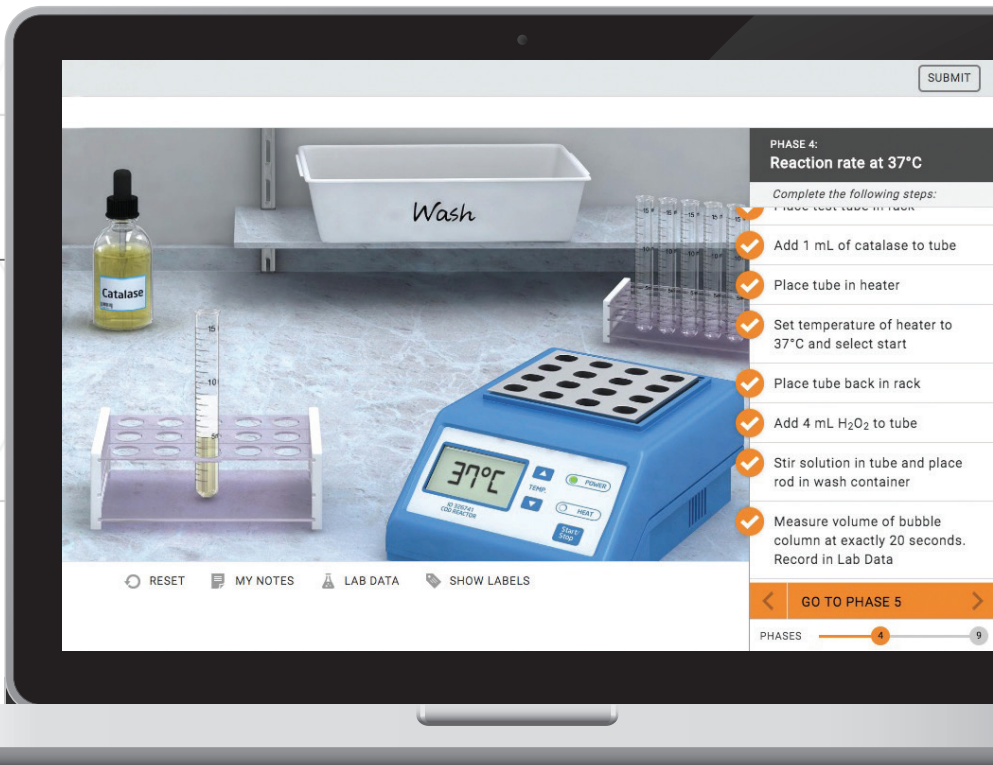


Virtual Labs

A Realistic
Simulated Lab
Experience



Introducing the new Connect® Virtual Labs! Your students will be better prepared for their practical experiments and retain more of the fundamental skills necessary for a successful laboratory experience.

Virtual Labs is a fully online lab solution that can be used as an online lab replacement, to help with preparation, or as a supplement to bridge the gap between the lab and lectures. These simulations guide students to learn the practical and conceptual skills needed, enable them to check for understanding and finally provide feedback. With adaptive pre-lab and post-lab assessments available, instructors can customise each assignment.



**Available 24/7—
even if the lab
space isn't!**



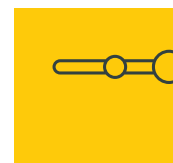
**Built with
accessibility in
mind.**



**Easy-to-follow
on-screen
instructions.**



**Student progress
is automatically
saved.**



**Visible
progress
bar.**

List of Connect[®] Virtual Labs Available for Chemistry

Virtual Labs Recommended* for Chemistry Available Now

Metric Measurement:

- Length
- Weight
- Volume
- Temperature

73 Total Labs
Currently
Available!

Diffusion:

- Effect of Molecular Weight of Diffusion in Air

Chemical Composition of Cells:

- Test for Starch
- Test for Sugars
- Test for Fat
- Test for Proteins

How Enzymes Function:

- Effect of Temperature
- Enzyme Activity
- Effect of pH
- Effect of Concentration

Osmosis:

- Movement of Water Across a Selective Permeable Membrane
- Tonicity in Red Blood Cells

Lab Safety:

- Hand Washing Procedure
- Personal Safety

Virtual Labs for Chemistry Released Throughout 2020

Density**:

- Determine Density of a Plastic Cube (July 2020)

Stoichiometry**:

- Synthesis of Calcium Carbonate (July 2020)

Reactions in Solution**:

- Reactions in Solution (Aug. 2020)

Calorimetry**:

- Calorimeter Constant (Sept. 2020)

Acid/Base: Equilibrium**:

- Identification of a Weak Acid using a Titration Curve (Oct. 2020)

Gas Law**:

- Determination of the Ideal Gas Law Constant (Oct. 2020)

Acid/Base: Stoichiometry**:

- Standardization of Sodium Hydroxide (Nov. 2020)
- Titration of Vinegar (Dec. 2020)

Virtual Labs for Chemistry Coming 2021

Colligative**:

- Freezing Point Depression (Jan. 2021)

Kinetics**:

- Reaction Rates at Different Concentrations (Feb. 2021)

Spectrophotometry**:

- Calibration Curve to Find Concentration (March 2021)

Equilibrium**:

- Determination of Equilibrium Constant (April 2021)

Buffer**:

- Buffer Capacity (May 2021)

Qualitative Analysis**:

- Qualitative Analysis (June 2021)

**Deliverability of anticipated Virtual Labs subject to change



To see the labs in action, click here to watch this 1-minute video. Or visit: bit.ly/ConnectVirtualLabs

See What Students are Saying about Virtual Labs:

What specifically in Virtual Labs enhanced your learning of the content?*



“The pop up questions kept me engaged and made sure I understood what was going on.”

–Student at Northeast Iowa Community College

“I am able to complete at my own pace and not feel rushed or left behind. If needed, I can repeat something to better understand.”

–Student at St. Louis Community College

“You are given immediate feedback where you’re going wrong so you can adjust and reroute.”

–Student at Somerset Community College

*Feedback pulled from a survey of 406 students from various schools across the US using Virtual Labs.

Acid/Base: Equilibrium

Students standardise a sodium hydroxide solution and use the standardised solution to determine the identity of an unknown weak acid using titration data.

- Core Concepts
- Standardisation of NaOH
- Titration and Identification of a Weak Acid

Acid/Base: Stoichiometry

Students standardise sodium hydroxide with KHP and use the standardised solution to titrate a sample of vinegar.

- Core Concepts
- Standardisation of NaOH
- Titration of Vinegar

Buffers

The buffering capacity of solutions will be explored by making buffer and non-buffer solutions and comparing pH values as strong acid or strong base is added to each solution.

- Core Concepts
- Observing a Buffer
- Buffer Capacity

Calorimetry

Two-part experiment: the calorimeter constant is determined and then used to determine the enthalpy of neutralisation.

- Core Concepts
- Calorimetry Constant
- Enthalpy of Acid-Base Neutralisation

Colligative

The freezing point depression of a series of salt solutions is used to determine the van't Hoff factor for the salt.

- Core Concepts
- Freezing Point Depression

Density

Students compare results from the different experimental strategies for determining the density of a solid object.

- Core Concepts
- Object of Known Density
- Object of Unknown Density

Electrochemistry

In this lab, students review oxidation reduction reactions and the electrochemical cell, identifying oxidising and reducing agents as well as the anode and cathode of the zinc, copper cell.

- Core Concepts
- Standard Reduction Potentials
- Electrochemistry: Concentration Dependence

Equilibrium

Calculate the equilibrium constant, K, using spectrophotometer absorption data.

- Core Concepts
- Calibration Curve
- Determination of K_c

Gas Law

The gas constant R is determined experimentally using the ideal gas law and the reaction between magnesium and hydrochloric acid.

- Core Concepts
- Determine the Ideal Gas Law Constant

Kinetics

This lab utilises the method of initial rates to determine the order of an Iodine Clock reaction with respect to hydrogen peroxide concentration.

- Core Concepts
- Reaction Rate at Different Concentrations
- Reaction Rate at Different Temperatures

Lab Skills

Practice basic laboratory skills including: measurements using a graduated cylinder, use of a balance, making solutions, diluting solutions, preparing a buret, and safety.

- Graduated Cylinder
- Mass by Difference
- Make a Solution
- Serial Dilution
- Using a Buret

Qualitative Analysis

Students have a list of six chemical compounds and six numbered solutions to match to the compounds on the list based on combining all possible pairs, observing the results and comparing the results with solubility rules and known properties of the compounds.

- Core Concepts
- Qualitative Analysis

Reactions in Solutions

Students combine 13 different sets of reactants, make observations, and write balanced chemical equations for the reactions they observe.

- Core Concepts
- Reactions in Solution

Spectrophotometry

Three-part experiment applying Beer's law: a calibration curve is constructed to determine the concentration of 3 different dyes; two dye mixtures are analysed; and the identity of an unknown mixture determined.

- Core Concepts
- Calibration Curves
- Mixing Colors
- Unknown

Stoichiometry

This lab explores the synthesis of insoluble salts by combining solutions containing the cation and anion, and quantitatively isolating the product.

- Core Concepts
- Synthesis of Calcium Carbonate
- Determine Identity of Unknown Sodium Compound

McGraw Hill's LearnSmart Labs is a revolutionary, outcome-based lab simulation. It assesses a student's knowledge and adaptively corrects deficiencies, allowing them to learn faster, reach greater understanding, and retain more knowledge with greater success. For more details please contact your education consultant:

mheducation.com.au/support-contact/contact-rep