Carolina™ Resources for Teaching

Chemistry

Includes resources for AP® Chemistry

2017

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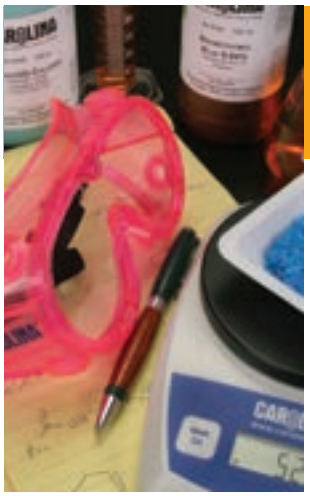
CAROLINA®



Carolina Investigations® for AP® Chemistry

Kits that Support the AP® Curriculum

What's the Big Idea?

If you are an AP® teacher, you go out of your way to help your students perform successfully on the AP® Exam. Carolina Investigations® for AP® Chemistry kits are specifically designed to support your efforts and meet the goals of the revised AP® Chemistry curriculum. That curriculum and our kit series center on 6 overarching **BIG** ideas:

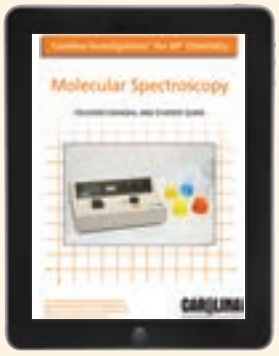
- **Big Idea 1: Atoms**
- **Big Idea 2: Chemical and Physical Properties**
- **Big Idea 3: Changes in Matter**
- **Big Idea 4: Rates of Chemical Reactions**
- **Big Idea 5: Thermodynamics**
- **Big Idea 6: Chemical Equilibrium**

All Carolina Investigations® for AP® Chemistry kits offer:

- Two teaching approaches: a guided activity and an inquiry activity
- Big Idea assessment questions modeled on the AP® Chemistry Exam's free-response questions
- Detailed inquiry activity preparation and procedure steps
- Inquiry activity experimental design template based on the scientific method

FREE Digital Teacher's Manuals

With any Carolina Investigations® for AP® Chemistry kit purchase you will receive a FREE digital teacher's manual. Display the digital manual on an interactive whiteboard, print it on demand and to your specifications, and make and save notes without damaging your paper copy. Look for an e-mail after purchase with your access code to this valuable resource! Digital teacher's manuals can also be purchased separately.



About the Cover

Colorful stalagmite-like columns of silicate precipitates form during use of the Carolina Chemonstrations®: Crystal Garden Kit (item #820107). Carolina Chemonstrations® simplify chemical demos and engage students with the wonders of chemistry. View them on pages 16–17.

Cover Photo by Jeff McAdams, Carolina Biological Supply Company

Carolina Investigations® for AP® Chemistry Complete Laboratory Package

Includes digital teacher's manuals!

The laboratory component of AP® Chemistry is a significant part of the new curriculum. Help your students succeed, make your teacher prep easier, and save money with a complete set of Carolina Investigations® for AP® Chemistry. The set includes 16 separate laboratory investigations aligned with the College Board's 6 Big Ideas of Chemistry, and supports the essential knowledge and learning objectives for AP® Chemistry. Each investigation provides 2 options, a guided activity and an inquiry activity where students develop their own procedure that follows the scientific method. Materials in each are sufficient for a class of 30 students. Digital teacher's manuals, included FREE with package purchase or sold separately, are 12-month eBook licenses to all 16 Carolina Investigations® for AP® Chemistry teacher's manuals.
Note: *Sold only to schools and businesses.*

840565 Per pkg **$682.00**

Customer Review

"Everything I needed for AP® Chem labs in one place! Easy to use and convenient in every way. This cut my lab prep time incredibly this year . . ."

High School Teacher

Classroom Tested, Teacher Approved

Carolina Investigations® for AP® Chemistry kits have been reviewed by your peers and field-tested in their classrooms.

521035 Carolina Investigations for AP Chemistry: Digital Teacher's Manual Package

From 840350 Carolina Chemonstrations for AP Chemistry: Big Idea 6—Equilibrium Kit (in use; test tube rack not included)

Carolina Investigations® for AP® Chemistry: Digital Teacher's Manual Package

Carolina Investigations® for AP® Chemistry are perfect for transitioning your classroom to inquiry. This digital manual bundle includes all 16 manuals, addresses the Big Ideas, and emphasizes the 7 science practices. Provide your own chemicals and supplies, but still take advantage of teacher-written and -tested background information, preparation instructions, and student guides. With these digital teacher's manuals you can:

- Display the manual on an interactive whiteboard
- Print the manual on demand and to your specifications
- Make and save notes without damaging your original

Digital manuals are 12-month eBook licenses and are accessed through Carolina's e-learning portal, CarolinaScienceOnline.com.

521035 Per pkg **$76.00**

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Carolina Chemonstrations® for AP® Chemistry: Complete Demo Package

Make the 6 Big Ideas of AP® Chemistry come alive with Carolina Chemonstrations® for AP® Chemistry kits. The 6 demonstration kits in this package *each* contain 2 to 4 demos that can be used to introduce or review the concepts of atomic structure, chemical and physical properties, changes in matter, rates of reactions, thermodynamics, or chemical equilibrium. Save money and get materials and instructions for 19 demos! Materials in each kit are sufficient for each set of demos to be performed at least twice.

Package includes:
Carolina Chemonstrations® for AP® Chemistry: Big Idea 1—Atoms Kit (item #840340)
Carolina Chemonstrations® for AP® Chemistry: Big Idea 2—Chemical and Physical Properties Kit (item #840342)
Carolina Chemonstrations® for AP® Chemistry: Big Idea 3—Changes in Matter Kit (item #840344)
Carolina Chemonstrations® for AP® Chemistry: Big Idea 4—Reaction Rates Kit (item #840346)
Carolina Chemonstrations® for AP® Chemistry: Big Idea 5—Thermodynamics Kit (item #840348)
Carolina Chemonstrations® for AP® Chemistry: Big Idea 6—Chemical Equilibrium Kit (item #840350)

840355 Per pkg **$171.50**

Big Idea 1: Atoms

Complexometric Titration of Calcium in Milk Kit

- Aligned with Big Idea 1 and Learning Objective 1.20
- Emphasizes Science Practices 2, 3, 4, 5, 6, and 7

Determine the concentration of calcium in milk by complexometric titration. Teach this laboratory experience using either the guided activity or inquiry activity. In the guided activity, students prepare and standardize a solution of EDTA and use it to determine the concentration of calcium in milk. Both the standardization and sample titrations are done 3 times and the average of the values used in the calculations. The inquiry activity allows students to design a procedure to determine the concentration of calcium in milk and requires them to account for interfering substances such as magnesium and other transition metals. **Note:** *Sold only to schools and businesses.*

840572 Complexometric Titration of Calcium in Milk Kit

840572	Kit	Each	**$51.95**
521019	Digital Teacher's Manual	Each	**$5.95**

Spectrophotometric Analysis of Food Dyes Kit

- Aligned with Big Idea 1 and Learning Objective 1.16
- Emphasizes Science Practices 1, 2, 3, 4, 5, 6, and 7

Determine the concentration of food dyes in powdered drink mixes using Beer-Lambert's law. Teach this laboratory experience using either the guided activity or inquiry activity. In the guided activity, students prepare solutions of known concentration for each of 2 food dyes, measure each solution's absorbance, and graph a calibration curve for each food dye. Students then use their data and curve to determine the concentration of food dye in unknown solutions containing a single food dye.

840568 Spectrophotometric Analysis of Food Dyes Kit (in use; flask, beaker, test tube rack, and spectrophotometer not included)

The inquiry activity allows students to design a procedure to determine the concentration of each food dye in its unknown solution. Students must choose the concentrations of the standard solutions that will allow them to interpolate the concentration of food dye in the drink mix and prepare the solutions. **Note**: *Sold only to schools and businesses.*

840568	Kit	Each	**$17.65**
521017	Digital Teacher's Manual	Each	**$5.95**

Gravimetric Analysis of a Carbonate Kit

- Aligned with Big Idea 1 and Learning Objective 1.19
- Emphasizes Science Practices 2, 3, 4, 5, 6, and 7

Students determine the identity of 2 unknown Group I metal carbonates using gravimetric analysis. This rigorous laboratory exercise can be taught using either a guided or an inquiry activity. In the guided activity, the first step is to precipitate the carbonates with excess calcium ions. After drying, the mass and moles of the resulting calcium carbonate are determined. From that data, students calculate the formula mass of the unknown Group I metal carbonate and identify the Group I metal.

The inquiry activity allows students to design a procedure for precipitating aqueous carbonate ions from 2 unknown Group I metal carbonates and analyzing the data to identify the unknown metal. **Note:** *Sold only to schools and businesses.*

840570	Kit	Each	**$21.15**
521018	Digital Teacher's Manual	Each	**$5.95**

Carolina Investigations® for AP® Chemistry kits include*:

- **Materials for 30 students**
- **FREE digital teacher's manual and student guide**
- **12-month eBook license (also sold separately)**

*Does not apply to Carolina Chemonstrations® for AP® Chemistry kits.

Molecular Spectroscopy Kit

- Aligned with Big Idea 1 and Learning Objective 1.15
- Emphasizes Science Practices 1, 2, 3, 4, 5, 6, and 7

Introduce students to the mechanics of molecular spectroscopy and how electromagnetic radiation interacts with molecular compounds. Teach this laboratory experience using either the guided activity or the inquiry activity. For guided inquiry, students graphically determine the optimum wavelength (lambda max) for primary-color food dyes and identify these dyes in mixtures using percent transmittance and absorption measurements. They also investigate if the concentration of a compound(s) in solution affects emission and absorption spectra.

840566 Molecular Spectroscopy Kit

In the inquiry activity, students develop a procedure for graphically identifying the optimum wavelength for maximum absorbance and minimum transmittance for primary-color food dyes. They also develop a procedure for determining if dye concentration affects percent transmittance and absorption measurements, and a procedure for identifying 2 or more dyes in a mixture of primary dyes. **Note:** *Sold only to schools and businesses.*

840566	Kit	Each	**$31.15**
521016	Digital Teacher's Manual	Each	**$5.95**

Carolina Chemonstrations® for AP® Chemistry: Big Idea 1—Atoms Kit

The 4 demonstrations in this kit can be used to introduce Big Idea 1 or to review atomic structure in preparation for the AP® Chemistry Exam. An exclusive digital kit component combines a virtual extraction of the copper in brass with hands-on spectroscopy to determine the percent composition. The oxidation of steel wool brings the law of conservation of mass alive, and elements are isolated from compounds in a colorful electrolysis demo. Finally, an irradiated salt demo results in thermal fluorescence, illustrating electron interactions. Particle-level explanations and Big Idea assessment questions help students solidify their understanding. Materials are sufficient for the 4 demonstrations to be performed twice.

840340 Per kit **$42.50**

Big Idea 2: Chemical & Physical Properties

Principles of Chromatography Kit

- Aligned with Big Idea 2 and Learning Objective 2.10
- Emphasizes Science Practices 2, 3, 4, 5, 6, and 7

Identify 3 food dyes in powdered drink mixes using paper chromatography and identify the components in plant pigment using thin-layer chromatography. Teach this laboratory experience using either the guided activity or inquiry activity. In the guided activity, students separate the components of 3 drink mixes using paper chromatography and identify each food dye by comparison with paper chromatography separations of pure food dyes they prepare. Using thin-layer chromatography, students separate the components of a plant pigment and identify the components by color and R_f value. In the inquiry activity, students design an experiment to separate food dyes in drink mixes and must select the proper mobile and stationary phases to effect an efficient separation. **Note:** *Sold only to schools and businesses.*

840574 Principles of Chromatography Kit

840574	Kit	Each	**$68.65**
521020	Digital Teacher's Manual	Each	**$5.95**

840576 Types of Chemical Bonds Kit *(above);* in use *(right)* (conductivity testers not included)

Types of Chemical Bonds Kit

- Aligned with Big Idea 2 and Learning Objective 2.22
- Emphasizes Science Practices 1, 2, 3, 4, 5, 6, and 7

Explore the 4 types of bonding in solids and learn about intramolecular and intermolecular forces. Teach this activity using either the guided activity or inquiry activity. In the guided activity, students classify 12 solids as ionic solids, covalent network solids, molecular solids, or metallic solids based on properties they test. Students learn about the intramolecular forces and intermolecular forces that affect the strength of attraction between atoms. In the inquiry activity, students test the properties of 4 solids, develop their own set of characteristics to distinguish between each bonding type, and then apply their rules to classify 8 additional solids. **Note:** *Sold only to schools and businesses.*

840576	Kit	Each	**$63.40**
521021	Digital Teacher's Manual	Each	**$5.95**

840342 Carolina Chemonstrations for AP Chemistry: Big Idea 2—Chemical and Physical Properties Kit *(above);* in use *(right)* (beaker not included)

Carolina Chemonstrations® for AP® Chemistry: Big Idea 2—Chemical and Physical Properties Kit

Demonstrate 4 discrepant events to introduce Big Idea 2 or to review how molecular structure and intra- and intermolecular forces determine the physical and chemical properties of substances. Students observe and explain hydrogen bonding, polarity, thermal expansion, and surface tension in terms of particulate interactions. Data analysis and Big Idea questions help prepare students for the AP® Chemistry Exam. Materials are sufficient for the set of 4 demonstrations to be performed twice.

840342 Per kit **$31.95**

More Information Available Online

Big Idea 3: Changes in Matter

Carolina Investigations® for AP® Chemistry kits include*:

- **Materials for 30 students**
- **FREE digital teacher's manual and student guide**
  12-month eBook license (also sold separately)

*Does not apply to Carolina Chemonstrations® for AP® Chemistry kits.

840578 Stoichiometry of Chemical Reactions Kit

Stoichiometry of Chemical Reactions Kit

- Aligned with Big Idea 3 and Learning Objective 3.3
- Emphasizes Science Practices 2, 3, 4, 5, and 7

Determine the molar ratio of reactants in 2 acid-base reactions using the method of continuous variation. Teach this activity using either the guided activity or inquiry activity. In the guided activity, students react volumes of acid and base in different ratios and graph the temperature changes. The volume ratio that produces the largest temperature change is the correct stoichiometry of the reaction. From their data, students identify their unknown acid from a list of 9 possibilities. In the inquiry activity, students design an experiment to determine the stoichiometry of an acid-base reaction. **Note:** *Sold only to schools and businesses.*

840578	Kit	Each	**$61.30**
521022	Digital Teacher's Manual	Each	**$5.95**

Chemical and Physical Changes Kit

- Aligned with Big Idea 3 and Learning Objective 3.10
- Emphasizes Science Practices 1, 3, 4, 5, 6, and 7

In this comprehensive laboratory exercise, students determine whether a process is a chemical or a physical change based on the production of heat, evolution of a gas, formation of a precipitate, or a color change. This exercise can be taught using either a guided or an inquiry activity. In the guided activity, students work at activity stations in rotation and classify each of the 15 processes they observe as either a chemical or a physical change.

In the inquiry activity, students observe 5 chemical and 5 physical changes, develop their own set of characteristics for each type of change, and then apply their rules to classify 10 additional unclassified processes. **Note:** *Sold only to schools and businesses.*

840586	Kit	Each	**$69.00**
521024	Digital Teacher's Manual	Each	**$5.95**

840586 Chemical and Physical Changes Kit (in use; test tube and test tube rack not included)

Vitamin C in Fruit Juices by Redox Titration Kit

- Aligned with Big Idea 3 and Learning Objective 3.9
- Emphasizes Science Practices 2, 3, 4, 5, 6, and 7

Determine the concentration of ascorbic acid in a commercial fruit juice by redox titration. Teach this laboratory experience using either the guided activity or inquiry activity. In the guided activity, students titrate solutions of known ascorbic acid concentration to create a standard curve, then titrate a sample of fruit juice and determine the concentration of ascorbic acid from the curve. In the inquiry activity, students design an experiment to determine the concentration of ascorbic acid in a sample they choose. **Note:** *Sold only to schools and businesses.*

840584	Kit	Each	**$30.70**
521023	Digital Teacher's Manual	Each	**$5.95**

840584 Vitamin C in Fruit Juices by Redox Titration Kit *(inset)* and in use *(above)*

Carolina Chemonstrations® for AP® Chemistry: Big Idea 3—Changes in Matter Kit

Students observe thought-provoking macroscopic chemical changes with this kit's 2 demonstrations. Use the kit to introduce Big Idea 3 or to review chemical reactions in preparation for the AP® Chemistry Exam. A decomposition reaction results in "instant fog," and a unique conductivity activity monitors an acid-base titration. Particle-level explanations and Big Idea assessment questions help students solidify their understanding. **Big Idea 3—Changes in Matter Kit** was written for use with the **Audible Conductivity Kit**. Materials are sufficient for the 2 demonstrations to be performed twice.

840344	Big Idea 3—Changes in Matter Kit	Each	**$27.50**
840895	Audible Conductivity Kit	Each	**$29.95**

840895 Audible Conductivity Kit (in use; battery and beaker not included)

Big Idea 4: Rates of Chemical Reactions

Chemical Kinetics Kit

- Aligned with Big Idea 4 and Learning Objective 4.2
- Emphasizes Science Practices 2, 3, 4, 5, 6, and 7

840588 Chemical Kinetics Kit

Determine orders of reaction, calculate reaction rate constants, and write rate laws for the oxidation of 4 food dyes. Teach this laboratory experience using either the guided activity or inquiry activity. In the guided activity, students mix a food dye with bleach and monitor the solution's absorbance over time. From their Beer-Lambert graph of absorbance as a function of time, students determine the order of the dye and the sodium hypochlorite and use the slope to calculate a pseudo rate constant. Students then use their data to determine the overall order of the reaction, write an integrated rate law for the reaction, and calculate the reaction's rate constant. In the inquiry activity, students design an experiment to determine the overall order of reaction, rate law, and rate constant for the oxidation of a food dye by sodium hypochlorite. **Note:** *Sold only to schools and businesses.*

840588	Kit	Each	**$37.95**
521025	Digital Teacher's Manual	Each	**$5.95**

840590 Factors Affecting Reaction Rates Kit (in use; microplate, beakers, pipets, stopwatches, and hot plate/stirrer not included)

Factors Affecting Reaction Rates Kit

- Aligned with Big Idea 4 and Learning Objective 4.1
- Emphasizes Science Practices 1, 2, 3, 4, 5, 6, and 7

Investigate factors that affect the rate of a reaction using the iodine clock reaction. Teach this laboratory experience using either the guided activity or inquiry activity. In the guided activity, students measure how quickly clear, colorless solutions of reactants turn deep blue when the temperature, concentration, and surface area of solid reactants are changed. The change in reaction time when a catalyst is added is also determined. In the inquiry activity, students design an experiment to determine the effect of changing temperature, concentration, surface area of solid reactants, and the presence of a catalyst on the rate of the iodine clock reaction. **Note:** *Sold only to schools and businesses.*

840590	Kit	Each	**$42.50**
521026	Digital Teacher's Manual	Each	**$5.95**

Carolina Chemonstrations® for AP® Chemistry: Big Idea 4—Reaction Rates Kit

Use dramatic demonstrations to introduce Big Idea 4 or to review factors affecting reaction rates. Students observe the catalyzed combustion of sugar and the classic Blue Bottle and Traffic Light demos. They then analyze data from the demos to show their grasp of how concentration, temperature, and catalysts affect reaction rates. Particle-level explanations and Big Idea questions help students prepare for the AP® Chemistry Exam. Materials are sufficient to perform the 3 demos twice.

840346 Per kit **$23.50**

Big Idea 5: Thermodynamics

Carolina Chemonstrations® for AP® Chemistry: Big Idea 5—Thermodynamics Kit

Use this set of 4 demonstrations to introduce Big Idea 5 in your AP® Chemistry class or to review the concepts of thermodynamics after completing the unit. Students observe and interpret demos illustrating the concepts of heat sinks, extreme endothermic reactions, and exothermic reactions resulting in crystallization. Data analysis and Big Idea questions help prepare students for the AP® Chemistry Exam. Materials are sufficient to perform the set of 4 demonstrations twice.

840348 Per kit **$34.75**

Carolina Investigations® for AP® Chemistry kits include*:

- **Materials for 30 students**
- **FREE digital teacher's manual and student guide 12-month eBook license (also sold separately)**

*Does not apply to Carolina Chemonstrations® for AP® Chemistry kits.

Fundamentals of Calorimetry Kit

- Aligned with Big Idea 5 and Learning Objective 5.7
- Emphasizes Science Practices 2, 3, 4, 5, 6, and 7

840592 Fundamentals of Calorimetry Kit

Determine the specific heat capacity of a calorimeter and the molar enthalpy of a solution of 2 chloride salts. Teach this laboratory experience using either the guided or inquiry activity. In the guided activity, students determine the specific heat capacity of a calorimeter then use the calorimeter to determine the molar enthalpy of solution of calcium chloride and ammonium chloride. Students perform multiple trials and observe that different masses of salt generate different temperature changes while the molar enthalpy of solution remains constant. In the inquiry activity, students design either a hot pack or cold pack using the 2 chloride salts. **Note:** *Sold only to schools and businesses.*

840592 Kit Each **$41.15**
521027 Digital Teacher's Manual Each **$5.95**

Big Idea 6: Chemical Equilibrium

Le Châtelier's Principle and Equilibrium Shifts Kit

- Aligned with Big Idea 6 and Learning Objective 6.9
- Emphasizes Science Practices 3, 4, 5, 6, and 7

Investigate how temperature, concentration, and pressure affect chemical equilibrium in 3 different reactions. Teach this laboratory experience using either the guided activity or inquiry activity. In the guided activity, students perform 3 separate activities to investigate chemical equilibrium. In the first investigation, they react starch and iodine at 3 different temperatures and observe the variation in color. In the second, magnesium hydroxide is reacted with an acid to determine the affect a change in hydroxide-ion concentration has on solubility. For the third investigation, a partial vacuum is pulled on carbonated water to show how pressure changes affect pH. Students also observe how changes in temperature and common ions affect the equilibrium between 2 complex ions. In the inquiry activity, students design experiments to show how temperature, concentration, and pressure affect the equilibria of starch-iodine, magnesium hydroxide, and carbonated water. They also design an experiment to maximize the percent yield of a reaction by adjusting temperature and reactant concentration. **Note:** *Sold only to schools and businesses.*

840594 Kit Each **$63.40**
521028 Digital Teacher's Manual Each **$5.95**

840594 Le Châtelier's Principle and Equilibrium Shifts Kit *(above)* and in use *(left)*

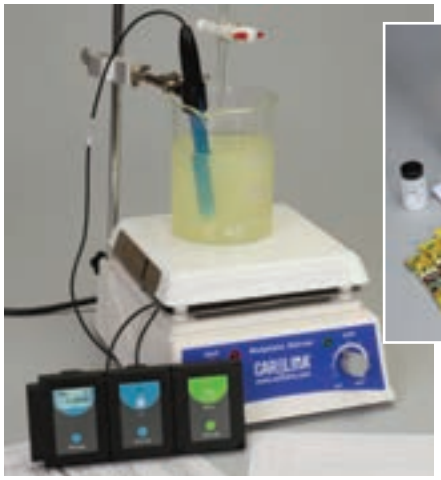
Preparation of a Buffered Solution Kit

- Aligned with Big Idea 6 and Learning Objective 6.18
- Emphasizes Science Practices 2, 3, 4, 5, 6, and 7

Prepare buffer solutions of assigned pH values and determine the buffer capacity of these solutions. Teach this laboratory experience using either the guided activity or inquiry activity. In the guided activity, students calculate the amounts of acid and base they need to prepare their stock acid and base solutions. Then using the Henderson-Hasselbalch equation they determine the volumes of stock acid and base solutions needed to prepare their buffers. Students then test the buffering capacity of these buffer solutions. In the inquiry activity, students choose the best conjugate acid-base pair to attain a buffer solution of desired pH and determine the concentration of the conjugate acid-base solutions needed to attain the required buffer capacity of the final solution. **Note:** *Sold only to schools and businesses.*

840598 Preparation of a Buffered Solution Kit *(inset)* and in use *(above)* (well plates, flasks, and stoppers not included)

840598	Kit	Each	**$49.40**
521030	Digital Teacher's Manual	Each	**$5.95**



840600 Evaluating Lemonade as a Buffer Kit *(above)* and in use *(left)* (hot plate/stirrer, beaker, ring stand, buret, and probeware not included)

Evaluating Lemonade as a Buffer Kit

- Aligned with Big Idea 6 and Learning Objective 6.20
- Emphasizes Science Practices 1, 2, 3, 4, 5, 6, and 7

Students evaluate a buffer solution's buffering capacity and compare the titration curves of a buffer solution and a weak acid. This comparative laboratory exercise can be taught using either a guided or an inquiry activity. In the guided activity, students measure the pH of a citric acid solution titrated with a strong base and plot the titration curve. Students repeat the procedure with a solution prepared from a commercial lemonade mix, which behaves as a buffer and whose primary ingredient is citric acid. Students compare the 2 titration curves, make observations, and address the differences in the curves. The inquiry activity allows students to design a procedure to evaluate a commercial lemonade mix's buffering capacity. **Note:** *Sold only to schools and businesses.*

840600	Kit	Each	**$34.25**
521031	Digital Teacher's Manual	Each	**$5.95**

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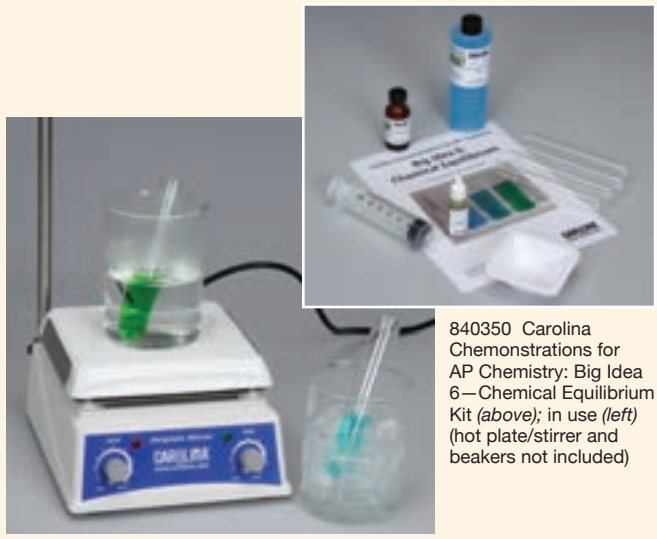


840350 Carolina Chemonstrations for AP Chemistry: Big Idea 6—Chemical Equilibrium Kit *(above);* in use *(left)* (hot plate/stirrer and beakers not included)

Carolina Chemonstrations® for AP® Chemistry: Big Idea 6—Chemical Equilibrium Kit

The 2 demonstrations in this kit illustrate Le Châtelier's principle and can be used to introduce Big Idea 6 or to review equilibrium in preparation for the AP® Chemistry Exam. They show how changes in temperature, concentration, or pressure can force a reaction at equilibrium to shift, favoring either the reactants or the products. Temperature and concentration are varied to shift a copper ion/copper chloride ion solution equilibrium, while pressure is changed to shift a carbonated water equilibrium. Particle level explanations and Big Idea questions help students solidify their understanding. Materials are sufficient to perform the 2 demonstrations 3 times.

840350 Per kit **$24.95**

840596 Concentration of Acetic Acid in Household Vinegar Kit *(above)* and in use *(right)* (hot plate/stirrer, beaker, ring stand, buret, and probeware not included)

Concentration of Acetic Acid in Household Vinegar Kit

- Aligned with Big Idea 6 and Learning Objective 6.13
- Emphasizes Science Practices 1, 2, 3, 4, 5, 6, and 7

This laboratory exercise combines the traditional skills of titration to determine acid concentration with insightful use of the Henderson-Hasselbalch equation to determine pK_a. It can be taught using either a guided or an inquiry activity. In the guided activity, students titrate the acetic acid in vinegar and use their titration data to determine the acid's concentration and pK_a. In the inquiry activity, students develop their own procedure to determine an acid's concentration in a solution and pK_a. **Note:** *Sold only to schools and businesses.*

840596	Kit	Each	**$39.50**
521029	Digital Teacher's Manual	Each	**$5.95**

Inquiries in Science® Chemistry Series

Grades 9–12.

Inquiries in Science® is our exclusive series of hands-on kits specifically designed to help high school students understand abstract, hard-to-grasp science concepts. The series tracks well with most textbooks, and kit topics reflect state science standards and extensive educator input. Since Inquiries in Science® is modular, you can use the kits individually, as a strand, or as a series to teach chemistry.

The 5E Learning Cycle

Field-tested in classrooms nationwide, Inquiries in Science® employs guided inquiry based on the 5E learning cycle of engage, explore, explain, extend, and evaluate. This inquiry-based approach also promotes STEM (science, technology, engineering, and math) practices. It enables students to:

- Consider a real-world question or problem
- Plan and conduct an investigation and gather data
- Understand the science concept by analyzing data and communicating findings
- Apply their findings to the original real-world question or problem and master the science concept

Inquiries in Science® Components

- **Kit**—Includes lab supplies (enough for at least 30 students working in groups) plus teacher's manual
- **Kit Refill**—Replenishes consumed materials
- **Digital Teacher's Manual**—FREE with kit purchase

Get a **FREE** digital teacher's manual with any Inquiries in Science® kit purchase. Display the digital manual on an interactive whiteboard, print it on demand and to your specifications, and make and save notes. The digital manual is accessed through Carolina's e-learning portal, CarolinaScienceOnline.com. Look for an e-mail after purchase with your access code to this valuable resource!

Inquiries in Science® helps students build critical-thinking and problem-solving skills, and encourages creativity, collaboration, and teamwork. It creates an environment in which you and your students work together as active learners.

Inquiries in Science® Chemistry Series Kits

MATTER **Strand** **251301** Per pkg **$1,123.80**	**REACTIONS: Chemical and Nuclear** **Strand** **251303** Per pkg **$1,071.00**	**SOLUTIONS** **Strand** **251302** Per pkg **$277.90**
Understanding Properties of Matter **251200** Per kit **$176.95**	*Balancing Chemical Equations* **251207** Per kit **$133.50**	*Finding Solutions* **251210** Per kit **$157.30**
Changing States of Matter **251201** Per kit **$169.50**	*Examining Thermochemistry* **251209** Per kit **$82.75**	*Observing Colligative Properties* **251211** Per kit **$141.50**
Reconstructing Atomic Theory **251219** Per kit **$129.90**	*Investigating Reaction Rates* **251212** Per kit **$197.95**	**ORGANIC CHEMISTRY**
Interpreting the Periodic Table **251203** Per kit **$217.35**	*Attaining Equilibrium* **251213** Per kit **$215.00**	*Introducing Organic Chemistry* **251218** Per kit **$199.95**
Bonding Chemically **251204** Per kit **$128.30**	*Discovering Acids and Bases* **251214** Per kit **$159.95**	
Expanding on the Gas Laws **251205** Per kit **$160.95**	*Exploring Voltaic and Electrolytic Cells* **251215** Per kit **$190.95**	
Determining Chemical Formulas **251206** Per kit **$61.50**	*Simulating Nuclear Transformations* **251216** Per kit **$171.50**	
Calculating with Stoichiometry **251208** Per kit **$163.50**		

Inquiries in Science®: Complete Chemistry Series Lab Package

Grades 9–12. This package of all 18 Inquiries in Science® chemistry kits provides lab activities that help students understand an essential science topic in the area of matter, chemical and nuclear reactions, solutions, or organic chemistry.

251300 Per pkg **$2,572.90**

Buy the complete package and save!

Carolina™ Chemistry Topic Bundles

Need a complete lab solution for a broad general chemistry topic? Look no further than Carolina™ Chemistry Topic Bundles. These hand-curated lab packages each include 1 teacher demonstration kit and 2 classroom kits. Use the teacher demos to introduce the topic or to ensure student understanding at the end of a unit. The 2 classroom kits provide thorough practical lab experiences.

Save time and money with Carolina™ Chemistry Topic Bundles!

New! Carolina™ Chemistry Topic Bundles

Bundle	Kits Included in Bundle	Topics	Catalog No.	Each
Gas Laws	Carolina Chemonstrations®: Gas Laws Carolina ChemKits®: Gas Laws Carolina ChemKits®: Molar Volume of a Gas	Gay-Lussac's, Avogadro's, Boyle's, Charles's, and Dalton's gas laws; molar volume of hydrogen gas; ideal gas law	**840860**	**$149.50**
Acids, Bases, and pH	Carolina Chemonstrations®: Rainbow Indicators Carolina ChemKits®: Understanding pH Measurement Carolina ChemKits®: Exploring Acids and Bases	pH indicators, fundamental properties of acids and bases, titration	**840862**	**$189.95**
Stoichiometry	Carolina Chemonstrations®: Balloon Stoichiometry Carolina ChemKits®: Introduction to Stoichiometry Carolina ChemKits®: Balancing Chemical Equations	Limiting and excess reagents, balanced chemical equations, percent yield, percent error, law of conservation of mass	**840864**	**$120.95**
Atomic Theory	Carolina Chemonstrations®: Luminol Light-Up Inquiries in Science®: Reconstructing Atomic Theory Economy Atomic Model Class Set	Chemiluminescence, atomic structures, electron configuration, electron energy levels, atomic theory	**840866**	**$219.95**
Chemical Reactions	Carolina Chemonstrations®: Metal Activity Series Carolina ChemKits®: Types of Chemical Reactions Carolina ChemKits®: Mystery Chemical Reactions	Activity series, reaction types, balancing equations, predicting products, identifying unknowns, evidence of reaction	**840868**	**$139.95**

840866 Carolina Chemistry Topic Bundles: Atomic Theory

840868 Carolina Chemistry Topic Bundles: Chemical Reactions

840333 Carolina Chemonstrations: Rainbow Indicators Kit (in use; flasks not included)

For more information (such as detailed descriptions, kit components, and needed but not supplied items) about the Carolina Chemonstrations® kits, Carolina ChemKits®, and Inquiries in Science® kits featured in these topic bundles, visit **Carolina.com**.

Carolina ChemKits®

Carolina quality and expertise, at a remarkable value

- Cover essential topics for high school general chemistry
- Can be completed in 1 or 2 class periods
- Include premeasured chemicals for a class of 30

Grades 9–12. Carolina ChemKits® are designed for high school general chemistry labs and developed with Carolina expertise provided by scientists, educators, and decades of experience. Manufactured in-house to exacting standards and priced to give you the best performance on a budget, these kits are a remarkable value. Each addresses a single topic with a guided investigation that focuses students on data collection, analysis, and critical thinking to help them develop a clear understanding of the topic.

Following the principles of green chemistry, kit chemicals are individually packaged in small, precise quantities to minimize environmental impact and waste. An added benefit of this approach is reduced prep time, so you spend more time teaching. Combine all of the above with the kits' comprehensive teaching materials (teacher's manual, student blackline masters, and more) and you have the perfect balance of scientific content, value, and ease of use. For more information, visit **Carolina.com/chemkits**.

Materials that are or that contain hazardous chemicals may be restricted to institutional or business sales only.

840838 Carolina ChemKits: Molecular Modeling

Topic	Description	Catalog No.	Each
Acids and Bases	Carolina ChemKits®: Exploring Acids and Bases	**840665**	**$103.95**
	Carolina ChemKits®: Understanding pH Measurement	**840667**	**$62.50**
Atomic Theory	Carolina ChemKits®: Atomic Theory	**840232**	**$91.00**
	Economy Atomic Model Class Set	**840243**	**$99.95**
	Carolina ChemKits®: Molecular Modeling	**840838**	**$99.95**

Carolina ChemKits®: Molecular Modeling

Bring visual and tactile learning to molecular structure and geometry with this 4-activity kit. Students draw Lewis dot structures, model electron domains to visualize a molecule's 3-D shape, construct 3-D molecular models, and study how dipole moment indicates molecular polarity. Materials are sufficient for 32 students working in groups of 4 and include 8 sets of durable plastic atomic models. **/!\ WARNING:** CHOKING HAZARD—Children under 8 yrs. can choke or suffocate on uninflated or broken balloons. Adult supervision required. Keep uninflated balloons from children. Discard broken balloons at once.

840838 Per kit **$99.95**

840642 Carolina ChemKits: Introduction to Paper Chromatography

Topic	Description	Catalog No.	Each
Biochemistry	Carolina ChemKits®: Introduction to Biochemistry	**841152**	**$69.95**
	Carolina ChemKits®: Introduction to Properties of Lipids	**841131**	**$96.95**
	Carolina ChemKits®: Qualitative Analysis of Proteins and Amino Acids	**841142**	**$145.00**
New!	Carolina ChemKits®: Introduction to Enzymes	**841172**	**$139.95**
		841172P	**$139.95**
Chemical Bonding	Carolina ChemKits®: Chemical Bonding	**840835**	**$62.00**
Chromatography	Carolina ChemKits®: Introduction to Paper	**840642**	**$43.50**
	Carolina ChemKits®: Food Dye Chromatography	**840644**	**$48.95**
	Carolina ChemKits®: Introduction to Thin-Layer Chromatography	**688950**	**$67.85**
	Carolina ChemKits®: Thin-Layer Chromatography of Amino Acids	**840640**	**$95.50**

Carolina ChemKits®: Introduction to Paper Chromatography

In this introductory kit, students are introduced to paper chromatography as a means for separating a mixture. They separate the components of a universal pH indicator to gain practice in chromatography technique. Then students separate the components of wet-erase markers and calculate the retardation factors. They use this data to understand how chromatography could be used to identify unknown components of a mixture. This activity requires approximately 70 minutes of classroom time, which can easily be divided between 2 class periods. **Kit** materials are sufficient for a class of 10 student groups. **Value Kit** contains materials for 4 classes!

840642 Kit Each **$43.50**
840643 Value Kit Each **$99.50**

Topic	Description	Catalog No.	Each
Elements, Compounds, and Mixtures	Carolina ChemKits®: Discovering the Periodic Table	**840072**	**$38.50**
	Carolina ChemKits®: Elements, Compounds, and Mixtures	**840968**	**$76.00**
	Carolina ChemKits®: Periodic Table Inquiry	**840074**	**$19.95**

Carolina ChemKits®: Periodic Table Inquiry

Students investigate periodicity by exploring and manipulating periodic table element cards. Through guided inquiry, they organize the element cards on the basis of physical and chemical properties and identify trends for atomic radius, electronegativity, and ionization energy. Finally, students investigate periodicity within the periodic table. Materials are sufficient for 30 students working in groups of 3.

840074 Per kit **$19.95**

840074 Carolina ChemKits: Periodic Table Inquiry

Topic	Description	Catalog No.	Each
Environmental Chemistry	Carolina ChemKits®: Production of Biodiesel	**841148**	**$108.00**
Equilibrium	Carolina ChemKits®: Chemical Equilibrium and Le Châtelier's Principle	**840709**	**$56.00**
	Carolina ChemKits®: Milk of Magnesia Rainbow	**840671**	**$60.25**
Gases	Carolina ChemKits®: Gas Laws and Engineering Air Bags	**840825**	**$38.75**
	Carolina ChemKits®: Molecular Mass of a Volatile Liquid	**840850**	**$25.50**
	Carolina ChemKits®: Gas Laws	**840289**	**$63.50**
	Carolina ChemKits®: Molar Volume of a Gas	**840827**	**$49.50**

Carolina ChemKits®: Gas Laws

Bring hands-on experimentation to your lessons on the gas laws with this "ideal" station-based kit. Along with the ideal gas law, students explore Avogadro's, Boyle's, Charles's, and Dalton's gas laws. They rotate through 11 activities and observe the relationships between volume, temperature, and pressure of a gas. In a separate activity, students construct a model of 1 mole of a gas at STP. Kit activities require 80 min and can be conducted over multiple days if needed. Materials are sufficient for 33 students working in groups of 3. **/!\ WARNING:** CHOKING HAZARD—Children under 8 yrs. can choke or suffocate on uninflated or broken balloons. Adult supervision required. Keep uninflated balloons from children. Discard broken balloons at once.

/!\ WARNING: CHOKING HAZARD—Toy contains a marble. Not for children under 3 yrs.

840289 Per kit **$63.50**

840289 Carolina ChemKits: Gas Laws

Topic	Description	Catalog No.	Each
Liquids and Solids	Carolina ChemKits®: Melting Point of Lauric Acid	**840875**	**$18.75**
	Carolina ChemKits®: Caffeine Extraction from Tea	**841119**	**$43.50**
Nanotechnology	Carolina ChemKits®: Exploring Nanotechnology	**840730**	**$76.50**
Nuclear Chemistry	Carolina ChemKits®: Radioactive Decay and Half-Life Simulations	**840715**	**$59.80**

Carolina ChemKits®: Radioactive Decay and Half-Life Simulations

Strengthen students' grasp of nuclear decay and half-lives with this 3-activity kit. Students simulate radioactive decay using both multi-faced cubes and water flow. They graph their data and determine the half-life of both "radioactive" samples. Students then perform a radioactive decay series simulation of a "newly discovered" radioisotope from an unstable nucleus to a stable nucleus. The card set for this activity allows students to mimic alpha, beta, gamma, and positron decay as their isotope forms daughter nuclei. The activities in this kit require approximately 2 hr of classroom time; however, the 3 activities can be completed on separate days if necessary. Kit materials are sufficient for a class of 10 groups of students, with no more than 4 students per group.

840715 Per kit **$59.80**

840715 Carolina ChemKits: Radioactive Decay and Half-Life Simulations *(right);* in use *(above)* (graduated cylinder and ring stand not included)

840805 Carolina ChemKits: Essence of Slime

Topic	Description	Catalog No.	Each
Organic Chemistry	Carolina ChemKits®: Soap Synthesis	**841139**	**$54.60**
	Carolina ChemKits®: Aspirin Synthesis	**840844**	**$29.95**
	Carolina ChemKits®: Super Water-Absorbent Polymers	**840672**	**$28.25**
	Carolina ChemKits®: Slime Time	**840808**	**$59.95**
	Carolina ChemKits®: Essence of Slime	**840805**	**$74.75**

Carolina ChemKits®: Essence of Slime

Students make 4 types of slime and then determine how those variations on the classic poly(vinyl) alcohol and borax slime formulation contribute to the variable properties of each slime type. Kit includes additives to make slime magnetic, fluorescent, phosphorescent, and thermochromatic. After preparing the 4 types of slime, students rotate through stations to test each type for a range of properties. Students use their data to identify the additives and connect their observations to the molecular-level structure of this hydrogel. **Kit** materials are sufficient for 1 class of 32 students. **Value Kit** includes sufficient materials for 4 classes! **Note:** *Sold only to schools and businesses.*

840805 Kit Each **$74.75**
840806 Value Kit Each **$186.85**

Topic	Description	Catalog No.	Each
Oxidation-Reduction Reactions	Carolina ChemKits®: Vitamin C in Fruit Juices	**840994**	**$43.25**
	Carolina ChemKits®: Silver Vials	**840842**	**$64.95**
	Carolina ChemKits®: Petri Dish Electrolysis	**840830**	**$49.40**
Properties of Matter	Carolina ChemKits®: Properties of Matter	**840921**	**$63.00**
Reaction Types	Carolina ChemKits®: Types of Chemical Reactions	**840740**	**$57.75**
	Carolina ChemKits®: Inorganic Reaction Chemistry	**840508**	**$46.30**
	Carolina ChemKits®: Investigating the Activity Series	**840705**	**$41.25**
	Carolina ChemKits®: Mystery Chemical Reactions	**840660**	**$66.20**
Solutions	Carolina ChemKits®: Ice Cream and Freezing-Point Depression	**840890**	**$29.75**
	Carolina ChemKits®: Solubility Curves	**840950**	**$27.50**

Carolina ChemKits®: Balancing Chemical Equations

Introduce and reinforce balancing chemical equations with this model-based kit. Students use colorful manipulatives and a unique balancing equations mat to understand the Law of Conservation of Mass and to visualize the number of atoms participating in each side of a chemical reaction. This activity also helps students understand the difference between coefficients and subscripts in chemical equations. Kit contains enough materials for 10 groups, pairs, or students working individually; materials can be reused.

840656 Per kit **$51.45**

840656 Carolina ChemKits: Balancing Chemical Equations *(above)* and in use *(left)*

840744 Carolina ChemKits: It's Not the Heat, It's Thermochemistry

Topic	Description	Catalog No.	Each
Stoichiometry	Carolina ChemKits®: Limiting Reagents and Antacid	**840685**	**$60.30**
	Carolina ChemKits®: Introduction to Stoichiometry	**840717**	**$59.95**
	Carolina ChemKits®: Advanced Stoichiometry	**840719**	**$34.75**
	Carolina ChemKits®: Balancing Chemical Equations	**840656**	**$51.45**
	Carolina ChemKits®: Law of Conservation of Mass	**840713**	**$63.50**
Thermochemistry	Carolina ChemKits®: It's Not Heat, It's Thermochemistry	**840744**	**$33.50**

Carolina ChemKits®: It's Not the Heat, It's Thermochemistry

Heat up your study of thermodynamics with this 2-activity kit. Students will investigate the thermodynamics of physical and chemical changes that absorb and release heat energy. Using a coffee cup calorimeter, students calculate the heats of a solution of 2 salt compounds. In the second activity, students determine the heat of combustion of a hydrocarbon using a soda can calorimeter. For both activities, students will write balanced thermochemical equations for the reactions and classify them as endothermic or exothermic. Kit activities require approximately 45 minutes. **Kit** materials are sufficient for a class of 30 students working in groups of 3. **Value Kit** includes materials for 4 classes! **Note:** *Sold only to schools and businesses.*

840744 Kit Each **$33.50**
840746 Value Kit Each **$83.75**

Experience Carolina STEM Challenge®

CAROLINA STEM CHALLENGE®

Carolina STEM Challenge® kits for middle and high school classrooms offer students real-world design challenges in an exciting tournament-style format.

Integrating STEM into your current curriculum has never been easier!

All kits focus on the science and engineering practices built upon in the Next Generation Science Standards®. Students engaging in these kits will be able to demonstrate pertinent STEM skills such as:

- Asking Questions and Defining Problems
- Developing and Using Models
- Planning and Carrying Out Investigations
- Analyzing and Interpreting Data
- Using Mathematics and Computational Thinking
- Constructing Explanations and Designing Solutions
- Engaging in Argument from Evidence
- Obtaining, Evaluating, and Communicating Information

Make It Bounce Kit

Grades 6–12. A chemistry lesson that is competitive? Yes! Bring the excitement of a Carolina STEM Challenge® to your chemistry classroom and watch student engagement bounce off the walls. Introduce students to polymer chemistry as they make bouncy balls using white glue and sodium borate. After testing their cross-linked polymer's properties, student teams are challenged to design a polymer that maximizes bounce. Kit materials support 15 teams, and the challenge requires 1 to 2 class periods. **Note:** *Sold only to schools and businesses.*

820101 Per kit **$46.25**

Chemical Reaction Rockets Kit

Grades 6–12. Set your sights on the skies with this kit! Students learn about gas-forming chemical reactions by creating gas-powered rockets. After a warm-up activity to create a simple rocket powered by the reaction between acetic acid and calcium carbonate, students modify the reaction and quantities of reactants along with the design of the rocket tube to maximize altitude. Teams then enter their rocket into a classroom competition and learn the real-world implications of the engineering design process. Kit materials support 15 teams working in groups of 2 or 3, and the challenge requires 1 to 2 class periods.

820103 Per kit **$51.50**

Crystal Growing Kit

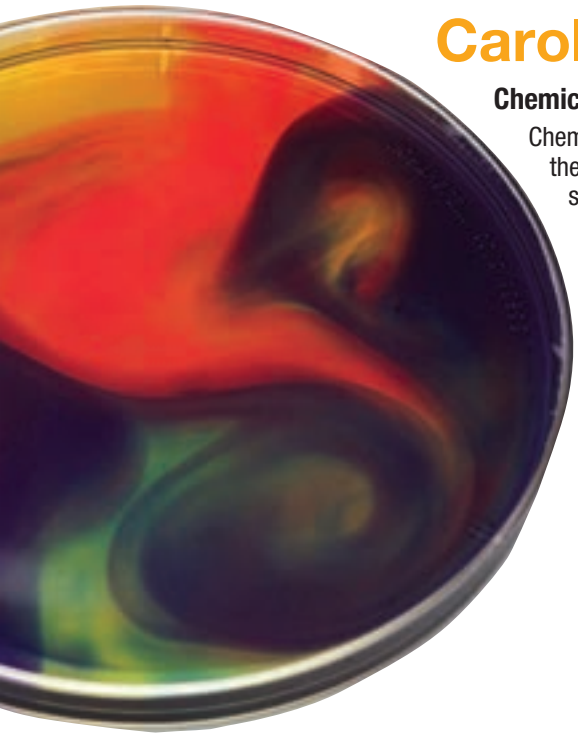
Grades 7–12. Watch the engineering design process crystallize in your classroom with this kit! Through a series of hands-on activities that focus on solutions and crystal growing, students learn about physical science and engineering concepts. Students first work through a warm-up activity to create a supersaturated sugar solution and grow sugar crystals. They then brainstorm ways that the sugar solution and crystal growing setup can be modified to meet a specific design challenge. Finally, student teams reengineer their crystal growing solutions and setups and compete to create the best design. Kit materials support 15 design teams of 2 students each.

820105 Per kit **$43.75**

Separation of a Mixture Kit

Grades 7–12. Students use planning skills, logic, and trial-and-error to construct a flowchart that details how to separate a mixture of sand, iron filings, sodium chloride, and stearic acid. They first perform a warm-up activity to determine the mixture components' physical properties. Students then compete in teams to successfully separate the mixture and recover the highest percentage by mass of each component. Kit materials support 15 design teams of 2 students each.

820109 Per kit **$54.95**



Carolina Chemonstrations®

Chemical demos made easy

Chemical demonstrations are a fantastic way to introduce chemistry topics and engage students with the wonders of chemistry. Demonstrations can be used to initiate student inquiry by encouraging students to develop explanations for their observations. Chemical demos are also a great way to wrap up a unit and review topics. Short on classroom time or lab resources? Demos can fill in the gaps between a lecture and a full classroom lab.

Carolina Chemonstrations® kits are designed to be used by the teacher in front of a class or small group, and every kit includes detailed instructions and enough materials to perform the demo at least 5 times. Each activity begins with students drawing upon previous knowledge to predict what will happen during the demo. After the demo, students model or illustrate the particulate-level interactions that explain their macro-level observations. To reduce your prep time and maximize results, every kit also comes with precisely measured chemicals. Materials that are or that contain hazardous chemicals may be restricted to institutional or business sales only.

We're adding new Carolina Chemonstrations® all the time! To find additional kits, go to **Carolina.com** and type "Chemonstrations" in the search field.

Carolina Chemonstrations®: Balloon Stoichiometry Kit

Bring some clarity to the topic of limiting and excess reagents with this demonstration that's both quick and memorable. Students watch balloons fill with carbon dioxide gas from the reaction of sodium bicarbonate and hydrochloric acid. The acid and base will vary between limiting and excess in 3 flasks, resulting in differently sized balloons and a pH indicator color change in the solution. Students will write a balanced equation for the reaction occurring in each flask and identify limiting reagents based on the mole ratios of reactants and products. This demo requires approximately 20 minutes, and materials are sufficient for the demo to be performed 4 times. **Note:** *Sold only to schools and businesses.* **/!\ WARNING:** CHOKING HAZARD—Children under 8 yrs. can choke or suffocate on uninflated or broken balloons. Adult supervision required. Keep uninflated balloons from children. Discard broken balloons at once.

840366 Per kit **$24.50**

Carolina Chemonstrations®: Observing Ionizing Radiation Using a Cloud Chamber Kit

Expand your nuclear chemistry demos beyond simulations with this unique cloud chamber activity. Students observe the contrails formed as ionizing radiation travels through a cooled, supersaturated vapor. They illustrate and explain what is happening in the cloud chamber on a particulate level while learning about nuclear processes and nuclear equations. Students then make connections between their observations of ionizing radiation and the occurrences and uses of radioactive isotopes in the world. This demonstration requires approximately 20 minutes of classroom time, and materials in the kit are sufficient to perform it 5 times. **Note:** *Sold only to schools and businesses.*

840374 Per kit **$42.50**

Carolina Chemonstrations®: Crystal Garden Kit

Grades 9–12. A garden in chemistry class? Yes! Your students will thrill to see colorful stalagmite-like columns of silicate precipitates forming in test tubes during this demonstration. With Carolina Chemonstrations®, students are active participants in chemical demonstrations. Students observe how transition metal salts dissolve in an aqueous solution of sodium silicate, write balanced equations for the metallic silicates formed, and see how the osmotic pressure of water helps to create and lengthen the silicate columns. This is a great demo for lessons on solubility, reaction types, and osmosis. This demonstration requires 15 minutes, and kit materials are sufficient for 5 demonstrations. **Note:** *Sold only to schools and businesses.*

820107 Per kit **$39.75**

Carolina Chemonstrations®: Reaction in a Bag Kit

Grades 7–12. In this classic introduction to scientific inquiry, students observe reactions between 4 compounds, observe simultaneous chemical and physical changes, and identify which reactions are responsible for each change. Carolina Chemonstrations® make students active participants in demonstrations. Prior to the demo, students make predictions, explaining on a molecular level the overall reaction producing a gas, a color change, and a change in temperature. After the demo, students design experiments to identify which reactions are responsible for each change. Big picture questions help students think critically about the topic. This demonstration requires approximately 15 minutes and materials are sufficient for 5 demonstrations. **Note:** *Sold only to schools and businesses.*

840382 Per kit **$28.85**

Carolina Chemonstrations®: Luminol Light-Up Kit

Shed some (blue) light on chemiluminescence, and bring visual learning to atomic theory with this teacher-led demonstration kit. Amaze your students when you mix a dry luminol mixture with water to produce a beautiful blue glow. A second demonstration simulates presumptive blood testing. Big picture questions and a particle-level explanation solidify students' grasp of the concepts including redox reactions, electromagnetic radiation, and the conservation of energy. This demonstration requires approximately 15 minutes, and materials are sufficient for 5 demonstrations.

840360 Per kit **$36.35**

Carolina Chemonstrations®: Carbon Snake Kit

Demonstrate carbohydrate dehydration with the popular carbon snake activity. Dehydrating sugar using concentrated sulfuric acid results in an amazing display of elemental carbon "snaking" out of a beaker. Students make predictions about the demonstration's outcome; observe the exothermic reaction and resulting carbon column; and then construct a particle-level explanation for the reaction. This demonstration is a great addition to discussions about chemical versus physical changes, evidence of chemical reactions, exothermic reactions, dehydration reactions, decomposition reactions, and carbohydrate structure. It requires approximately 10 minutes, and kit materials are sufficient for 5 demonstrations. **Note:** *Sold only to schools and businesses.*

840376 Per kit **$43.50**

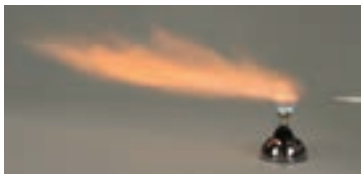
Carolina Chemonstrations®: Beaker Freezer Kit

Don't leave endothermic reactions out in the cold—showcase them with this impressive demonstration! Students observe how a reaction between 2 solid compounds absorbs heat from its surroundings and freezes a beaker to a wooden block. Students participate in the demo by making predictions based on prior knowledge and creating particulate-level representations of the reaction. This demo requires approximately 10 minutes of classroom time, and materials in the kit are sufficient for the demo to be performed 6 times. **Note:** *Sold only to schools and businesses.*

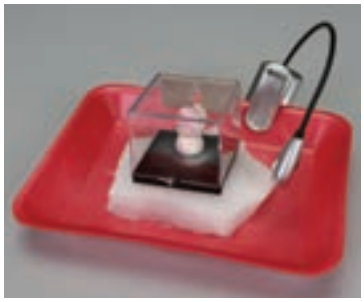
840378 Per kit **$39.95**

840378 Carolina Chemonstrations: Beaker Freezer Kit

From 820107 Carolina Chemonstrations: Crystal Garden Kit



From 840362 Carolina Chemonstrations: Dust Explosion Kit

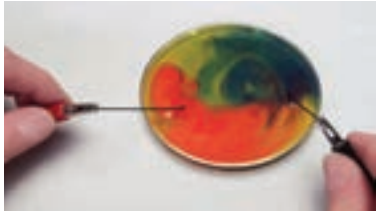


From 840374 Carolina Chemonstrations: Observing Ionizing Radiation Using a Cloud Chamber Kit

Carolina Chemonstrations®

Visit Carolina.com to explore all of our Carolina Chemonstrations® demo kits.

Catalog No.	Kit Title	Each
840366	Balloon Stoichiometry	$24.50
840378	Beaker Freezer	$39.95
840321	Blue Bottle	$35.00
840376	Carbon Snake	$43.50
840311	Catalytic Cobalt	$29.95
820107	Crystal Garden	$39.75
840362	Dust Explosion	$54.50
840315	Elephant Toothpaste	$34.95
840357	Energy Transformations with Irradiated Salt	$32.95
840375	Gas Laws	$54.75
840325	Iodine Clock Reaction	$32.75
840338	Isolating the Elements	$38.50
840307	Like a Salt to a Flame	$37.50
840305	Lost Volume	$15.50
840360	Luminol Light-Up	$36.35
840319	Metal Activity Series	$35.10
840339	Nylon Synthesis	$25.50
840374	Observing Ionizing Radiation Using a Cloud Chamber	$42.50
840327	Polyurethane Foam	$32.50
840333	Rainbow Indicators	$42.95
840382	Reaction in a Bag	$28.85
840341	Reaction Types	$24.95
840309	Silver Lining	$42.95
840303	Super Water-Absorbent Polymers	$24.25
840364	Under Pressure	$13.50
840301	Water Electrolysis	$21.95
840329	Whoosh Bottle	$24.95



From 840301 Carolina Chemonstrations: Water Electrolysis Kit

From 840303 Carolina Chemonstrations: Super Water-Absorbent Polymers Kit

From 840327 Carolina Chemonstrations: Polyurethane Foam Kit

840181 Carolina Molymod Molecular Model Set

Carolina™ Molymod® Molecular Model Set

Save Money!

- Spend less when you buy this high-quality model set
- Build skeletal or space-filling models
- Use parts interchangeably with other Molymod® products

Save Time!

- Parts snap together and stay together
- Assembled models are easy to handle
- Set withstands many years of classroom use

Suitable for introductory chemistry in high school or college. Features durable Molymod® components. This set enables students to construct skeletal or space-filling models for organic and inorganic chemistry.

10 Carbon (black)
22 Hydrogen (white)
6 Oxygen (red)
2 Nitrogen Tetrahedral (blue)
Nitrogen Pyramidal (blue)
8 Sulfur (yellow)
6 Halogen (green)
4 Trigonal Bipyramid (brown)
4 Octahedral (gray)
12 Short Links (white)
30 Medium Links (gray)
12 Long Flexible Links (gray)
Link Remover Tool

840181 Per set **$36.60**

840140 Magnetic Water Kit

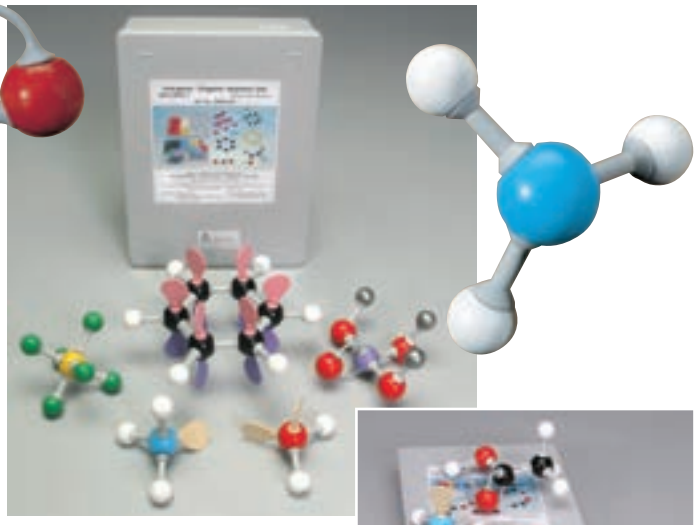
Magnetic Water Kit

Grades 8–12. This cup of model water molecules is the answer for students thirsting to explore and understand polarity, hydrogen bonding, surface tension, solubility, states of matter, and crystal structure. Powerful magnets embedded in the atom centers let students actually see and feel simulated molecular attraction or repulsion, making fundamental molecular interactions easier to comprehend.

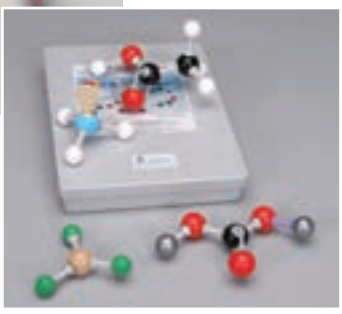
Kit contains:
Plastic Cup
12 Water Molecules
Sodium Ion
Chloride Ion
Hydroxyl Group
Ethane Molecule (with 1 removable hydrogen)

Class Set contains:
6 Kits
Carrying Tray

840140 Kit Each **$49.95**
840141 Class Set Each **$266.90**



840182 Molymod Organic/Inorganic Molecular Model Teacher Set *(above)* and 840184 Student Set *(right)*



Molymod® Organic/Inorganic Molecular Model Sets

These versatile molecular model sets contain plastic atoms and bonds designed to make skeletal models of elementary organic and inorganic structures. Available as a **Teacher Set** and a **Student Set**, each packed in a plastic case with instruction sheet. In the contents listing below, the number of atoms or parts in each set is preceded by a "T" for Teacher Set and an "S" for Student Set.

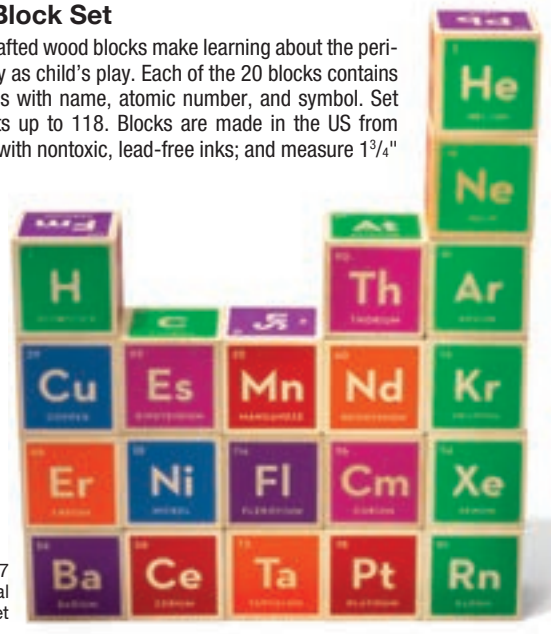
Carbon (black) (T 20; S 6)
Halogen (green) (T 8; S 6)
Hydrogen (white) (T 14; S 14)
Lone Pair Electron Clouds (T 6; S 3)
Metal (gray) (T 14; S 8)
Nitrogen (blue) (T 10; S 3)
Oxygen (red) (T 22; S 7)
Phosphorus (purple) (T 7; S 2)
Sulfur (yellow) (T 13; S 2)
Boron (beige) (T 1; S 0)
Atom sp^3 (beige) (T 1; S 0)
Atom dsp^3 (beige) (T 1; S 0)
Atom d^2sp^3 (beige) (T 1; S 0)
Medium Links (gray) (T 38; S 20)
Medium Links (purple) (T 12; S 5)
Long Flexible Links (gray) (T 36; S 12)
Unhybridized P-Orbital (pink) (T 6; S 0)
Unhybridized P-Orbital (purple) (T 6; S 0)

840182 Teacher Set Each **$69.95**
840184 Student Set Each **$41.60**

Elemental Block Set

Colorful, hand-crafted wood blocks make learning about the periodic table as easy as child's play. Each of the 20 blocks contains 6 element images with name, atomic number, and symbol. Set includes elements up to 118. Blocks are made in the US from basswood; dyed with nontoxic, lead-free inks; and measure $1\frac{3}{4}$" (44 mm).

840077
Per set
$38.50



840077 Elemental Block Set

Essential Equipment for Your Laboratory

Spectronic® 200 Spectrophotometer

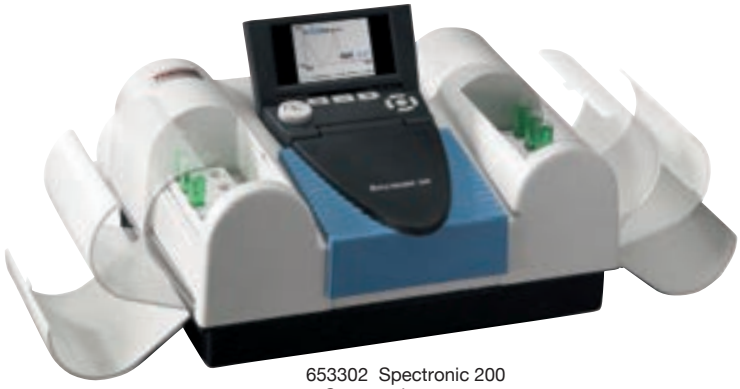
- Full-color LCD display
- Sloped surfaces shed spills
- Corrosion-resistant construction
- Stackable for easy storage
- USB port for exporting data

The latest addition to the classic Spectronic® 20 series improves upon its predecessors in every respect. The unit automatically sets to 0% T when powered up. It sweeps across the entire wavelength range with every scan, eliminating the need to recalibrate at 0% T or 100% T when the wavelength is changed. With your solution in the sample holder, 1 push of a button sets to 100% T. The sample chamber has room-light immunity, meaning the sample door does not need to be closed to make a reading, which allows the use of tall test tubes. The chamber accommodates 10-mm square cuvettes and 13- to 25-mm-diameter round cuvettes. The unit measures absorbance, transmittance, and concentration. The LCD display measures $2^{3}/_{4}$" W × 2" H and tilts to suit the viewer. The display emulates the appearance of the Spectronic® 20D+ and can show text in English, Spanish, French, German, and Italian. Place the unit on its end and easily store on a shelf like a book. Includes 12 test tube cuvettes and 1-year manufacturer's warranty.

Specifications:

Wavelength Range:	340 to 1,000 nm
Wavelength Accuracy:	±2 nm
Photometric Range:	–0.3 A to 2.5 A
Photometric Accuracy:	±0.05 A at 1.0 A
Power Requirements:	100 to 240 V (selected automatically)
Dimensions:	15" W × 12" D × $3^{3}/_{5}$" H (39 cm W × 30 cm D × 16 cm H)
Weight:	$9^{7}/_{10}$ lb

653302 Spectronic 200 Spectrophotometer Each **$1,495.00**
653314 Replacement Tungsten Lamp Each **$37.40**



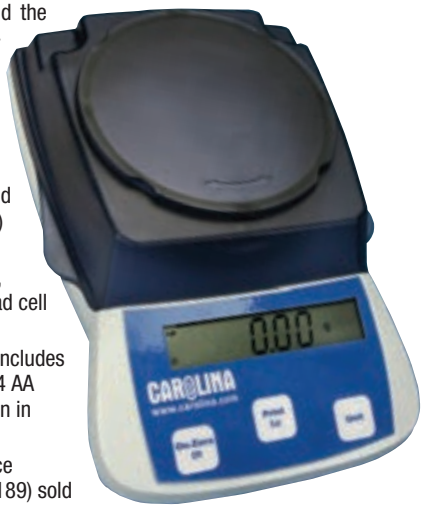
653302 Spectronic 200 Spectrophotometer

Carolina™ Electronic Balance

Pulling its weight

- Advanced features and technology
- Built-in durability for the classroom
- Stackable to save space

Whether you teach biology, chemistry, or physical science, we have the right balance for you. This value-packed balance is highly popular because it offers simple operation, years of service, and the durability that you and your students demand.



- **Latest Features**—Hinged draftshield for more accurate weighing, LCD display, travel protection lock, RS232 interface hookup, and 2 weighing modes (g and N)
- **Durability**—Splash-proof keypad, stainless-steel pan, sturdy body, plus 200-lb load cell protection
- **Flexible Energy Source**—Includes an AC adapter or switch to 4 AA batteries (not supplied) when in the field
- **Lockable**—Optional Balance Security Device (item #702189) sold separately
- **Carolina Exclusive 2-Year Warranty**

Capacity, 300 g; readability, 0.01 g; repeatability, 0.1 g. Calibrate balance from the keypad. Dimensions, $5^{1}/_{2}$ × 9 × $2^{1}/_{2}$" (139 × 228 × 63 mm); pan, $4^{7}/_{10}$" diam.

702017 Each **$443.00**

Carolina™ Digital Hot Plate/Stirrer

- Digital display
- Fast, reliable, and safe
- Ceramic work surface
- Two-year warranty

Better than the original! This hot plate/stirrer is fast and simple to use with an easy-to-read digital display, dial for stirring speed, and recessed buttons to set temperature. The maintenance-free, 1-piece ceramic work surface contains advanced microprocessor controls and a strong magnetic stirrer. This unit can boil 400 mL of water in 20 minutes! A safety indicator LED displays when the plate is hotter than 50° C. 120-V AC. CE approved.

Catalog No.	Top Size	Stir Speed	Temp Range	Each
701027	$6^{1}/_{2}$ × $6^{1}/_{2}$"	200 to 1,500 rpm	5 to 380° C	**$445.00**

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