Lt Chemistry Collection

Prepare and engage students with interactive lessons and experiments

Lt is a cloud-based learning platform that allows you to run chemistry labs without headaches.

The Lt Chemistry Collection includes 19 customizable lessons, grouped into modules. Each module contains a combination of pre-lab prep, lab, and extension activities.

Combine lessons with Vernier Science Education's Go Direct® Sensors to provide a practical learning experience that prepares students to use instrumentation in the lab, or use Lt's pre-recorded example data for remote learning situations.

Professionally-developed lessons

Lessons in our Chemistry Collection reinforce general chemistry concepts including acid-base titration, states of matter, heats of reaction, synthesis, buffers, equilibria principles, and more.

Each media-rich lesson is designed to maximize engagement with a strong focus on student outcomes and incorporate recommendations from the American Chemical Society's *Assessment Tool for Chemistry**. Use our lessons off-the-shelf or tailor any lesson to suit your curriculum and your teaching preferences. Lessons can be grouped, and ordered per your course needs.

*Please note that the Lt Chemistry Collection is not endorsed by, or affiliated with, the American Chemical Society in any way.

- Improved efficiency
- Improved results in theory and clinical practice
- Increased student engagement
- Increased student pass rates*

**Results of using Lt at the School of Nursing, Otago Polytechnic | Te Pūkenga, 2017*

Developed in partnership with

Vernier SCIENCE EDUCATION

For nearly forty years, Vernier® Science Education has created award-winning technology, software, and data-analysis tools for education. Their products are trusted by universities and colleges around the world.

"The customization of the labs is much appreciated as we can align the lab's background information with our lecture content and more."

Professor Priyanka Pant,
Science Department Chair,
Lake Washington Institute of Technology, USA

ADINSTRUMENTS

Lt Chemistry Collection

19 MODULE COLLECTION

Modules include: Pre-Lab Prep + Lab + Extension*

**if applicable*

Key:

- Go Direct® Conductivity Probe
- Go Direct® Gas Pressure Sensor
- Go Direct® Melt Station
- Go Direct® pH Sensor
- Go Direct® SpectroVis® Plus Spectrophotometer
- Go Direct® Temperature Probe
- Go Direct® Voltage Probe
- No Sensor required

Acid–Base Titration

Determine the equivalence point of a strong acid-strong base titration and calculate the unknown concentration of the acid solution. Perform additional titrations using acids and bases of varying strengths to differentiate the shape of their titration curves, and learn about the appropriate selection of acid–base indicators.

Beer's Law

Construct a standard curve using a series of standard solutions of copper sulfate and determine the concentration of an unknown copper sulfate solution by measuring its absorbance.

Determining a Chemical Formula

Measure changes in mass after heating and reacting a hydrated compound containing copper, chlorine, and water molecules locked in the crystal structure of the solid compound. Then use the law of definite proportions to find the empirical and molecular formula.

Determining an Equilibrium Constant

Construct a standard curve using a series of standard solutions of iron (III) thiocyanate complex ion and use this curve to determine the concentration of the ion in a series of new solutions. Determine the K_{eq} of the reaction between iron (III) ions and thiocyanate ions.

Determining the K_{sp} of Calcium Hydroxide

Titrate a saturated solution of calcium hydroxide with a standard hydrochloric acid solution to calculate the K_{sp} of the compound. In the extension activity, explore the common-ion effect by adding a calcium chloride solution to a saturated calcium hydroxide solution.

Dissociation Constants

Experimentally determine the acid dissociation constant of acetic acid by measuring the pH of acetic acid solutions of different initial concentrations. Then calculate the base dissociation constant of sodium acetate and compare the result to the experimentally-determined value. In the extension activity, explore how the addition of a strong acid or a strong base impacts the pH of a buffer solution.

Electrochemistry: Voltaic Cells

After practicing by preparing a voltaic cell with copper and lead electrodes and measuring its potential, test two voltaic cells with unknown metal electrodes and identify the unknown metals by examining the cell potential. Explore various concentration cells and use the Nernst equation to calculate the solubility product constant for lead iodide.

Electrolytes and Nonelectrolytes

Measure the conductivity of aqueous solutions containing strong, weak, and nonelectrolytes. Determine if the compounds have dissociated, and if so, whether this dissociation is complete or partial. In the extension activity, investigate the relationship between conductivity and strong and weak bases.

Evaporation and Intermolecular Attractions

Measure the temperature changes caused by the evaporation of several liquids. Relate these temperature changes to the strength of the intermolecular forces of attraction present, and use these results to predict the temperature changes for several other liquids. In the extension activity, examine how dispersion forces are influenced by the shapes of isomers.

Identifying an Unknown Diprotic Acid

Titrate an unknown diprotic acid with a sodium hydroxide solution of known concentration. Use the results to calculate the molar mass of the unknown diprotic acid, then identify it. In the extension activity, calculate the acid dissociation constants for the unknown diprotic acid.

Liquid Chromatography

Perform an isocratic separation and a step-gradient separation using a Sep-Pak® C18 cartridge to separate the dyes (FD&C Blue and FD&C Red) from the other ingredients present in grape-flavored Kool-Aid®.

Measuring and Predicting Heats of Reaction

First, experimentally confirm Hess' law by measuring temperature changes to determine the heat of three reactions. Subsequently, measure the temperature changes associated with two reactions: magnesium oxide with hydrochloric acid, and magnesium with hydrochloric acid. Use the results to calculate the heat of combustion of a magnesium ribbon using Hess' law.

Molar Volume of a Gas

Measure pressure and temperature changes in a sealed vessel while solid magnesium reacts with an excess of hydrochloric acid to produce hydrogen gas. Then use the combined gas law to calculate the molar volume of the gas produced at non-standard conditions. In the extension activity, investigate the effect of temperature change on the volume of a fixed molar amount of hydrogen gas.

Quantitative Analysis of a Precipitate

Monitor conductivity while adding sulfuric acid to barium hydroxide, and determine the equivalence point of the reaction. From this information, find the concentration of the barium hydroxide solution. In addition, capture the precipitate and measure its mass to confirm the molar concentration of the $Ba(OH)_2$ solution. In the extension activity, explore the concepts of lattice enthalpy, hydration enthalpy, and solubility.

Rate Law Determination

Monitor the change in the absorption over time while crystal violet reacts with sodium hydroxide. Determine the observed rate constant, k_{obs}. In the extension activity, determine the half-life of this reaction.

Standardizing a Solution

Titrate the primary standard potassium hydrogen phthalate against a solution of sodium hydroxide with unknown concentration. Use the change in pH to determine the concentration of the sodium hydroxide solution. In the extension activity, examine measurement uncertainties.

Synthesis and Analysis of Aspirin

Synthesize aspirin, then test the purity of the synthesized sample by determining its melting point and also comparing the absorbance of the sample to a set of standard solutions of salicylic acid (impurity).

Temperature and State Changes

Measure changes in temperature as water freezes, boils, and melts. Relate molecular structure and intermolecular forces to the boiling points of other molecules. In the extension activity, supercool samples of sodium thiosulfate pentahydrate and discuss this phenomenon in terms of crystallization and heat release.

How can Lt help?

Educators

Easy lesson authoring
Building media-rich lessons is simple. Drag-and-drop a range of content types to create interactive exercises, including multiple-choice questions, short-form written answers, and image annotation.

Collaborative
Share content and workload with your fellow educators and teaching assistants. Set varying levels of access to allow others to review content, add content, or publish revisions online.

Flexible grading
Automatically grade quizzes while keeping the flexibility to add feedback and positive reinforcement, and manually grade written assessments.

Supporting your Lt journey
When you sign up to Lt, you become part of our global community of Lt collaborators. We provide you with ongoing support, including a dedicated Customer Success Manager during onboarding and beyond to ensure you're meeting your teaching objectives.

Students

Learn anywhere, anytime
Lt's cloud-based platform means students can learn on almost any device that connects to the internet. Whether they use iOS or Android, tablet, mobile, or laptop, lessons will be resized to suit.

Go Direct® Sensor integration
In the lab, students can record and view data live on screen with Vernier's suite of Go Direct® Sensors. The sensors are integrated with data sampling panels in Lt that can record temperature, gas pressure, absorbance spectra, pH, and more.

Remote learning
All chemistry labs include built-in, pre-recorded example data that students can access for data analysis, meaning students can achieve the desired learning outcomes even if they lack access to sensors or laboratory space.

Administration

Simple setup
Lt needs only an internet browser to allow course administration, authoring, and publishing. Our data acquisition app, used for sampling, installs in 30 seconds.

Analytics
Our analytics allow you to view class progress in each lesson and section in your course, and provide valuable insights about where and how students are interacting with course material.

Secure and scalable
Totally secure, Lt is hosted on Amazon Web Service's encrypted servers with guaranteed 99% uptime and the ability to maintain speed as more students sign in to Lt.

Future-proof
Lt is automatically updated with new features by our team of engineers, developers, and education specialists.

TRY Lt FOR FREE
Sign up now: **adi.to/try_lt**