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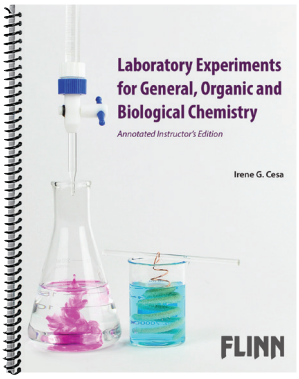
A New Standard for General, Organic and Biological Chemistry

Chemicals and Curriculum Together

Laboratory Experiments for General, Organic and Biological Chemistry

Author: Irene G. Cesa, Ph.D.



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Build a Solar Cell

Laboratory Kit

Solar energy, the conversion of sunlight to electricity, has enormous potential as a clean source of renewable energy. High-performance solar cells are very expensive while less expensive solar cells are not as efficient. Dye sensitized solar cells mimic the process that occurs in photosynthesis to harvest sunlight and convert it to electricity. In this activity, students build a dye-sensitized solar cell (DSC) and learn about the principles behind its operation.

Complete for 24 students working in groups of four.

Catalog No.	Description	Price/Each
AP8043	Build a Solar Cell—Laboratory Kit	$82.80

Preparation of Esters

Laboratory Kit

Ponder the taste of your favorite fruit. That unique flavor is the result of the combined senses of taste and smell. In the case of fruits, the primary flavor and fragrance ingredients are organic compounds called esters. By combining different alcohols and carboxylic acids, students synthesize four distinct esters. Students will enjoy learning about chemical formulas and equations, functional groups, organic chemistry and equilibriums with this fragrant activity!

Complete for 24 students working in pairs.

Catalog No.	Description	Price/Each
AP8013	Preparation of Esters—Laboratory Kit	$72.50

Properties of Carbohydrates

Laboratory Kit

What is a carbohydrate? What are the roles of carbohydrates in energy, metabolism and cell structure? Students explore the structure and properties of different types of carbohydrates and learn how they can be identified. By performing four classification tests in sequence on five samples, each carbohydrate's identity is accurately determined.

Complete for 24 students working in pairs.

Catalog No.	Description	Price/Each
AP8038	Properties of Carbohydrates—Laboratory Kit	$44.95

Digestive Enzymes

Laboratory Kit

Organisms that do not make their own food must break down large molecules to generate the "building blocks of life." Investigate the properties of digestive enzymes that break down plant and animal tissue—food—into glucose, amino acids and fatty acids needed for metabolism and growth. Students will investigate the actions of amylase, pepsin and lipase on proteins, starches and fats in a series of chemical tests. The results are used to determine the optimum pH conditions for specific enzymes.

Complete for 24 students working in pairs for Part A and groups of 4 in Part B.

Catalog No.	Description	Price/Each
AP8035	Digestive Enzymes—Laboratory Kit	$74.75

Classifying Chemical Reactions

Laboratory Kit

The power of chemical reactions to transform our lives is visible all around us—in our homes, in our cars, even in our bodies. Chemists try to make sense of the great variety of chemical reactions the same way that biologists organize their knowledge of life, by sorting reactions into groups and classifying them. Classifying chemical reactions allows us to predict what chemical reactions will occur when different substances are mixed. Students observe a variety of chemical reactions and identify patterns in the conversion of reactants into products. The properties of the reactions will be analyzed to classify the chemical reactions into different groups.

Complete for 24 students working in pairs.

Catalog No.	Description	Price/Each
AP8019	Classifying Chemical Reactions—Laboratory Kit	$46.50

Silver Ornaments

Laboratory Kit

Illustrate the chemistry of oxidation–reduction reactions by creating a beautiful silver ornament! Simply combine four solutions in a glass ornament ball, swirl and *viola*—a thin, lustrous, silver coating plates onto the inside of the ornament. Besides creating a beautiful ornament, students also calculate the thickness of the silver mirror and estimate the number of atoms in the silver layer. You will find students "reflecting" on oxidation-reduction reactions in a whole new way!

Complete for 24 students working in pairs.

Catalog No.	Description	Price/Each
AP8011	Silver Ornaments—Laboratory Kit	$68.25

Amino Acids and Proteins

Laboratory Kit

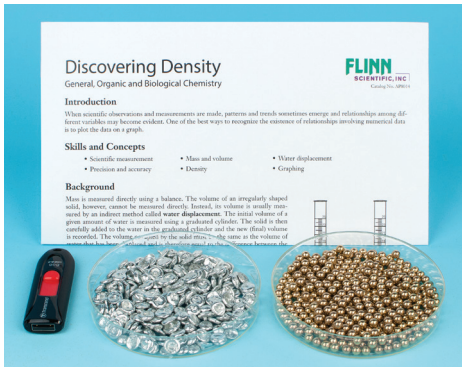
What are the roles of amino acids in the structure and properties of proteins? Investigate proteins and amino acids and learn how these biological molecules can be identified. In this activity, students explore the structures and properties of amino acids and how they relate to protein function. Students perform chemical tests to detect the presence of specific amino acids and then determine the relationship between structure and function by studying protein denaturation.

Complete for 24 students working in pairs.

Catalog No.	Description	Price/Each
AP8039	Amino Acids and Proteins—Laboratory Kit	$77.65

Discovering Density

Laboratory Kit



What better way to understand the concept of density than by using scientific observations, patterns and trends to determine relationships among variables? Students determine the density of two "mystery metals" by plotting mass and volume measurements and then analyzing the precision and accuracy of their data. Students feel like accomplished scientists discovering the concept of density for themselves just as Archimedes did with a crown many centuries ago.

Complete for 24 students working in pairs.

Catalog No.	Description	Price/Each
AP8014	Discovering Density—Laboratory Kit	$49.25

Atomic Spectra

Laboratory Kit

When a pure atomic gas such as hydrogen or helium is subjected to a high-voltage electrical discharge, light is produced and the gas glows. When this light passes through a diffraction grating, a spectrum is produced. Instead of seeing the familiar rainbow of colors, light emitted by the gas produces a series of bright, colored lines. This series of bright lines is called an atomic emission spectrum and is unique to each element.

In this experiment, students investigate continuous and line emission spectra from various sources of light using a spectroscope. Students also use the spectroscope to observe the atomic spectra of different elements in spectrum tubes and to identify the elements that may be present in fluorescent lights, street lamps and novelty "neon" lamps.

Complete for 24 students working in pairs. Gas discharge tubes and power supplies are required and available separately.

Catalog No.	Description	Price/Each
AP8016	Atomic Spectra—Laboratory Kit	$ 78.75
AP1327	Spectrum Tube Power Supply	203.80
AP1334	Hydrogen Gas Spectrum Tube	40.00
AP1333	Helium Gas Spectrum Tube	40.00
AP1337	Mercury Vapor Spectrum Tube	62.45
AP1338	Neon Gas Spectrum Tube	40.00

Beverage Density

Laboratory Kit

Have you ever noticed it is easier to float in the ocean than in a swimming pool? This is because seawater has greater density than fresh water due to the presence of dissolved salt in the ocean. What factors determine the density of a solution? Can the density of a solution be used to determine how much of a particular substance is dissolved in it? Determine the sugar content of beverages by creating a calibration curve using the density of five reference solutions by comparing the results against provided values on nutrition labels.

Complete for 24 students working in pairs.

Catalog No.	Description	Price/Each
AP8015	Beverage Density—Laboratory Kit	$41.95

Analyzing Calcium in Milk

Laboratory Kit

Healthy body, good teeth, strong bones—the benefits of calcium in good nutrition are well known. Milk and dairy products are widely promoted as an important source of calcium in the diet. Explore the chemistry behind the nutrition with this experiment that measures the amount of calcium in milk. Students analyze the calcium content in skim milk by microscale titration with EDTA. An excellent activity to "bone-up" on calcium properties and titration skills!

Complete for 24 students working in pairs.

Catalog No.	Description	Price/Each
AP8025	Analyzing Calcium in Milk—Laboratory Kit	$77.75

Chemical Testing of DNA

Laboratory Kit

Explore the procedures used in the chemical testing of nucleic acids! Nucleic acids—RNA and DNA—are essential macromolecules involved in the storage, transfer and expression of genetic information. Students will marvel at their ability to extract nuclear material from fruit and determine its composition using simple chemical tests. From there, students analyze the isolated nucleic acid macromolecule to verify the composition of the phosphate, deoxyribose and nucleotide groups.

Complete for 24 students working in pairs.

Catalog No.	Description	Price/Each
AP7994	Chemical Testing of DNA—Laboratory Kit	$72.70

Separating a Mixture by Filtration

Laboratory Kit

Most of the matter around us consists of mixtures, or physical blends, of many substances. The main characteristic of a mixture is that it has a variable composition—the components of the mixture may be mixed in varying proportions. The substances in a mixture retain their distinctive chemical identities, as well as some of their unique physical properties. How are the properties and composition of a mixture affected by physical and chemical changes? In this experiment, students separate a mixture of charcoal and salicylic acid and determine the percent composition of each component in the mixture.

Complete for 24 students working in pairs.

Catalog No.	Description	Price/Each
AP8017	Separating a Mixture by Filtration—Laboratory Kit	$32.75

Alcohols and Their Oxidation Products

Laboratory Kit

In this two-part organic biochemistry lab, students first explore the physical and chemical properties of alcohols, phenols, aldehydes, and ketones. Tests are performed to establish the qualitative differences among these functional groups, such as solubility in water, reaction with an oxidizer, and color changes when mixed with Schiff's reagent.

The results of these tests are then used in a qualitative analysis scheme to identify the functional groups and structures of three natural products found in essential plant oils.

Includes reproducible student handouts, detailed background information, complete Teacher Notes with sample data, and all necessary chemicals.

Complete for 24 students working in pairs. Perform this lab in a fume hood.

Catalog No.	Description	Price/Each
AP7914	Alcohols and Their Oxidation Products—Student Laboratory Kit	$103.51

Synthesis of Aspirin

Laboratory Kit

Aspirin, first synthesized in 1897, is one of the oldest yet most common drugs in use today. Like many modern drugs, aspirin has its roots in an ancient folk remedy—the use of willow extracts to treat fever and pain. Aspirin is prepared the same way today as it was more than 100 years ago. In this lab, students investigate the structure, synthesis and properties of aspirin. Students prepare acetylsalicylic acid (aspirin) and analyze its purity. Chemical reactions of the product are used to determine if any starting material remains or if the product decomposes. The identity of the product is also confirmed by melting point and thin-layer chromatography (TLC).

Complete for 24 students working in pairs. Perform this experiment in a fume hood or a well-ventilated lab.

Catalog No.	Description	Price/Each
AP8037	Synthesis of Aspirin—Laboratory Kit	$107.65

Properties of Biological Buffers

Laboratory Kit

Many chemical reactions in living organisms take place at neutral pH values. How do cells maintain the delicate pH balance required for life and health? Buffers! A buffer protects against rapid changes in pH when acids or bases are added to it. All living cells contain a natural buffer system to maintain the constant pH needed for proper cell function. Students will learn all about how buffers work by examining a model carbonate blood buffer and phosphate cell buffers.

Complete for 24 students working in pairs.

Catalog No.	Description	Price/Each
AP8032	Properties of Biological Buffers—Laboratory Kit	$44.95

Discovering Instant Cold Packs

Laboratory Kit

Instant cold packs are familiar first-aid devices used to treat injuries when ice is unavailable. Most commercial cold packs consist of a plastic package containing a white solid and an inner pouch of water. Firmly squeezing the pack causes the inner pouch to break. The solid then dissolves in the water producing a change in temperature.

In this guided-inquiry experiment, students analyze a cold pack, design a calorimetry experiment, and determine the heat of solution for a "cold-pack solid" dissolving in water.

Complete for 24 students working in pairs.

Catalog No.	Description	Price/Each
AP8024	Discovering Instant Cold Packs—Laboratory Kit	$35.75

Molar Volume of Hydrogen

Laboratory Kit

Avogadro, Boyle, Charles and Dalton—these scientists and their gas laws are well known. They defined the relationships among four macroscopic gas properties: pressure, volume, temperature and the number of moles of gas. How much gas must be generated to fill a hot air balloon or an airbag? The amount of gas needed to fill any container can be calculated if we know the molar volume of the gas. Answering this general question requires knowledge of all of the gas laws! In this experiment students determine the volume of one mole of hydrogen gas at standard temperature and pressure (STP). The volume of hydrogen collected by water displacement will be measured and corrected for differences in temperature and pressure in order to calculate the molar volume of hydrogen at STP.

Complete for 24 students working in pairs.

Catalog No.	Description	Price/Each
AP8023	Molar Volume of Hydrogen—Laboratory Kit	$28.50

Making Soap

Laboratory Kit

Soap-making is an ancient craft and one of the oldest known chemical reactions involving organic compounds. Soaps are sodium and potassium salts of fatty acids. They are prepared by reacting fats and oils with a strong base, such as sodium hydroxide or potassium hydroxide. In this experiment, students make soap and study its properties. The soap will be prepared via saponification of a fat and oil with a solution of sodium hydroxide. The properties of the soap will then be investigated—its pH, texture, emulsifying action, and solubility in hard water.

Complete for 24 students working in pairs.

Catalog No.	Description	Price/Each
AP8041	Making Soap—Laboratory Kit	$31.75

Ruby-Red Colloidal Gold

Laboratory Kit

From nanotech fibers and nanosensors to nanobots, nanotechnology has created so much "buzz" that it is hard to tell where the science ends and the science fiction begins. Wherever it may lead in the future, the science of nanotechnology begins with solid particles called nanoparticles that are 1–100 nm in size. Shrinking the size of solid-phase particles to the nanometer scale—one billionth of a meter—changes their physical and chemical properties. The surprising properties of "colloidal gold" are a good example of this phenomenon. Whereas normal or "bulk" gold is a bright, shiny, metallic yellow, colloidal gold nanoparticles are red or blue, and not at all shiny.

Students prepare a sample of gold nanoparticles and qualitatively investigate the scattering of light by the particles with a laser pointer. Then they use a spectrophotometer to construct an absorbance spectrum. The effect of particle size on the color of the nanoparticles is also investigated.

Complete for 24 students working in pairs. Laser pointers are required and available separately.

Catalog No.	Description	Price/Each
AP8026	Ruby-Red Colloidal Gold—Laboratory Kit	$70.75
AP8934	Laser Pointer	22.05

Survey of Oxidation and Reduction Reactions

Laboratory Kit

Iron exists in the body in two forms—iron(II), Fe^{2+}, and iron(III), Fe^{3+}, ions and their compounds. Interconversion of the two forms of iron takes place via the loss or gain of an electron. Investigate the role of electron transfer in the reactions of iron(II) and iron(III) compounds with oxidizing and reducing agents, respectively. The results will be analyzed to determine the change in oxidation state for each reactant, the oxidation and reduction half-reactions, and the balanced chemical equations for the redox reactions.

Complete for 24 students working in pairs.

Catalog No.	Description	Price/Each
AP8029	Survey of Oxidation and Reduction Reactions—Laboratory Kit	$41.25

Properties of Hydrocarbons

Laboratory Kit

Hydrocarbons are organic compounds containing only carbon and hydrogen. This apparent simplicity in the structure of hydrocarbons is belied by the great diversity in the size or length of hydrocarbon molecules, the extent of branching in carbon–carbon chains, the variety of possible ring sizes, and the presence of alkene, alkyne, and aromatic functional groups.

In this activity, students investigate the properties of a variety of hydrocarbons, including cyclohexane, cyclohexene, toluene, styrene, and acetylene. Students first perform solubility and density tests on the different compounds, followed by reactivity tests with bromine water and permanganate solution. Students analyze the results of these tests to characterize the properties of the various hydrocarbons.

Complete for 24 students working in pairs. Perform this lab in a fume hood.

Catalog No.	Description	Price/Each
AP7913	Properties of Hydrocarbons—Student Laboratory Kit	$74.75

Chemical Bonding and the Properties of Solids

Laboratory Kit

Looking for patterns in the properties of different substances can help us understand how and why atoms join together to form compounds. What kinds of forces hold atoms together? How does the nature of the forces holding atoms together influence the properties of a material?

In this experiment, students study the physical properties of common solids and investigate the relationship between the type of bonding in a substance and its properties, volatility (odor), melting point, solubility, conductivity, hardness and brittleness. Students identify the type of bonding in a solid by comparing its observed properties to the general properties of covalent-network, ionic, metallic and molecular solids.

Enough materials are included for 24 students working in pairs.

Catalog No.	Description	Price/Each
AP8020	Chemical Bonding and the Properties of Solids—Laboratory Kit	$75.95

Titration of Fruit Juices

Laboratory Kit

The refreshing taste of fresh fruit juices is due to a complex blend of flavors and fragrances. Fruit juices get a sweet taste from sugars, especially fructose and glucose, and a sour or tart taste from acids, such as citric acid and tartaric acid. The balance of sugar-to-acid content is one of the main factors responsible for the appealing taste of fruit juices— too much sugar, and the juice will taste bland, but too much acid, and the juice will taste sour. The "total acidity" of fruit juices is determined by titration with sodium hydroxide. In this experiment, students compare the citric acid content in a variety of fruit juices. The concentration of citric acid in each juice will be determined by a titration using phenolphthalein to find the equivalence point or endpoint in the titration.

Complete for 24 students working in pairs.

Catalog No.	Description	Price/Each
AP8031	Titration of Fruit Juices—Laboratory Kit	$26.25

Preparation and Properties of Biodiesel

Laboratory Kit

Biodiesel is an alternative processed fuel obtained from biological sources, usually vegetable oils, for use in cars and trucks. Alternative fuels such as biodiesel or bioethanol generate a great deal of interest because of concerns about climate change and the depletion of nonrenewable energy sources such as petroleum. In this activity students prepare biodiesel and investigate the amount of energy it releases when burned. Cooking (vegetable) oil is reacted to form a methyl ester by transesterification with methyl alcohol and a strong base. Once produced, the heat of combustion of the resulting biodiesel is determined by calorimetry.

Complete for 24 students working in pairs.

Catalog No.	Description	Price/Each
AP8042	Preparation and Properties of Biodiesel—Laboratory Kit	$31.75

Properties of Lipids

Laboratory Kit

Fats and oils, waxes and cholesterol, steroid hormones and Vitamins A and D—all of these natural products belong to a diverse class of biological compounds called lipids. What are the properties of lipids? What role do lipids play in the chemistry of life? By performing three specific tests, students identify and classify lipids and examine their properties.

Complete for 24 students working in pairs.

Catalog No.	Description	Price/Each
AP8040	Properties of Lipids—Laboratory Kit	$97.65

Exploring Equilibrium

Laboratory Kit

The word equilibrium has two Latin roots: aequi, meaning equal, and libra, meaning weight or balance. Our physical sense of equilibrium—in the motion of a seesaw or the swing of a pendulum—suggests an equal balance of opposing forces. How does this physical sense of equilibrium translate to chemical equilibrium?

In this activity, students explore the nature of chemical equilibrium of two different reversible reactions. First, they study the formation of a complex ion and investigate the effects of changing the concentrations of reactants and the reaction temperature. Students then study acid–base equilibrium by observing the color changes of an indicator. Students practice critical-thinking skills as they build on their observations and apply their knowledge to predict whether a reaction is exothermic or endothermic, based on the effect of temperature on the position of equilibrium. *Complete for 24 students working in pairs.*

Catalog No.	Description	Price/Each
AP8028	Exploring Equilibrium—Laboratory Kit	$26.25

Mole Ratios

Laboratory Kit

The reaction of copper wire with silver nitrate in aqueous solution provides a beautiful display of chemistry in action—delicate silver crystals begin to grow on the wire surface and the color of copper(II) ions gradually appears in solution. What relationships govern the relative quantities of reactants and products in this chemical reaction?

Students measure the mass of the silver produced, determine the mass of copper wire that reacted, and calculate the number of moles of each. After comparing the number of moles of reactants versus products, students determine the mole ratio and write the balanced chemical equation for the reaction.

Complete for 24 students working in pairs.

Catalog No.	Description	Price/Each
AP8022	Mole Ratios—Laboratory Kit	$69.95

Electrophoresis and DNA Forensics

Laboratory Kit

The world of forensic science was revolutionized with the discovery of scientific techniques for identifying humans, and all living things, using DNA. DNA fingerprinting can be used to identify the source of DNA in forensic investigations and has also been used to diagnose genetic diseases, identify disaster victims and study evolutionary relationships among organisms. In this activity, students investigate the basic principles of DNA forensics using gel electrophoresis, which allows them to identify matching DNA profiles from a collection of DNA samples.

Complete for 24 students working in pairs. Electrophoresis units and power supplies are required and available separately.

Catalog No.	Description	Price/Each
AP8036	Electrophoresis and DNA Forensics—Laboratory Kit	$134.75
FB1713	Six Gel Electrophoresis Apparatus	370.45
FB0316	Dual Power Supply	212.25

Iodine Clock Challenge

Laboratory Kit

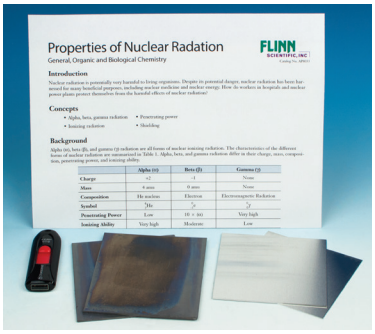
The demonstration of an "iodine clock" involves a chemical reaction that suddenly turns blue due to the formation of the familiar iodine–starch complex. The color change occurs abruptly, like an alarm clock ringing. Can students predict the amount of time it will take for the iodine clock to ring? This guided-inquiry activity allows students the opportunity to observe the iodine clock reaction, analyze how the concentration of potassium iodate influences the rate of the reaction, and then predict the amount of potassium iodate needed to make the clock "ring" in 25 seconds and verify the accuracy of their prediction.

Complete for 24 students working in pairs.

Catalog No.	Description	Price/Each
AP8027	Iodine Clock Challenge—Laboratory Kit	$50.75

Properties of Nuclear Radiation

Laboratory Kit

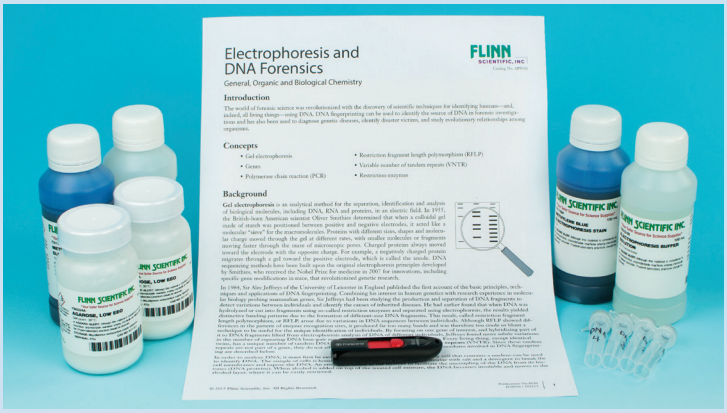


Nuclear radiation is potentially harmful to living organisms. Despite its potential danger, nuclear radiation has been harnessed for many beneficial purposes, including nuclear medicine and nuclear energy. How do workers in hospitals and nuclear power plants protect themselves from the harmful effects of nuclear radiation?

In this experiment, students compare the properties of alpha, beta and gamma radiation. The activity (counts per minute) of low-level alpha, beta and gamma sources are measured using a Geiger-Müller radiation detector, which "counts" the number of atoms ionized by nuclear radiation. Students investigate the relative penetrating power of alpha, beta and gamma radiation by measuring how the recorded activity changes when they place different materials between the source and the detector. The effectiveness of different shielding materials will also be determined.

Complete for 24 students working in groups of three. Radioactive sources and measuring equipment are required and available separately.

Catalog No.	Description	Price/Each
AP8033	Properties of Nuclear Radiation—Laboratory Kit	$ 57.75
TC1564	Radiation Monitor	173.20
AP8796	Radioactive Source Kit, Set of 3	289.95



Models of Organic Compounds

Laboratory Kit

There are more than nine million organic compounds! What factors are responsible for this tremendous number? What makes all of these compounds different? Students build organic molecules using models to understand the basic structure of organic compounds. Once constructed, students use the models to draw structural formulas of organic compounds, determine the general formulas for different classes of hydrocarbons, and develop the concept of isomers of organic compounds.

Complete for six student groups.

Catalog No.	Description	Price/Each
AP8034	Models of Organic Compounds—Laboratory Kit	$144.75

Vitamin C Analysis

Laboratory Kit

The importance of eating fresh fruits and vegetables to prevent disease has been known for a long time. British sailors were nicknamed "limeys" because they were given limes and lemons to eat during long voyages to prevent scurvy. The concept of vitamins—trace nutrients required to protect against so-called deficiency diseases—was introduced in the early 20th century. The chemical structure of Vitamin C was determined in 1933, and it was called ascorbic acid in recognition of its anti-scurvy properties. How much Vitamin C is present in fresh fruit juices?

In this experiment, students analyze the Vitamin C content in fruits or fruit juices by microscale titration. They then determine the amount of Vitamin C by comparison against titration data obtained for a series of reference solutions containing known amounts of Vitamin C. After preparing a calibration curve, the amount of Vitamin C in the fruit juice sample can be determined.

Complete for 24 students working in pairs.

Catalog No.	Description	Price/Each
AP8030	Vitamin C Analysis—Laboratory Kit	$41.95

Enzyme Kinetics

Laboratory Kit

Enzymes play an essential role in our bodies every day whether we realize it or not! Understanding enzyme kinetics is necessary to understand how enzymes function. Enzymes known as peroxidases protect plant and animal cells against damage by catalyzing the breakdown of hydrogen peroxide, a natural but toxic by-product of cellular respiration. Watch students make the connection of how the enzyme concentration and substrate concentration effect the rate of the peroxidase-catalyzed decomposition of hydrogen peroxide. An ideal activity to teach enzyme structure and function, kinetics and rate laws and enzyme-substrate binding.

Complete for 24 students working in pairs.

Catalog No.	Description	Price/Each
AP7993	Enzyme Kinetics—Laboratory Kit	$27.95

Periodic Trends and the Properties of Elements

Laboratory Kit

The periodic table is the most recognized symbol of chemistry around the world. It is a valuable tool that allows scientists not only to classify the elements but also to explain and predict their properties. Similarities and differences among the elements give rise to so-called periodic trends, both across rows and within columns of the periodic table. Recognizing periodic trends in the physical and chemical properties of the elements is key to understanding the full value of the periodic table.

In this two-part experiment, students first examine periodic trends in the activity and then the solubility of the alkaline earth metals. The trend in metal activity within a group and across a period is determined by comparing the reactions of metals with water and acids. The solubility of alkaline earth metal salts are studied to identify an unknown alkaline earth metal solution.

Complete for 24 students working in pairs.

Catalog No.	Description	Price/Each
AP8018	Periodic Trends and the Properties of Elements—Laboratory Kit	$54.95

Lewis Structures and Molecular Geometry

Laboratory Kit

Molecules have shape! The structure and shape of a molecule influence its physical properties and affect its chemical behavior as. Lewis structures and VSEPR theory offer useful models for visualizing the structures of covalent compounds. Students practice drawing Lewis structures of molecules and use these structures to predict their molecular geometry. Molecular models will be studied to visualize the shapes of molecules and to sketch their three-dimensional structures.

Complete for six student groups.

Catalog No.	Description	Price/Each
AP8021	Lewis Structures and Molecular Geometry—Laboratory Kit	$73.80