Introduction

Model ChemLab - An interactive Lab Simulation for Windows® and the Mac® OS

Whether your challenge is to introduce new computer technology to your curriculum, or bring the lab experience to on-line students or a need for an alternative to dangerous, expensive or environmentally hazardous labs, then Model ChemLab is the classroom proven solution for you.

Model ChemLab originated from academic work in computer simulation and software design at McMaster University. It has continued to be developed with extensive input from educators interested in the possible application of computer simulations for classroom and distance learning.

Model ChemLab is a unique product incorporating both an interactive simulation and a lab notebook workspace with separate areas for theory, procedures and student observations. Commonly used lab equipment and procedures are used to simulate the steps involved in performing an experiment. Users step-through the actual lab procedure while interacting with animated equipment in a way that is similar to the real lab experience.

ChemLab comes with a range of pre-designed lab experiments for general chemistry at the high school and college level. Users can expand upon the original lab set using ChemLab's LabWizard development tools, thus allowing for curriculum specific lab simulation development by educators. These user designed simulations combine both text based instructions and the simulation into a single distributable file.

Product Info:

Available in Pro and Standard Editions. **Professional version** includes the Lab Wizard tool, which enables instructors to run, edit, and create lab simulations, while the Standard edition enables students to only run lab simulations.

ChemLab Design:

- Easy to use lab interface modeled on common lab procedure
- Student lab notebook workspace area
- Real time animated interactive simulation engine
- Lab Wizard tools for easy user created lab simulations

- Support for plug-in lab simulations extensions
- Integration with RasMol molecular viewer
- Integrated Periodic Table application with quiz
- Available in English, Spanish and French

Lab equipment:

- Beakers, Erlenmeyer and Florence flasks, test tubes, graduated cylinders, burets,eye dropper, pipets, watch glasses, filtering flask with buchner funnel, bunsen burner, hot plate / Magnetic stirrer, stirring rods, evaporation dish, calorimeter, conductivity meter, potentiometer, Spectrophotometer and others…
- Balances: centigram, electronic and high sensitivity balance
- Distillation equipment setup: distillation flask with heating mantel, distillation head, condenser and distillation take-off

Common Lab Procedures:

- Titration, Decanting /pouring
- Heating and hot/cold water baths
- Temperature, weight, pH, conductivity, voltage and volume measurements
- Plot titration curves

Large selection of pre-defined labs simulations:

- Acid/base reactions, bond lab, cations reactions, electrochemistry, equilibrium, flame lab, fractional crystallization, fractional distillation, gas laws, gravimetric analysis, kinetics, redox reactions, stoichiometry, thermal chemistry, volumetric analysis, water quality, weak acid titration and many more.. *(See Current Lab List)*
- Additional simulations developed by third parties

Lab Wizards (Professional Edition):

- *Allow users to create customized lab simulations*
- *Lab Wizard steps users through process of new lab creation*
- *Single distributable file*
- *Expandable chemical database allows users to add new chemicals to ChemLab*

Free updates from Model Science web site:

- *Registered users can download updates and new Lab simulations from the Model Science web site.*

Wide Range of Applications:

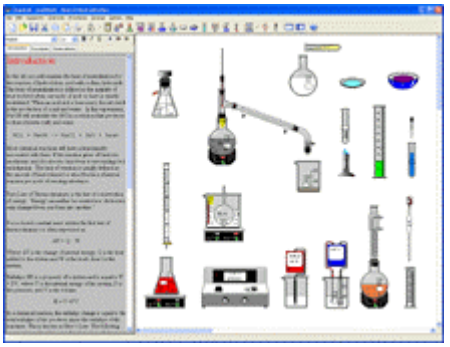
- *Ideal for distance learning, demonstrations, lab run-throughs, pre-lab work, dangerous and environmentally hazardous, expensive, or lengthy labs.*

Technical Requirements:

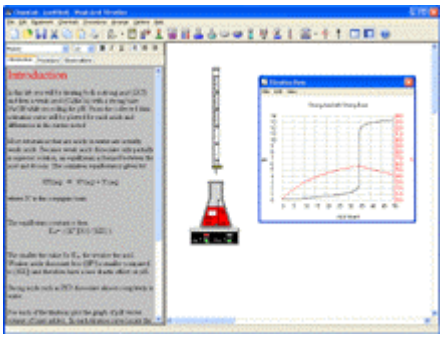
- *Windows® 95/98/ME/XP/NT/2000 with 8MB RAM VGA or higher (also available for Mac OS 7.0)*

Screen Shots:

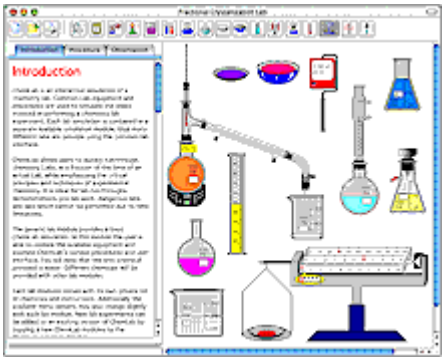
ChemLab Professional (LabWizard)



ChemLab Standard



Titration Curve



ChemLab - Mac OSX

Testimonials:

"Teaching chemistry laboratory procedures by means of a virtual laboratory on a personal computer is a very powerful concept. Students are not limited by time or space in the virtual laboratory, and educational institutions which do not have the physical or economic

means to maintain a real chemistry lab will welcome this alternative. Model ChemLab is just such a tool. It is compatible with Windows and Macintosh operating systems which are found in most schools. Use is very intuitive and easy to learn. It comes with over 20 different laboratory modules, and the Professional Edition has a Wizard which permits design of additional modules. Each module functions like a lab notebook with one page describing the principles and objectives, another page giving stepwise procedures, and a third page for recording observations and computations. The experiments are performed in a window by assembling components selected from a menu, and then interactively weighing, mixing, heating, measuring etc. Model ChemLab is a well-designed product which fills a real need."
Editor, Science Book and Films Journal
American Association for the Advancement of Science

"I had a great deal of fun with this package, as did my students. I would certainly recommend this package to all teachers of basic chemistry as a method of augmenting the practical experience available to their students. The software is extremely user-friendly and the instructions, both for running listed modules and developing new ones, are clear and helpful. We intend to introduce this software to our foundation chemistry students in pre-lab sessions, so that they can make the most of their time spent in the laboratory."
Wynne Evans, Chemistry Instructor
University of Glamorgan

"This is an innovative resource that is fun to use and has a great deal of potential for Chemistry teachers at any level and for any type of course. It simulates laboratory experiments by providing lab procedures, apparatus and chemicals for students to run experiments. The ability to customise the existing activities and to include new ones using the Lab Wizard is a particularly attractive feature of this product. In addition, the software designers are easy to contact and open to ideas."
Steve Lewis, Chemistry Instructor
Shrewsbury Sixth Form College

"Model ChemLab is a visually enticing program that the Florida High School uses to give our virtual students the

opportunity to "handle" objects and chemicals found in a chemistry lab. This saves us the large expense of sending out glassware and allows us to do lab activities with chemicals that are not able to be sent to the students. The students respond very well to the ease of use of the program, and they are very excited by the graphic interface."
Jennifer Whiting, Chemistry Instructor
Florida Internet High School

"I just got the lastest version of your software and I would like to congratulate you for the very nice piece of work you have done. I am sure that this software will be a "citation classic" as we say for very good scientific papers."
Clément Lemaignan
Research Director, CEA France

"I love this program! Just amazing. I had the sensation that I was back in the lab. I also liked the use of text... one section for theory, one for procedures and another for observations ... excellent!"
Daniel Barboza Vieira,
First year chemistry student, University of São Paulo

Current Lab List for ChemLab

Name	Description	Platform
Acetate Buffer	Compare the pH of a buffer solution to a weak acid solution.	Win
Acid-Base Titration	Perform strong acid base titration and plot titration curve.	Win/Mac
Atomic Weight of Magnesium	Determine the atomic weight of magnesium by the amount of hydrogen gas evolved.	Win/Mac
Balance Lab	Examine the precision of three types of balances.	Win
Bond Lab	Examine the chemical behavior of iconic and covalent bonds.	Win
Cation and Anion Reaction	This lab examines the reaction between cations and anions.	Win/Mac
Charles' Law	This Lab examines the relationship between volume and temperature for gases at constant pressure.	Win

Crude Oil Distillation	Separate crude oil into its components using fractional distillation.	Win/Mac
Determination of Specific Heat Lab	This lab uses a calorimeter to determine the specific heat of a metal.	Win/Mac
☐ Double Replacement Reaction	Examine a simple double replace reaction.	Win
☐ Dumas Method (Ideal Gas Law)	Determine the molecular weight of a gas using the ideal gas law.	Win
Electrochemical Cell	Create electrochemical cells and measure their voltages.	Win/Mac
Flame Chemistry	Examination of high temperature light emissions.	Win/Mac
Fractional Crystallization	This lab examines the properties of chemical solubility	Win/Mac
☐ Gas Compression	Examine the relationship between Volume and Pressure in Gases at constant temperature.	Win
Gravimetric Analysis of Chloride	This lab uses gravimetric analysis to determine the percentage of chloride in an unknown.	Win/Mac
Hard Water Analysis by Titration	Measure calcium and magnesium content in water by titration.	Win/Mac
☐ Heat of Neutralization	Determine the Heat of Neutralization for HCl with NaOH.	Win
Hydrate Formula	Determination of the formula of a hydrate.	Win/Mac
Iron (II) Redox Titration	Determination of the percentage of iron in an unknown iron (II) sulfate by redox titration.	Win/Mac
☐ Molar Volume of Hydrogen Gas	Determining Molar Volume of Hydrogen Gas.	Win
Molecular Viewer Lab	Use RasMol molecular viewer from ChemLab to view molecular structures.	Win
Oxygen Production	Oxygen is produced by the decomposition of potassium chlorate.	Win/Mac
Reaction Kinetics in Redox Reaction	Investigate the reaction kinects involved in oxidation of iodine with hydrogen peroxide.	Win/Mac
Unknown Acid-Base Titration	This lab examines the titration of unknown acids with a known base.	Win
☐ Spectrophotometer Lab	An examination of the use of Spectrophotometer and the Beer-Bouger Law.	Win

Volumetric Analysis of Chloride	Volumetric analysis is used to determine the percentage of chloride in an unknown.	Win/Mac
Volumetric Analysis of Copper (II) Sulfate	Volumetric analysis is used to determine the percentage mass of copper in a copper(II) salt.	Win/Mac
Water Salt Concentration by Conductivity	Determine salt concentration by measuring conductivity.	Win/Mac
Water Salt Concentration by Titration	Determine the salt content of water by titration.	Win/Mac
Weak Acid Titration	Perform weak acid base titration and plot titration curve.	Win