

Haddon Township High School
Course Overview Template

Subject Area: Science

Course Name: Accelerated Chemical Techniques

Summary: This accelerated course is designed to develop laboratory skills through the application of principles introduced at the Lab Chemistry level. Informal personal instruction will be provided in a 50% laboratory situation. Students will practice techniques of qualitative and quantitative analysis. Further development of chemical principles includes: the topics of equilibrium, oxidation and reduction, kinetics, thermodynamics, and organic chemistry.

Unit Title	Student Learning Target	Standards	Resources	Assessment
Matter and Measurement	<ul style="list-style-type: none">• Review classification of matter, metric system and problem solving.• Study the periodic table as a resource in chemistry.• Practice measuring skills needed for quantitative labs.	<p>5.1 Science Practices: Science is both a body of knowledge and an evidence-based, model-building enterprise that continually extends, refines, and revises knowledge. The four Science Practices strands encompass the knowledge and reasoning skills that students must acquire to be proficient in science.</p> <p>5.2 Physical Science: Physical science principles, including fundamental ideas about matter, energy, and motion, are powerful conceptual tools for making sense of phenomena in physical, living, and Earth systems science.</p> <p>9.1 21st Century Life & Career Skills: All students will demonstrate the creative, critical thinking, collaboration, and problem-solving skills needed to function successfully as both global citizens and workers in diverse ethnic and</p>	textbook, video, lab materials	Lab activity: To analyze a mixture, students will write the balanced equation of a chemical reaction, complete the lab procedure, and record in lab journal the data/calculations along with percent error. Student lab skills will be illustrated in this activity.

		organizational cultures.		
Math in Chemistry	<ul style="list-style-type: none"> • Write formulas and balance equations, • Determine the mole ratio in a compound and in balanced equations. • Determine an empirical formula of a compound and percent yield of a product of a chemical reaction. 	<p>5.1 Science Practices: Science is both a body of knowledge and an evidence-based, model-building enterprise that continually extends, refines, and revises knowledge. The four Science Practices strands encompass the knowledge and reasoning skills that students must acquire to be proficient in science.</p> <p>5.2 Physical Science: Physical science principles, including fundamental ideas about matter, energy, and motion, are powerful conceptual tools for making sense of phenomena in physical, living, and Earth systems science.</p> <p>9.1 21st Century Life & Career Skills: All students will demonstrate the creative, critical thinking, collaboration, and problem-solving skills needed to function successfully as both global citizens and workers in diverse ethnic and organizational cultures.</p>	balances, rules, graduated cylinders, carbonate compounds	Lab activity: Determination of the nature of a compound/preparation of an inorganic compound.
Reactions in Aqueous Solutions	<ul style="list-style-type: none"> • Describe the properties of solutions. • Determine solutions concentration 3 ways – molarity, molality and percent by mass. • Distinguish between acid/base and redox reactions. • Perform and interpret the 	<p>5.1 Science Practices: Science is both a body of knowledge and an evidence-based, model-building enterprise that continually extends, refines, and revises knowledge. The four Science Practices strands encompass the knowledge and reasoning skills that students must acquire to be proficient in science.</p>	chemical solutions, test tubes, metals, textbook	Lab activity: Students construct an activity series and compare with actual series.

	results of a titration.	<p>5.2 Physical Science: Physical science principles, including fundamental ideas about matter, energy, and motion, are powerful conceptual tools for making sense of phenomena in physical, living, and Earth systems science.</p> <p>9.1 21st Century Life & Career Skills: All students will demonstrate the creative, critical thinking, collaboration, and problem-solving skills needed to function successfully as both global citizens and workers in diverse ethnic and organizational cultures.</p>		
Electrons in Atoms and Periodic Trends	<ul style="list-style-type: none"> • Use wavelength equation to calculate frequency using speed of light. • Describe how electrons populate the orbitals of a ground state atom. • Relate the electron arrangement to periodic table location. 	<p>5.1 Science Practices: Science is both a body of knowledge and an evidence-based, model-building enterprise that continually extends, refines, and revises knowledge. The four Science Practices strands encompass the knowledge and reasoning skills that students must acquire to be proficient in science.</p> <p>5.2 Physical Science: Physical science principles, including fundamental ideas about matter, energy, and motion, are powerful conceptual tools for making sense of phenomena in physical, living, and Earth systems science.</p> <p>9.1 21st Century Life & Career Skills: All students will demonstrate the creative,</p>	textbook, periodic table video	Given a property, students will report the trend in both periods/groups and explain this trend.

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Chemical Bonding	<ul style="list-style-type: none"> • Determine type of bond using electronegativity. • Determine the dipole moment/bond distance. • Calculate formal charge and use to determine most favorable Lewis structure. • Describe 3 dimensional shape of molecule using VSEPR model. 	<p>5.1 Science Practices: Science is both a body of knowledge and an evidence-based, model-building enterprise that continually extends, refines, and revises knowledge. The four Science Practices strands encompass the knowledge and reasoning skills that students must acquire to be proficient in science.</p> <p>5.2 Physical Science: Physical science principles, including fundamental ideas about matter, energy, and motion, are powerful conceptual tools for making sense of phenomena in physical, living, and Earth systems science.</p> <p>9.1 21st Century Life & Career Skills: All students will demonstrate the creative, critical thinking, collaboration, and problem-solving skills needed to function successfully as both global citizens and workers in diverse ethnic and organizational cultures.</p>	molecular model kits, lab manual	Complete assigned molecules, using model kits, giving shape and polarity of molecules.
Gases	<ul style="list-style-type: none"> • Construct molecular models and determine polarity and intermolecular forces. • Use ideal gas law to 	<p>5.1 Science Practices: Science is both a body of knowledge and an evidence-based, model-building enterprise that continually extends, refines,</p>	internet resources, textbook	Randomly choose a substance and research important uses. Relate the uses to the molecular shape of that substance.

	determine molecular mass.	<p>and revises knowledge. The four Science Practices strands encompass the knowledge and reasoning skills that students must acquire to be proficient in science.</p> <p>5.2 Physical Science: Physical science principles, including fundamental ideas about matter, energy, and motion, are powerful conceptual tools for making sense of phenomena in physical, living, and Earth systems science.</p> <p>9.1 21st Century Life & Career Skills: All students will demonstrate the creative, critical thinking, collaboration, and problem-solving skills needed to function successfully as both global citizens and workers in diverse ethnic and organizational cultures.</p>		
Acid/Base Chemistry and Titrations	<ul style="list-style-type: none"> • Complete various types of titrations – acid/base, precipitation and redox reactions • Use mole concept applied to all types of chemical reactions. • Use dimensional analysis to determine theoretical yield and percent yield of a chemical reaction. 	<p>5.1 Science Practices: Science is both a body of knowledge and an evidence-based, model-building enterprise that continually extends, refines, and revises knowledge. The four Science Practices strands encompass the knowledge and reasoning skills that students must acquire to be proficient in science.</p> <p>5.2 Physical Science: Physical science principles, including fundamental ideas about matter, energy, and motion, are powerful conceptual tools for making sense of</p>	chemicals, burets, magnetic stirrers	Lab activity: Given a word equation students determine balanced equation. Use balanced equation to determine the concentration of an unknown acid/base solution. Determine % error. Determine the % vinegar in a bottle to verify the 5% required by law.

		<p>phenomena in physical, living, and Earth systems science.</p> <p>9.1 21st Century Life & Career Skills: All students will demonstrate the creative, critical thinking, collaboration, and problem-solving skills needed to function successfully as both global citizens and workers in diverse ethnic and organizational cultures.</p>		
Equilibrium	<ul style="list-style-type: none"> • Use mass action expressions to determine the equilibrium constants. • Explain how the K_w for water is related to the pH scale. • Use equilibrium constants to predict the direction of change of the chemical reaction. 	<p>5.1 Science Practices: Science is both a body of knowledge and an evidence-based, model-building enterprise that continually extends, refines, and revises knowledge. The four Science Practices strands encompass the knowledge and reasoning skills that students must acquire to be proficient in science.</p> <p>5.2 Physical Science: Physical science principles, including fundamental ideas about matter, energy, and motion, are powerful conceptual tools for making sense of phenomena in physical, living, and Earth systems science.</p> <p>9.1 21st Century Life & Career Skills: All students will demonstrate the creative, critical thinking, collaboration, and problem-solving skills needed to function successfully as both global citizens and workers in diverse ethnic and</p>	chemicals, spectrophotometer, indicators	Lab activity: Given 4 combinations predict the shift in equilibrium. Verify the shift in the lab. Explain.

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Oxidation and Reduction/Electrochemistry	<ul style="list-style-type: none"> • Balance redox reactions using half-reactions. • Identify oxidizing and reducing agents. • Describe reactions in electrolytic cells and voltaic cells. • List conditions that must be met for spontaneous redox reaction. 	<p>5.1 Science Practices: Science is both a body of knowledge and an evidence-based, model-building enterprise that continually extends, refines, and revises knowledge. The four Science Practices strands encompass the knowledge and reasoning skills that students must acquire to be proficient in science.</p> <p>5.2 Physical Science: Physical science principles, including fundamental ideas about matter, energy, and motion, are powerful conceptual tools for making sense of phenomena in physical, living, and Earth systems science.</p> <p>9.1 21st Century Life & Career Skills: All students will demonstrate the creative, critical thinking, collaboration, and problem-solving skills needed to function successfully as both global citizens and workers in diverse ethnic and organizational cultures.</p>	solutions, batteries, glassware, voltmeters	Lab activity: Use electrolysis to determine equivalent mass of a metal. This lab activity relates to Gas Laws.
Organic Compounds	<ul style="list-style-type: none"> • Explain how carbon is capable of forming many different compounds. • Classify and name organic compounds by structure and properties. • Prepare an organic compound by fermentation and distillation. 	<p>5.1 Science Practices: Science is both a body of knowledge and an evidence-based, model-building enterprise that continually extends, refines, and revises knowledge. The four Science Practices strands encompass the knowledge and reasoning skills that students must acquire to be proficient in science.</p>	computers, internet	Student groups report on properties of each category of organic compounds giving nomenclature, structure and general properties and uses.

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Thermodynamics	<ul style="list-style-type: none"> • Calculate standard free energy using standard free energies of formation. • State the 3 laws of thermodynamics. • Use free energy to predict whether reactions are spontaneous. 	<p>5.1 Science Practices: Science is both a body of knowledge and an evidence-based, model-building enterprise that continually extends, refines, and revises knowledge. The four Science Practices strands encompass the knowledge and reasoning skills that students must acquire to be proficient in science.</p> <p>5.2 Physical Science: Physical science principles, including fundamental ideas about matter, energy, and motion, are powerful conceptual tools for making sense of phenomena in physical, living, and Earth systems science.</p> <p>9.1 21st Century Life & Career Skills: All students will demonstrate the creative,</p>	computer with internet access and textbook	<p>Report on the life and work of Ludwig Boltzman.</p> <p>Alternative: report on how biological systems use coupling of spontaneous and nonspontaneous reactions to drive biological formations/systems.</p>

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Kinetics	<ul style="list-style-type: none"> • List and describe the factors that affect the rate of chemical reaction. • Determine the rate of a reaction given time and concentration. • Explain how activation energy affects a rate and be able to use the Arrhenius Equation. 	<p>5.1 Science Practices: Science is both a body of knowledge and an evidence-based, model-building enterprise that continually extends, refines, and revises knowledge. The four Science Practices strands encompass the knowledge and reasoning skills that students must acquire to be proficient in science.</p> <p>5.2 Physical Science: Physical science principles, including fundamental ideas about matter, energy, and motion, are powerful conceptual tools for making sense of phenomena in physical, living, and Earth systems science.</p> <p>9.1 21st Century Life & Career Skills: All students will demonstrate the creative, critical thinking, collaboration, and problem-solving skills needed to function successfully as both global citizens and workers in diverse ethnic and organizational cultures.</p>	textbook, internet	Report on the nitrogen cycle, the role of bacteria and the chemistry of the enzyme nitrogenase. Alternative report: explain the factors that affect reaction rates and give examples of each.