.5 Water

Chapter 11: GASES

11.1 Gases and Pressure
11.2 The Gas Laws
11.3 Gas Volumes and the Ideal Gas Law
11.4 Diffusion and Effusion***

Chapter 12: SOLUTIONS

- 12.1 Types of Mixtures
- 12.2 The Solution Process
- 12.3 Concentrations of Solutions

Chapter 13: IONS IN AQUEOUS SOLUTIONS AND COLLIGATIVE PROPERTIES

- 13.1 Compounds in Aqueous Solutions
- 13.2 Colligative Properties of Solutions***

Chapter 14: ACIDS AND BASES

- 14.1 Properties of Acids and Bases
- 14.2 Acid-Base Theories***
- 14.3 Acid-Base Reactions

*SC.912.P.10.7 (Distinguish between endothermic and exothermic chemical processes) should be taught here.

**SC.912.P.10.12 (Differentiate between chemical and nuclear reactions) should be taught here.

***Shorten or skip as time permits for non-honors

2019-2020 Santa Rosa School Calendar (Weekly)

Week	Dates	Days	Quarter
1	12 August - 16 August	5	**Start 1st**
2	19 August - 23 August	5	
3	26 August - 30 August	5	↑
4	3 September - 6 September	4	9
5	9 September - 13 September	5	Weeks
6	16 September - 20 September	4	↓
7	23 September - 27 September	5	
8	30 September - 4 October	5	
9	7 October - 11 October	5	**End 1st**
10	15 October - 18 October	4	**Start 2nd**
11	21 October – 25 October	5	
12	28 October - 1 November	5	
13	4 November - 8 November	5	↑
14	12 November - 15 November	4	9
15	18 November - 22 November	5	Weeks
16	2 December - 6 December	5	↓
17	9 December - 13 December	5	
18	16 December - 19 December	3 1/2	**End 2nd**

*** See school-based testing schedule for the course SSA and EOC administration time**

Week	Dates	Days	Quarter
19	7 January - 10 January	4	**Start 3rd**
20	13 January - 17 January	5	
21	21 January - 24 January	4	
22	27 January - 31 January	5	↑
23	3 February - 7 February	5	10
24	10 February - 14 February	5	Weeks
25	18 February - 21 February	4	↓
26	24 February – 28 February	5	
27	2 March - 6 March	5	
28	9 March – 12 March	4	**End 3rd**
29	23 March – 27 March	5	**Start 4th**
30	30 March – 3 April	5	
31	6 April - 9 April	4	
32	13 April - 17 April	5	↑
33	20 April - 24 April	5	10
34	27 April – 1 May	5	Weeks
35	4 May - 8 May	5	↓
36	11 May - 15 May	5	
37	18 May - 22 May	5	
38	26 May - 29 May	3 1/2	**End 4th**

	Chapter/Lesson	Suggested Science Activities – depending on availability of equipment, supplies and time.	Vocabulary	NGSSS
safety throughout the year	Safety/Lab Skills, Introduction to Chemistry: Chapter 1 Sections 1.1 and 1.2 Pgs. 1-13	Discuss classroom rules and safety procedures Send home safety contract Enrichment activity on safety rules Safety Test or Quiz Lab: Basic methods of measurement (grad. Cylinder, mass by difference, volume by water displacement, equipment ID, filtering)	Matter Chemistry Biotechnology	
	Scientific Method & Communication :	Lab: Bubbles Lab: Technical Writing (given an assembled object, student writes specific directions for assembly; another student uses these directions to assemble same object)	Scientific method Independent variable Dependent variable Theory Scientific law Observation Model	SC.912.N.1.4 - Identify sources of information and assess their reliability according to the strict standards of scientific investigation. SC.912.N.1.5 - Describe and provide examples of how similar investigations conducted in many parts of the world result in the same outcome. SC.912.N.4.1 - Explain how scientific knowledge and reasoning provide an empirically-based perspective to inform society's decision making. SC.912.N.1.2 - Describe and explain what characterizes science and its methods. SC.912.N.2.1 - Identify what is science, what clearly is not science, and what superficially resembles science (but fails to meet the criteria for science. SC.912.N.2.2 - Identify which questions can be answered through science and which questions are outside the boundaries of scientific investigation, such as questions addressed by other ways of knowing, such as art, philosophy, and religion. SC.912.N.2.3 - Identify examples of pseudoscience (such as astrology, phrenology) in society.

				SC.912.N.3.3 - Explain that scientific laws are descriptions of specific relationships under given conditions in nature, but do not offer explanations for those relationships. SC.912.N.2.4 - Explain that scientific knowledge is both durable and robust and open to change. Scientific knowledge can change because it is often examined and re-examined by new investigations and scientific argumentation. Because of these frequent examinations, scientific knowledge becomes stronger, leading to its durability. SC.912.N.1.6 - Describe how scientific inferences are drawn from scientific observations and provide examples from the content being studied. SC.912.N.1.3 - Recognize that the strength or usefulness of a scientific claim is evaluated through scientific argumentation, which depends on critical and logical thinking, and the active consideration of alternative scientific explanations to explain the data presented. SC.912.N.3.4 - Recognize that theories do not become laws, nor do laws become theories; theories are well supported explanations and laws are well supported descriptions.SC912.N.1.2 - Describe and explain what characterizes science and its methods. SC.912.N.1.1 – Define a problem based on a specific body of knowledge, for example: biology, chemistry, physics, and earth/space science, and do the following: 1. pose questions about the natural world,

				2. conduct systematic observations, 3. examine books and other sources of information to see what is already known, 4. review what is known in light of empirical evidence, 5. plan investigations, 6. use tools to gather, analyze, and interpret data (this includes the use of measurement in metric and other systems, and also the generation and interpretation of graphical representations of data, including data tables and graphs), 7. pose answers, explanations, or descriptions of events, 8. generate explanations that explicate or describe natural phenomena (inferences), 9. use appropriate evidence and reasoning to justify these explanations to others, 10. communicate results of scientific investigations, and 11. evaluate the merits of the explanations produced by others.
	Matter and Change :	Demo exo and endothermic reactions Distinguish Physical and Chemical Properties/Physical and Chemical Changes Lab: calcium chloride and baking soda with phenol red Lab: Classifying Matter Lab: Separating Mixtures - (or other mixtures lab) Lab: heating curve for para-dichlorobenzene or water	Mass Volume Physical property Chemical property Physical change Chemical change Mixtures Compounds	SC.912.P.8.1 - Differentiate among the four states of matter. SC.912.P.8.2 - Differentiate between physical and chemical properties and physical and chemical changes of matter. SC.912.N.1.1 SC.912.P.10.1 – Distinguish between the forms of energy and recognize that they can be transformed from one form to others

			Elements Exothermic endothermic	SC.912.P.10.7 Distinguish between endothermic and exothermic chemical processes
	Scientific Measurement :	Lab: Accuracy and Precision Lab: Investigating Density Addition and subtraction of sig. figs. /mult. And division of sig. fig. Problem solving using dimensional analysis Error and percentage error Lab: metric conversions and dimensional analysis (interconversion within metric system)	Scientific notation Measurement Accuracy Precision Percent error Significant figures Energy (potential and kinetic) Density Conversion factor Bar graphs Line graphs Stem and leaf plot Circle graph Box and whisker plot Scatter plot	SC.912.N.1.1 MA.912.S.1.2 - Determine appropriate and consistent standards of measurement for the data to be collected in a survey or experiment. MA.912.S.3.2 - Collect, organize, and analyze data sets, determine the best format for the data and present visual summaries. SC.912.P.10.5 Relate temperature to the average molecular kinetic energy
	Atomic Structure:	Introduction to moles including molar atomic mass of elements. Lab: Isotopes or other isotope lab Lab: students use a ball as a “hydrogen nucleus” and calculate the “radius” of an atom that large. Students draw this atom on a map of Santa Rosa County. Lab: Black Box lab — (using inference, indirect measurement)	Atom Atomic theory Electrons Protons Neutrons Nucleus Atomic number Mass number Isotopes Atomic mass Mole	SC.912.N.1.1 SC.912.N.2.4 SC.912.N.3.1 - Explain that a scientific theory is the culmination of many scientific investigations drawing together all the current evidence concerning a substantial range of phenomena; thus, a scientific theory represents the most powerful explanation scientists have to offer. SC.912.N.3.2 - Describe the role consensus plays in the historical development of a theory in any one of the disciplines of science.

				SC.912.N.3.5 - Describe the function of models in science, and identify the wide range of models used in science. SC.912.P.8.3 - Explore the scientific theory of atoms (also known as atomic theory) by describing changes in the atomic model over time and why those changes were necessitated by experimental evidence. SC.912.P.8.4 - Explore the scientific theory of atoms (also known as atomic theory) by describing the structure of atoms in terms of protons, neutrons and electrons, and differentiate among these particles in terms of their mass, electrical charges and locations within the atom. MA.912.S.1.2 - Determine appropriate and consistent standards of measurement for the data to be collected in a survey or experiment. SC.912.N.2.5 - Describe instances in which scientists' varied backgrounds, talents, interests, and goals influence the inferences and thus the explanations that they make about observations of natural phenomena and describe that competing interpretations (explanations) of scientists are a strength of science as they are a source of new, testable ideas that have the potential to add new evidence to support one or another of the explanations.
	Electrons in Atoms	Distinguish orbital notations, electron configuration notation and noble gas configuration for elements through period 5 Lab: Flame Tests /Spectrum lab	Energy level Quantum Atomic orbital Electron cloud Quantum mechanics Electron configuration	SC.912.N.1.1 SC.912.N.2.4 SC.912.N.3.1 SC.912.N.3.2 SC.912.P.10.9 - Describe the quantization of energy at the atomic level. SC.912.P.8.4

			Aufbau principle Hund's rule Pauli exclusion principle Wavelength Frequency EM radiation Atomic emission spectrum Planck's constant Heisenberg uncertainty principle	SC.912.P.10.18 - Explore the theory of electromagnetism by comparing and contrasting the different parts of the electromagnetic spectrum in terms of wavelength, frequency, and energy, and relate them to phenomena and applications. SC.912.N.1.7 - Recognize the role of creativity in constructing scientific questions, methods and explanations SC.912.N.2.5
	Nuclear Chemistry: Chapter	Lab: Half-life of pennium (887) or other half-life lab Video – NOVA: Einstein's Big Idea (buy or borrow PBS) Nuclear Chemistry Poster Project: groups research topics in nuclear chemistry, make a poster and present to class. (optional) Distinguish between alpha and beta decay in nuclear reactions Distinguish between fission and fusion reactions	Radioactivity Radioisotopes Alpha particle Beta particle Gamma ray Half-life Radioactive decay Positron emission Transmutation Nuclear fission Nuclear fusion	SC.912.P.10.10 - Compare the magnitude and range of the four fundamental forces (gravitational, electromagnetic, weak nuclear, strong nuclear). SC.912.P.10.11 - Explain and compare nuclear reactions (radioactive decay, fission and fusion), the energy changes associated with them and their associated safety issues. SC.912.P.10.12 - Differentiate between chemical and nuclear reactions. SC.912.L.17.15 - Discuss the effects of technology on environmental quality. SC.912.L.17.16 - Discuss the large-scale environmental impacts resulting from human activity, including waste spills, oil spills, runoff, greenhouse gases, ozone depletion, and surface and groundwater pollution. SC.912.N.1.7 - Recognize the role of creativity in constructing scientific questions, methods and explanations SC.912.N.4.2 - Weigh the merits of alternative strategies for solving a specific societal problem by comparing a number of

				different costs and benefits, such as human, economic, and environmental.
	The Periodic Table: Chapter Periodic Trends	Lab: Chemistry “Aliens” (given a series of cards with figures, students organize the cards into a “periodic chart”) Project: Wall Periodic Table (students are assigned an element and all cards are put together to make a giant periodic table on the wall. Lab: Periodic Trends-	Mendeleev Metals Non-metals Metalloids Periods Groups Halogens Alkali metals Alkaline earth metals Noble gases Transition metals Inner transition metals Periodic law Periodicity Electronegativity Ionization energy Atomic radius Periodic table	SC.912.P.8.5 - Relate properties of atoms and their position in the periodic table to the arrangement of their electrons. SC.912.N.1.1 SC.912.N.1.7 - Recognize the role of creativity in constructing scientific questions, methods and explanations
	Ionic and Metallic Bonding	Project – Building Ionic Crystals (students build crystals of ionic compounds from 3D images online) Lab: Solutions Containing Ions– students use voltmeters to test the conductivity of solutions of different substances. Electrolytes and non-electrolytes) Ion Card Games – Flinn (flinnsci.com) or make your own ion cards. Students put together cation and anion cards which represent neutral ionic compounds. 1 deck of about 100 cards per group.	Valence electrons Electron dot structures Octet rule Cation Anion Ionic compound Ionic bond Chemical formula Formula unit Metallic bond	SC.912.N.1.6 SC.912.P.8.6 - Distinguish between bonding forces holding compounds together and other attractive forces, including hydrogen bonding and van der Waals forces. SC.912.N.1.7 - Recognize the role of creativity in constructing scientific questions, methods and explanations

			Crystalline structure Alloys	
	Covalent Bonding	Lab: Modeling Covalent Compounds/Molecular Geometry with models or clay. Lab: Investigating Polarity and Intermolecular Forces - comparing the properties of water vs. ethanol (drying time on a paper towel, surface tension on a penny, capillarity with chromatography paper). This could also be done as a demo. Discuss the bonding properties of Carbon	Covalent bond Molecule Molecular formula Structural formula Non-polar covalent bond Polar covalent bond Unshared electron pair Resonance Molecular orbital Molecular geometry Polarity Hybridization Van der Waals forces Dispersion forces Hydrogen bond	SC.912.P.8.6 SC.912.N.1.1 SC.912.P.8.7 - Interpret formula representations of molecules and compounds in terms of composition and structure. SC.912.P.8.12 - Describe the properties of the carbon atom that make the diversity of carbon compounds possible. SC.912.N.1.7 - Recognize the role of creativity in constructing scientific questions, methods and explanations
	Chemical Names and Formulas	Chemical Formula Card Games (see ionic and metallic bonding) Oxidation numbers --assign oxidation numbers to elements in polyatomic ions and compounds Practicing skills: Chemical names and writing formulas	Oxidation number Polyatomic ions Binary compound Stock naming Older nomenclature	SC.912.P.8.7
	Chemical Quantities	Lab: Avogadro's Number and the Mole Lab – Measuring Mass of one mole of different household compounds (sugar, salt,	Mole Avogadro's number	SC.912.P.8.9 - Apply the mole concept and the law of conservation of mass to calculate

		baking soda) and comparing them with each other. Lab: Percent Composition - find the percent of sugar in chewing gum or the percent water in popcorn Lab: percentage of oxygen in potassium chlorate Lab: Determining Empirical Formulas of MgO (optional)	Molar mass Empirical formula Molar volume of a gas Percent composition Molecular formula	quantities of chemicals participating in reactions. MA.912.S.1.2 - Determine appropriate and consistent standards of measurement for the data to be collected in a survey or experiment.
	Chemical Reactions	Practice: Writing Formula Equations Practice: Balancing Chemical Equations Lab: Exploring Types of Chemical Reactions (individual stations for reaction types) Lab: precipitation microscale lab Discuss Le Chatelier's Principle Discuss Factors affecting reaction rates including catalyst and energy diagram	Chemical equation Reactants Products Catalyst Coefficients Balanced equation Synthesis reaction Decomposition Single replacement Activity series Double replacement Combustion Equilibrium Activation energy Reaction rate Le Chatelier's Principle	SC.912.P.8.8 - Characterize types of chemical reactions, for example: redox, acid-base, synthesis, and single and double replacement reactions. SC.912.P.12.12 - Explain how various factors, such as concentration, temperature, and presence of a catalyst affect the rate of a chemical reaction. SC.912.P.12.13 - Explain the concept of dynamic equilibrium in terms of reversible processes occurring at the same rates.
	Stoichiometry	Lab: Reaction Stoichiometry/Limiting Reactants - Using baking and vinegar, students observe which reactant causes a change in the amount of carbon dioxide produced. Keep one reactant constant at a time.	Stoichiometry Percentage yield Theoretical yield Actual yield Limiting reagent	SC.912.P.8.9- Apply the mole concept and the law of conservation of mass to calculate quantities of chemicals participating in reactions. MA.912.S.1.2

			Excess reagent	
	States of Matter	Labeling a phase diagram Demo: Iodine crystal sublimation OR Quicklab: with air freshener in sublimator	Kinetic theory Gas pressure Atmospheric pressure Average kinetic energy Vaporization Evaporation Boiling point Melting point Freezing point Sublimation Deposition Phase diagram	SC912.P.8.1 SC.912.P.12.13 - Describe phase transitions in terms of kinetic molecular theory. SC.912.P.12.11 - Describe phase transitions in terms of kinetic molecular theory.
	Behavior of Gases	Graham's law demo – with ammonia and HCl in glass tube Lab: Diffusion of Gases ---hint: put dots of indicator on top petri dish and turn over instead of bottom one. Lab: Molar Mass of Butane (students measure 100 ml of butane in a graduated cylinder and calculate its molar mass using the Ideal Gas Law)	Compressibility Boyle's law Charles's law Gay-Lussac's law Combined gas law Ideal gas law STP Dalton's law of Partial pressure Diffusion effusion Graham's law	SC.912.P.10.5 - Relate temperature to the average molecular kinetic energy. SC.912.P.12.10 - Interpret the behavior of ideal gases in terms of kinetic molecular theory. MA.912.S.1.2 - Determine appropriate and consistent standards of measurement for the data to be collected in a survey or experiment.
	Solutions	Lab: Making a Solution -- use only molarity and molality Demo: endo and exothermic dissolving (sodium hydroxide and ammonium chloride)	Miscible Immiscible Solute Solvent Henry's law Molarity Molality Concentrate Dilute	SC.912.P.10.1 SC.912.P.10.2 Explore the Law of Conservation of Energy by differentiating among open, closed, and isolated systems and explain that the total energy in an isolated system is a conserved quantity SC.912.P.10.6 Create and interpret potential energy diagrams, for example: chemical

			Colligative property	reactions, orbits around a central body, motion of a pendulum MA.912.S.1.2 - Determine appropriate and consistent standards of measurement for the data to be collected in a survey or experiment. SC.912.L.18.12 - Discuss the special properties of water that contribute to Earth's suitability as an environment for life: cohesive behavior, ability to moderate temperature, expansion upon freezing, and versatility as a solvent.
	Acids, Bases and Salts	Lab: Distinguish common household chemicals as acids or bases using universal indicator and litmus paper Titration Demo	Acid Base Salt pH hydronium hydroxide neutralization	SC.912.P.8.11 - Relate acidity and basicity to hydronium and hydroxyl ion concentration and pH. SC.912.N.1.1 SC.912.P.8.8