Chemistry
Scope and Sequence

PROFILE

Science is a way of knowing and experiencing the natural world. It is a social and intellectual endeavor that provides the foundation for lifelong informed decision-making, problem-solving, improved quality of life and technological advances. Learning science is an active process, and all students should have access to challenging, relevant, exciting, "hands-on," and content-rich science experiences.

OUR CURRICULUM

The Conroe Independent School District offers students a challenging science curriculum that utilizes inquiry and discovery models of instruction which provide opportunities for all students to participate and master science concepts. Students will experience the richness of science through hands-on laboratory and field investigations through inquiry and active experimentation. Emphasized science process skills include: observing, measuring, identifying, classifying, predicting, comparing, inferring, and drawing conclusions. Students will also develop a proficient use of technology through analyzing and collecting data for real world science applications. Our science curriculum is based on the Texas Essential Knowledge and Skills (TEKS) curriculum framework.

CURRICULUM & INSTRUCTION STAFF

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EXPECTATIONS

1. **Student Investigations**
   The students will be able to gather, analyze, and interpret information using selected equipment and tools. The students will conduct field and laboratory investigations using safe, environmentally appropriate and ethical practices. The student will spend at least 40% of instructional time conducting investigations.

2. **Vocabulary**
   The student will build and expand vocabulary, through a print-rich environment, to increase fluency and understanding by incorporating scientific vocabulary into their everyday speaking, listening, and writing routines.

3. **Content Integration**
   The student will read a variety of texts to analyze, review, and critique scientific explanations, hypotheses, and theories as to strengths and weaknesses, and draw inferences on promotional materials. The student will write to inform, describe, and classify using correct scientific vocabulary, scientific concepts, sentence structure, capitalization, punctuation, spelling, usage, and word order.

4. **The student will…**
   a. Demonstrate safe practices
   b. Plan and implement descriptive investigations – well-defined questions and formulated hypotheses
   c. Select and use equipment and technology
   d. Collect data through observation and measurement
   e. Demonstrate repeated investigations to increase reliability of results
   f. Organize, analyze, evaluate, make inferences, and predict trends from direct and indirect evidence
   g. Communicate valid conclusions
   h. Construct graphs, tables, maps, and charts to organize, examine, and evaluate data
   i. Connect science concepts with history and scientists

SCIENCE PROCESS SKILLS

Throughout the year, students will master certain required skills. These skills are important to a student's understanding of the nature of science. **The Science Process Skills are not designed to be taught in isolation.** They are to be embedded in each instructional unit and some should be practiced each time science is taught.

The student will:

1. Demonstrate safe practices during field and laboratory investigations. **(TEKS 1A)**
2. Make wise choices in the use and conservation of resources and the disposal or recycling of materials. **(TEKS 1B)**
3. Plan and implement investigative procedures including asking questions, formulating testable hypotheses, and selecting equipment and technology. **(TEKS 2A)**
4. Collect data and make measurements with precision. **(TEKS 2B)**
5. Express and manipulate chemical quantities using scientific conventions and mathematical procedures such as dimensional analysis, scientific notation, and significant figures. **(TEKS 2C)**
6. Organize, analyze, evaluate, make inferences, and predict trends from data. **(TEKS 2D)**
7. Communicate valid conclusions. **(TEKS 2E)**
8. Analyze, review, and critique scientific explanations, including hypotheses and theories, as to their strengths and weaknesses using scientific evidence and information. **(TEKS 3A)**

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FIRST NINE WEEKS

SCIENCE PROCESS SKILLS SHOULD BE PRACTICED EACH TIME SCIENCE IS TAUGHT.

VOCABULARY		STUDENT EXPECTATIONS (SEs)		RESOURCES / ACTIVITIES
NOUNS	**VERBS**			
flammable corrosive disposal variable independent dependent control theory law mass/gram/ volume/liter length/meter	infer interpret observe analyze organize demonstrate calculate express manipulate predict evaluate	**Week 1**	**INTRODUCTION TO CHEMISTRY** 1. Demonstrate safe practices during laboratory investigations 2. Identify laboratory equipment with its proper use 3. Describe the parts of the scientific method	Wine – Water – Milk Demo Safety Rules Safety Contract Safety Scavenger Hunt Safety Symbol Card Scramble Gummy Bear Lab Blue Book Chapter 1 pg. 16, front cover Red Book Appendix C pg. 839-840
		Week 2	4. Differentiate between the fundamental SI units and prefixes 5. Express and manipulate mathematical calculations such as metric conversions, scientific notation, significant figures, dimensional analysis. 6. Organize, analyze, and predict trends from data tables and graphs	Rainbow lab Bubble gum lab Milk observation lab Blue Book Chapters 1 & 2 Red Book Appendix A & Chapter 1
mixture heterogeneous homogeneous solutions solute solvent element compound alloy metal non-metal metabolic endothermic exothermic oxidation reduction digestion rock cycle	differentiate investigate classify observing calculate distinguish investigate	**Week 3**	**PROPERTIES OF MATTER** 1. Differentiate between: elements, compounds, and mixture, solids, liquid, gases, metals, non-metals, metalloids. 2. Differentiate between: physical and chemical properties, physical and chemical changes	Element, Compound, Mixture lab States of Matter lab Physical Separation lab Demo – sugar & sulfuric acid Dry Ice lab Blue Book Chapter 3 Red Book Chapter 1

density viscosity buoyancy qualitative quantitative intensive extensive		**Week 4**	**PROPERTIES OF MATTER (cont'd)** 3. Investigate and verify the law of conservation of mass 4. Investigate and verify the law of conservation of energy 5. Distinguish between density, buoyancy & viscosity 6. Investigate and calculate density	Physical & Chemical changes lab Physical & Chemical properties card sort Density lab Ziploc lab Hot packs / cold pack
nucleus electron cloud neutron electron isotope Ion mass number	describe analyze	**Week 5**	**STRUCTURE OF THE ATOM** 1. Research and describe the atomic history from Dalton to Bohr. 2. Describe the existence and properties of subatomic particles	Atom Building Game Obsertainer Lab Atoms in a Bag Lab Blue Book Chapter 4 Red Book Chapter 2
		Week 6	3. Describe the existence of isotopes and calculate the average atomic mass.	Beanium
metal non-metal metalloid oxidation number valence electrons periodicity atomic radius family/group period series	research describe identify summarize predict infer investigate inference	**Week 7**	**PERIODIC TABLE** 1. Research and describe the role of scientists involved in the development of the Periodic Table from Mendeleev to Mosely. 2. Summarize the historical development of the periodic table to understand the concept of periodicity.	Periodic Table Foldable Castle Mendeleev Periodic Card Puzzle Missing Cousin Lab Mendeleev for a day Predicting Properties of Mystery Elements Mole Day Celebrations Periodic Patterns using colors Density Trend Lab Video – Reactivity of Alkali Metals Blue Book Chapter 6 Red Book Chapter 3
		Week 8	3. Identify the trends in periodicity including atomic radius, families/group sand periods, ionic radius, atomic mass, atomic number and valence number. 4. Identify elements by their family/group name and make inferences about their chemical behaviors based on their location within a family/group.	
		Week 9	**REVIEW CONCEPTS**	

SECOND NINE WEEKS

SCIENCE PROCESS SKILLS SHOULD BE PRACTICED EACH TIME SCIENCE IS TAUGHT.

VOCABULARY		STUDENT EXPECTATIONS (SEs)		RESOURCES / ACTIVITIES
NOUNS	**VERBS**			
Alpha Beta Gamma Positron ltalf-life fission fusion radioactivity	balance calculate graph investigate describe contrast	**Week 1**	**NUCLEAR CHEMISTRY** 1. Differentiate between alpha, beta and gamma radiation. 2. Differentiate between fission, fusion and nuclear decay. 3. Solve simple half-life problems and balance nuclear equations.	Atom Game M & M decay activity Personal Radiation Dose Survey Uranium Decay Series activity Blue Book Chapters 4 & 25 Red Book Chapter 21
electronega tivity Lewis Dot Structure / Diagram ionic metallic covalent binary polyatomic ion subscript valence electron oxidation number polar non-polar metal non-metal inert transition metal molecule crystal lattice octet rule	transfer share evaluate identify classify investigate compare describe	**Week 2**	**BONDING AND NOMENCLATURE** 1. Use electronegativity difference to predict bond types. 2. Identify the Lewis Dot structure of different elements. 3. Identify ionic compounds using scientific nomenclature. 4. Investigate the physical and chemical properties of ionic compounds.	Ionic vs covalent lab Coffee can lid lab Polyatomic ion naming puzzle Ion rummy Bonding foldable Blue Book Chapters 8 & 9 Red Book Chapters 4,5, & 9
		Week 3	5. Identify covalent compounds using scientific nomenclature. 6. Investigate the physical and chemical properties of covalent compounds. 7. Distinguish between polar and non-polar bonds and molecules. 8. Identify the shapes of common molecules.	Covalent model lab Gum Drop lab Slime lab
		Week 4	9. Compare the arrangement of atoms in covalent molecules, ionic crystals, and metallic substances. 10. Describe the influence of intermolecular forces on the physical and chemical properties of covalent compounds specifically hydrogen bonding in water.	

molar mass mole atomic mass Avogadro's number empirical formula molecular formula hydrate percent composition	express manipulate calculate identify	**Week 5**	**THE MOLE** 1. Introduce concept of the mole. 2. Calculate molar mass. 3. Conversions: ♦ particles to mole ♦ mole to mass ♦ mass to mole	Mole station lab Mini-mole lab Aluminum foil lab Blue Book Chapter 11 Red Book Chapter 12
		Week 6	4. Determine the percent composition of a substance 5. Calculate the empirical and molecular formula of a compound.	
		Week 7	6. Identify hydrates using scientific nomenclature.	Epsom salt lab
		Week 8	**REVIEW**	
		Week 9	**EXAMINATION**	

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THIRD NINE WEEKS

SCIENCE PROCESS SKILLS SHOULD BE PRACTICED EACH TIME SCIENCE IS TAUGHT.

VOCABULARY		STUDENT EXPECTATIONS (SEs)		RESOURCES / ACTIVITIES
NOUNS	**VERBS**			
Law of Conservation of mass activity series products reactions coefficient exothermic endothermic precipitate oxidation reduction aqueous catalyst solubility chart	identify measure balance predict express verify investigate	**Week 1**	**CHEMICAL REATIONS AND EQUATIONS** 1. Introduce five types of chemical reactions: ♦ synthesis ♦ decomposition ♦ single replacement (displacement) ♦ double replacement (displacement) ♦ combustion 2. Express chemical changes using balanced chemical equations.	Chemical Reaction foldable Types of reaction lab Electrolysis of H_2O – demo Blue Book Chapter 10 Red Book Chapter 6
		Week 2	3. Convert an equation written with chemical names to a balanced equation using chemical symbols. 4. Express the description of a chemical change as a chemical equation.	Single replacement under the microscope lab Naming and formula lab
		Week 3	5. Predict products for the five reaction types.	
mole Law of Conservation of mass mole ratio limiting reactants percent yield	calculate compare investigate	**Week 4**	**STOICHIOMETRY** 1. Determine quantities of reactants and products using stoichiometry: ♦ mole to mole ♦ mole to mass ♦ mass to mass	Conservation of Mass lab Blue Book Chapter 12 Red Book Chapter 12
		Week 5	2. Verify the law of conservation of mass in a chemical reaction.	Ziploc lab

electron wavelength frequency absorption spectra	calculate predict absorb emit distinguish	**Week 6**	**QUANTUM MODEL** 1. Recognize the four quantum numbers; principal, orbital, magnetic, and spin. 2. Express electron configurations and orbital notations of elements.	Atom Game Blue Book Chapter 5 Red Book Chapters 2 & 7
emission energy levels quanta orbital electron cloud electron configuration	classify	**Week 7**	3. Understand the relationship between the electromagnetic spectrum and wavelength, frequency and energy. 4. Understand periodic trends and relate them to electron arrangements: ♦ Atomic radius ♦ Ionic radius ♦ Oxidation number ♦ Chemical reactivity	Flame test lab Spectrum tube with diffraction glasses
polarity solute solvent concentrated dilute solubility saturated supersaturated unsaturated electrolyte dissociation	describe compare distinguish investigate identify dissolve	**Week 8**	**SOLUTIONS** 1. Describe the properties including polarity, surface tension, high specific heat 2. Compare unsaturated, saturated, and supersaturated solutions using solubility curves. 3. Identify the factors that influence solubility, including temperature, pressure and the nature of the solute and solvent.	Properties of water lab The solubility of common salts lab Creating a solubility curve lab Blue Book Chapter 15 Red Book Chapter 13
		Week 9	4. Identify the factors that influence the rate of dissolving including particle size, agitation and temperature. 5. Describe the properties of solutions including the electrolytic behavior and colligative properties. 6. Calculate molarity.	Factors affecting solubility lab Like dissolves like lab Ice Cream lab

FOURTH NINE WEEKS

SCIENCE PROCESS SKILLS SHOULD BE PRACTICED EACH TIME SCIENCE IS TAUGHT.

VOCABULARY		STUDENT EXPECTATIONS (SEs)		RESOURCES / ACTIVITIES
NOUNS	**VERBS**			
acid base proton donor hydromium hydroxide neutralization titration pH, pOH indicator dissociation	analyze distinguish demonstrate describe identify predict balance	**Week 1**	**ACIDS/BASES** 1. Distinguish between the properties and behavior of acids and bases. 2. Use a variety of indicators to classify chemicals as acids or bases.	Teeth whitening article with questions Characteristics of Acids Acidic salt lab Blue Book Chapter 19 Red Book Chapter 14
		Week 2	3. Relate concentration of ions to pH. 4. Predict the products of and balance neutralization reactions.	Indicator lab Aspirin lab Antacid lab Titration lab
		Week 3	**TAKS REVIEW**	
		Week 4	**TAKS REVIEW**	
		Week 5	**TAKS TESTING**	
pressure temperature collision volume phase change diagram phase diagram solid liquid gas	describe calculate evaluate melt freeze boil sublimate condense	**Week 6**	**KINETIC THEORY AND GASES** 1. Recognize the parts of the kinetic theory 2. Recognize the effects of the gain or loss of heat energy on the properties of solids, liquids, and gases. (Phase change diagram)	Probeware – heating curve lab Vacuum pump demo Blue Book Chapter 14 Red Book Chapters 10 & 11
		Week 7	3. Describe interrelationships among temperature, particle number, pressure and volume of gases contained within a closed system using: Dalton, combined, and Ideal Gas Laws.	Charles Law lab Syringe lab Cigarette Lighter lab

		Week 8	**KINETIC THEORY AND GASES (cont'd)** 4. Determine quantities of reactants and products using stoichiometry.	
		Week 9	**REVIEW CONCEPTS**	
		Week 10	**EXAMINATION**	
		Week 11		