

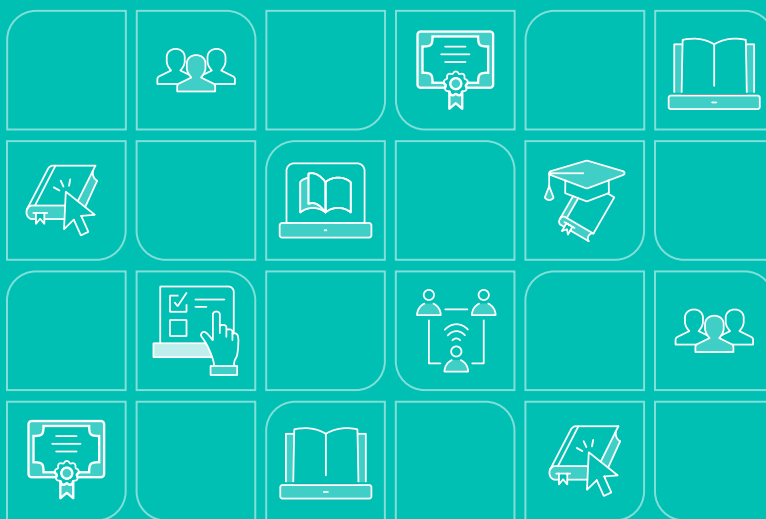


R A M P

U P

CHEMICAL SAFETY

Resources to Support Laboratory Safety
Education and Practice



March 2023



ACS
Chemistry for Life®

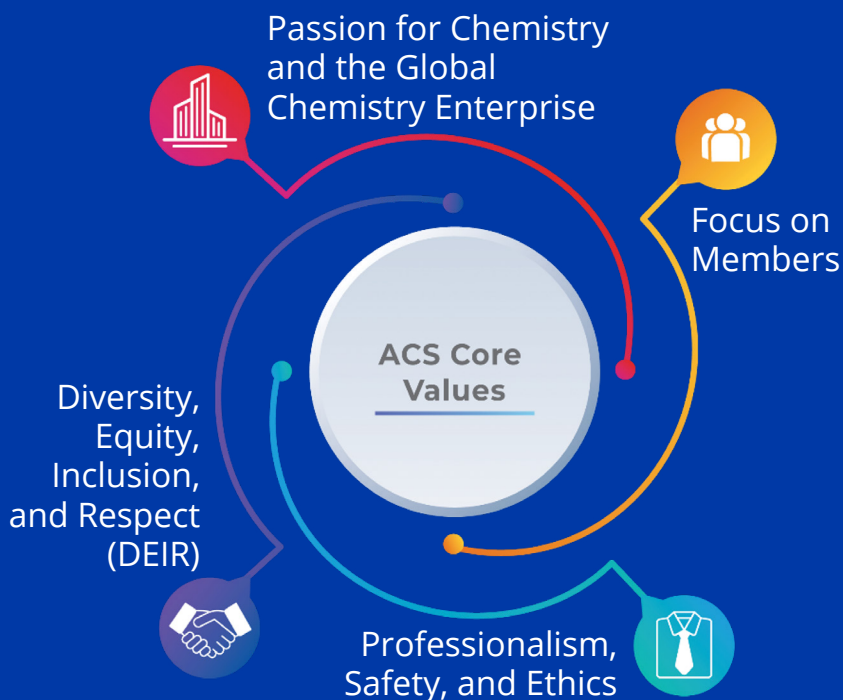


ACS Institute
Learn. Develop. Excel.



ACS CENTER FOR
Lab Safety

American Chemical Society



ACS supports and promotes the safe, ethical, responsible, and sustainable practice of chemistry coupled with professional behavior and technical competence. ACS recognizes a responsibility to safeguard the health of the planet through chemical stewardship.

All chemistry learners and practitioners should be engaged in critically considering and researching hazards and then implementing the most effective safety controls to minimize risks from these hazards.

ACS safety education resources support risk-based education and help educators to integrate it to chemistry curricula.



For All Interested in Getting Involved with Safety Communities

Division of Chemical Health and Safety (CHAS)



The Division of Chemical Health and Safety (CHAS) is a vibrant community of chemical professionals who promote chemical health and safety in public and across the chemical enterprise. Safety experts, researchers, educators, and learners regularly contribute to CHAS activities. CHAS members can participate in an email discussion group; contribute to, organize, and learn from programming at national, regional, and local meetings; help lead and operate the division; and participate in technical projects such as ACS Innovative Project Grants. For more information about joining CHAS, visit <https://dchas.org/>

Safety Committee of the Division of Chemical Education

The Safety Committee provides resources and strategies to chemistry and science educators in order to prepare chemists and others to function safely when using chemicals. The committee regularly arranges and sponsors symposia at national ACS meetings and the Biennial Conference on Chemical Education (BCCE). These are often co-sponsored with the Committee on Chemical Safety (CCS) and the CHAS. Committee members also routinely collaborate with CCS on major projects related to chemical safety issues in chemical education. For more information and how to join, visit <https://www.divched.org/about-divched/committees-boards/safety-committee>

Committee on Chemical Safety (CCS)

The Committee on Chemical Safety (CCS) encourages safe practices in chemical activities; serves as a resource to chemical professionals in providing advice and counsel on the handling of chemicals; seeks to ensure safe facilities, designs, and operations by calling attention to potential hazards and stimulating education in safe chemical practices; and provides advice to other units of ACS on matters related to chemical safety and health. ACS members interested in being appointed to serve on an ACS committee should submit their committee assignment preferences to the online committee preference form. For more information, visit <https://www.acs.org/content/acs/en/about/governance/committees/committees/information/preferences.html>.

For more information about CCS, visit www.acs.org/ccs





For Chemists in Charge of Safety

Laboratory Safety

Explore the fundamental topics needed to maintain safety and regulatory compliance in chemical laboratories. Learn about practical, current regulatory measures for the prevention of accidents, incidents, or chemical exposures that could result in adverse effects on health, injuries, fire, or property loss, or interfere with laboratory operations. This course includes the Occupational Safety and Health Administration (OSHA) training requirements for Chemical Hygiene Officers. It is geared to laboratory employees in need of fundamental laboratory health and safety training, both in academia and in industry.

<https://institute.acs.org/courses/laboratory-safety.html>

ACS Institute > Courses > Laboratory Safety

In-Person


Laboratory Safety

Explore the fundamental topics necessary to maintain safety and regulatory compliance in chemical laboratories.

Pricing: Starting USD 1695
Duration: >1 day

[Registration Info](#)

About the Instructor(s)



Christopher E Kohler
Laboratory Safety Manager, Indiana University

Chris Kohler is the Laboratory Safety Manager for Indiana University. He has been a Certified Chemical Hygiene Officer since 2001.

About the Course

Learn about practical, current regulatory measures for the prevention of accidents, incidents, or chemical exposures that could result in adverse effects on health, injuries, fire, property loss or interference with laboratory operations. It includes the OSHA training requirements for Chemical Hygiene Officers.

Laboratory Safety and Health

Learn best practices to minimize personal injury, health impairment, property loss, regulatory fines, and liability in the laboratory. This course provides an overview of practical, current regulatory measures for the prevention of accidents, incidents, or exposures that may cause health impairment, injury, or fire, or interfere with laboratory operations. It is applicable for laboratory and pilot plant employees responsible for safety and health issues.

<https://institute.acs.org/courses/laboratory-safety-health.html>

ACS Institute > Courses > Laboratory Safety and Health

In-Person


Laboratory Safety and Health

Learn best practices to minimize personal injury, health impairment, property loss, regulatory fines, and liability in your laboratory.

Pricing: Starting USD 1495
Duration: >1 day

Coming Soon

About the Instructor(s)



Roger R. Conrad
Retired – Senior Principal Safety Specialist, Retired – Air Products & Chemicals, Inc

Roger Conrad, CSP, CCHO, served as Senior Principal Safety Specialist for 37 years with Air Products & Chemicals. In that capacity, he provided laboratory safety training and conducted safety audits internationally.

About the Course

Learn best practices to minimize personal injury, health impairment, property loss, regulatory fines, and liability in your laboratory. You'll receive an overview of the practical and latest regulatory measures for the prevention of accidents, incidents, or exposures that may cause health impairment, injury, fire, or interfere with your laboratory operations.

Professional Development Opportunities Offered by CHAS

Grow professionally with a number of professional development opportunities offered by experts from the Division on Chemical Health and Safety (CHAS). These include workshops on managing chemical waste, investigating chemistry-related accidents, safety leadership, or hazards related to reactivity. The workshops are offered in person during the ACS meetings or virtually during the year. CHAS can also help to arrange presentations of these workshops in other venues. If you are interested in arranging any of these trainings for your company or local section meetings, contact CHAS at membership@dchas.org



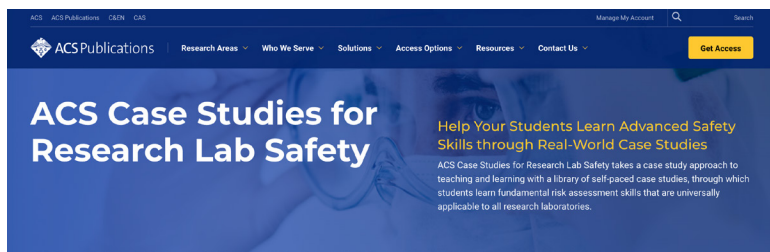
For Graduate Programs and Researchers

ACS Case Studies for Research Lab Safety

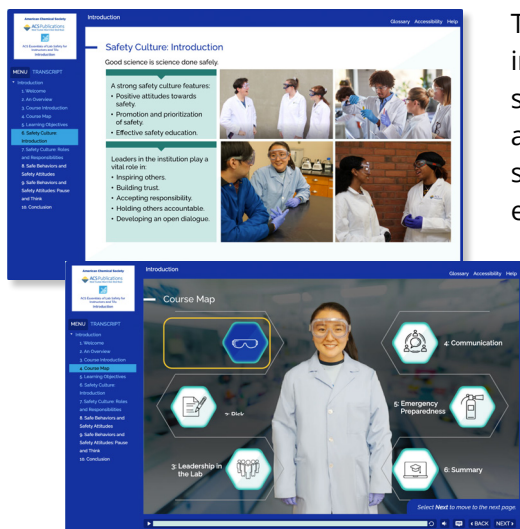
The screenshots display the course interface with various interactive elements like multiple-choice questions, feedback messages, and scenario illustrations.

This online course uses case studies of real-world laboratory incidents to teach advanced risk assessment skills, using the RAMP framework, that are universally applicable to all lab research environments. Each case study leads learners through the exploration of an incident with questions that prompt them to reflect on how and why incidents happen. This process helps learners reason through decisions at various levels and identify ways to assess risks and minimize hazards, even when performing common tasks in the lab. Vivid illustrations and simulated conversations make each scenario relatable and increase learners' awareness and readiness. These case studies can also help stimulate important conversations around risk assessment and research safety with others in the lab. Purchase the course for self-study at <https://institute.acs.org/courses/acs-case-studies-for-research-lab-safety.html>

Request a demo and more information about institutional adoption at <https://solutions.acs.org/solutions/institute/acs-case-studies-research-lab-safety/>

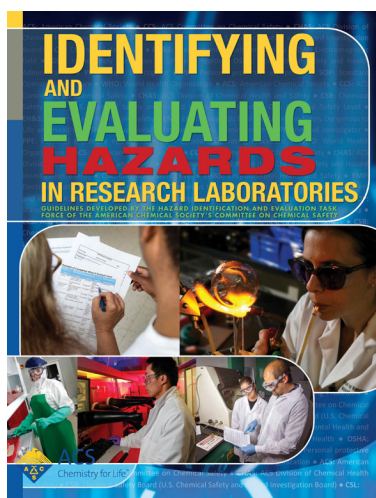


ACS Essentials of Lab Safety for Instructors and TAs



This is a 90-minute online course that helps TAs and new instructors to be confident and effective leaders in lab safety by reviewing best practices, communication skills, and role-modeling behaviors in the laboratory to support a safe learning environment. It prepares learners to respond effectively to lab incidents and offers a checklist to assess learners' readiness and empower TAs and instructors to identify important safety equipment and institutional policies. More information about this course can be found at <https://solutions.acs.org/get-access/>. To request a demo, email ACSPubsSales@acs.org.

Identifying and Evaluating Hazards in Research Laboratories



Learn about methods and tools for recognizing hazards and managing risks in research laboratories. This guide also provides [tools](#) (e.g., templates and examples) that can be shared with your team and used immediately. This guide is applicable for researchers of all levels: undergraduate students, graduate students, postdoctoral scholars, instructors, principal investigators (PIs), and technicians.

Full guide: [Identifying and Evaluating Hazards in Research Laboratories](#)

Web version of the guide: <https://institute.acs.org/lab-safety/hazard-assessment/fundamentals.html>

The Communicating Safety Information chapter in the [*ACS Guide to Scholarly Communication*](#)

Read this chapter, written by Samuella Sigmann and Leah McEwen, to ensure that your scholarly publications include appropriate safety information.

https://pubsapp.acs.org/paragonplus/submission/ACS_Guide_to_Scholarly_Communication_1.3_Communicating_Safety_Information.pdf

CHAS Workshop on Empowering Academic Researchers to Strengthen Safety Culture (Workshops by Graduate Students for Graduate Students)

This 3.5-hour virtual workshop is primarily directed at frontline researchers in academic institutions: graduate students, postdoctoral scholars, and undergraduate students. Led by a team consisting of graduate students, the discussions focus on the challenges of students making the transition to being independent researchers in academia. Topics include risk assessment of research projects, understanding the often-confusing safety hierarchies of academic institutions, and graduate student-led Laboratory Safety Teams. Faculty members and safety staff are also encouraged to attend, to expand their understanding of these challenges and seek ways to become better champions for these frontline researchers. Learn more and register for an upcoming workshop at <https://dchas.org/2022/05/11/workshops2022/>.

ACS Chemical Health & Safety



A journal from ACS Publications, *ACS Chemical Health & Safety* is a global platform for ensuring that all members of the chemical enterprise receive access to new research, safety information, regulatory updates, effective chemical hygiene practices, and hazard assessment tools. The journal publishes high-quality articles of interest to research scientists, Environmental Health and Safety (EH&S) professionals, and non-research personnel who manage or conduct work in areas where chemicals are used or hazardous waste is generated.

The journal's scope spans topics such as:

- Chemical safety information
- Human and organizational factors related to the management of chemical risk
- Laboratory/industrial incidents and lessons learned
- Laboratory and chemical storage layout, maintenance, and modification
- Industrial and safety engineering approaches that lead to inherently safety research practices

For more information, visit <https://pubs.acs.org/journal/achsc5>

The Pistoia Alliance Chemical Safety Library (CSL)

Pistoia Alliance



Contribute to increasing safety in the lab by sharing information about hazardous reactions encountered in the course of your research. Your submission will then be posted anonymously to alert scientists to potential dangerous experiments. This open access platform has been developed and is hosted by CAS to streamline access to hazardous reaction information crowd-sourced from academic, industry, and government institutions around the world.

<https://www.cas.org/resources/chemical-safety-library>

CAS
A Division of the American Chemical Society

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CONTACT TRAINING LANGUAGE SEARCH

LOGIN

PISTOIA ALLIANCE CHEMICAL SAFETY LIBRARY

The use of dangerous chemicals in the laboratory puts researchers at increased risk of injury - even death. To protect from these risks, it is critical that hazardous reaction incident information is shared widely, across the global research community.

The Pistoia Alliance Chemical Safety Library (CSL) is a new open-access platform that streamlines access to hazardous reaction information crowd-sourced from academic, industry and government institutions around the world. Developed and hosted by CAS, the CSL supports laboratory safety by providing tools to:



For Undergraduate Programs

FOR STUDENTS

ACS College Lab Safety Video Series

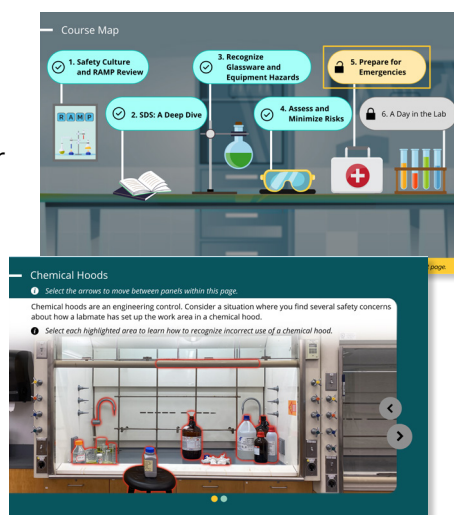
Use these six free videos to introduce RAMP-based laboratory safety to help your students to move from merely obeying safety rules to thinking critically about recognizing hazards and minimizing the risks of these hazards. Access these videos at www.acs.org/safetyvideos or on the ACS Chemical Safety YouTube channel at <https://www.youtube.com/playlist?list=PLLG7h7fPoH8lZ6i2rfDK0zVoompXayRL>



ACS Essentials of Lab Safety for General Chemistry

ACS ESSENTIALS OF LAB SAFETY FOR GENERAL CHEMISTRY

Use this 90-minute online course that provides students with the vital concepts of chemical safety and prepares them for their first experiment in the general chemistry lab. The six interactive learning modules introduce the RAMP framework. Critical instruction is brought to life through narrated presentations with real-life photos and videos, and the course is completed with a capstone exercise to assess understanding of foundational lab safety protocols. This course is intended for use in the introductory general chemistry laboratory sequence but may also support other science and engineering labs. This easily adoptable course seamlessly integrates with most learning management systems, allowing instructors to teach and assess with ease. It also complies with the ADA accessibility standards and is easy to use on all devices, making its content available for all students anytime, anywhere, with a consistent user experience. Request a demo and more information at <https://solutions.acs.org/solutions/institute/acs-essentials-of-lab-safety-for-general-chemistry/>.



ACS Essentials of Lab Safety for Organic Chemistry

Use this 90-minute online course that exposes students to a deeper level of understanding of general concepts in chemical safety before they perform experiments in the organic chemistry lab. Using the RAMP framework and an inquiry-based teaching methodology, the course builds on what students will have learned from their introductory and general chemistry courses to prepare them for the increased hazards in the organic chemistry lab. This course is intended for use in organic chemistry lab courses. This easily adoptable course seamlessly integrates with most learning management systems, allowing instructors to teach and assess with ease. It also complies with the ADA accessibility standards and is easy to use on all devices, making its content available for all students anytime, anywhere, with a consistent user experience. More information about this course can be found at <https://solutions.acs.org/solutions/institute/safety-organic-chemistry/>. Request a demo and more information at <https://solutions.acs.org/get-access/>.

CHAS Workshop on Empowering Academic Researchers to Strengthen Safety Culture (Workshops by Graduate Students)

This 3.5-hour virtual workshop is primarily directed at frontline researchers in academic institutions: graduate students, postdoctoral scholars, and undergraduate students. Led by a team consisting of graduate students, the discussions focus on the challenges of students making the transition to being independent researchers in academia. Topics include risk assessment of research projects, understanding the often-confusing safety hierarchies of academic institutions, and graduate student-led Laboratory Safety Teams. Faculty members and safety staff are also encouraged to attend, to expand their understanding of these challenges and seek ways to become better champions for these frontline researchers. Learn more and register for an upcoming workshop at <https://dchas.org/2022/05/11/workshops2022/>.

Foundations of Chemical Safety and Risk Management

ACS Institute > Courses > Foundations of Chemical Safety and Risk Management

On-Demand

Foundations of Chemical Safety and Risk Management

This online, self-paced course offers education on chemical safety concepts.

Pricing: FREE
Duration: >1 day

Registration Info

About the Course

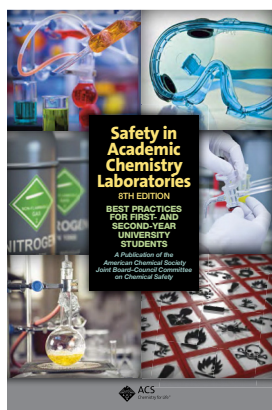
The purpose of this course is to offer education on chemical safety concepts for undergraduate students. The course is organized around the R.A.M.P. chemical safety concept - Recognize hazards, Assess the risks from the hazards, Minimize and manage the risks, and Prepare for the unexpected and emergencies.

The intended outcomes of this course are to encourage students to adopt a risk-based lab safety culture and to improve chemical safety awareness.

Integrate this more advanced, 17-unit online course for your undergraduate students who have taken at least two semesters of general chemistry with the lab and one semester of organic chemistry with the lab. Advanced enrichments are provided as extensions for more mature learners, including doctoral and postdoctoral scholars and all interested in working

in chemistry labs. The course could serve as a great introduction to both regulations and lab safety for incoming international students or as a safety overview for new graduate students. The intended outcomes of this course are to introduce methods of managing hazards and risks in the chemistry lab and adopt a risk-based lab safety culture. The course includes instructor materials to support integration of the course into chemistry curricula. For more information and to register, visit <https://institute.acs.org/courses/foundations-chemical-safety.html>.

Safety in Academic Chemistry Laboratories Booklet



Use this content to provide students with an overview of the key issues related to the safe use of chemicals in the first two years of an undergraduate program in chemistry. This booklet can be downloaded as a PDF at free of charge or purchased for \$10 as a hard copy. This publication is also available in Spanish and Arabic.

[safety-in-academic-chemistry-laboratories-students.pdf \(acs.org\)](https://institute.acs.org/publications/safety-in-academic-chemistry-laboratories-students.pdf)

[sacl8-arabic.pdf \(acs.org\)](https://institute.acs.org/publications/sacl8-arabic.pdf)

[seguridad en laboratorios academicos de quimica \(acs.org\)](https://institute.acs.org/publications/seguridad-en-laboratorios-academicos-de-quimica.pdf)

Chemical Health and Safety Exam

CHEM ED EXAMS ACS Exams ACS Division of Chemical Education Examinations Institute

In cooperation with: UWMILWAUKEE

About Us Instructors Students News

General Message/Update

New Practice Exam with Feedback

We have been listening to your requests for a practice exam that provides instant feedback and results for each question. IT'S HERE – and you can purchase it NOW for \$15.00 or through a bundle.

Tutorial practice exams are available for:

- General Chemistry, First Term
- Organic Chemistry, Full Year

Assess skills related to laboratory safety. This exam has been specifically designed for students completing their second year of the organic chemistry laboratory series. (The exam assesses chemical health & safety skills in general rather than acting as a certification exam for lab work.) For more information, contact the ACS Exams Institute at <https://uwm.edu/acs-exams/>

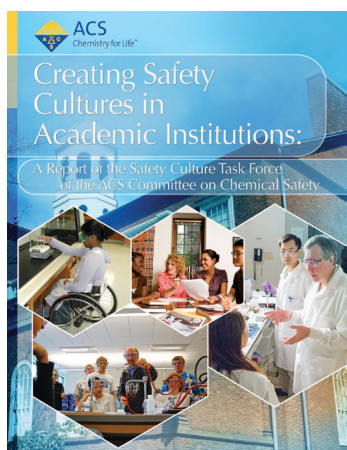
Guidelines for Chemical Laboratory Safety in Academic Institutions



Use these guidelines to develop, enhance, and integrate safety education into chemistry curricula.

[acs-safety-guidelines-academic.pdf](https://www.acs.org/content/dam/acsorg/education/undergraduate/undergraduate_guidelines_for_chemical_laboratory_safety_in_academic_institutions.pdf)

Creating Safety Cultures in Academic Institutions



Use the suggestions and recommendations in this guide to strengthen the culture of safety in your department.

<https://www.acs.org/content/dam/acsorg/about/governance/committees/chemicalsafety/academic-safety-culture-report.pdf>



For Those Involved in Demonstration and Outreach

Safety in Outreach Settings

Learn how to minimize risks when engaging the public with chemistry with this practical guide, which helps you to identify and select low-risk activities, recognize and eliminate high-risk activities and demos before they lead to accidents. This guide will also help you to make strategic changes to activities and demos to minimize the likelihood of injury and promote a culture of safety. Visit this guide at <https://www.acs.org/content/acs/en/education/outreach/safety.html>

Safety Guidelines for Chemical Demonstrations

Use this two-page overview of steps before, during, and after a demonstration using chemicals, with special comments about outreach. Prepared by the Safety Committee of the Division of Chemical Education.

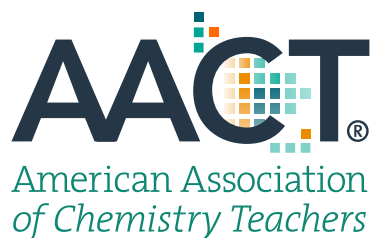
[divched_2018_safetyflyer2pager_proof1.pdf \(acs.org\)](#)





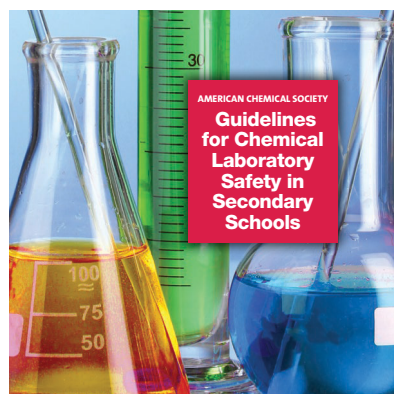
For High School Teachers

American Association of Chemistry Teachers



Contribute your voice to a growing network of chemistry educators by becoming a member of the American Association of Chemistry Teachers (AACT). Participate in leadership, share resources, and learn from other professionals. AACT provides teachers of chemistry with high quality classroom resources that integrate lab safety best practices. To learn more, visit [teachchemistry.org](https://www.teachchemistry.org)

Guidelines for Chemical Laboratory Safety in Secondary Schools



Increase your understanding of best practices to ensure your own and your students' safety in the chemistry laboratory. This publication can be downloaded as a PDF free of charge or purchased as a hard copy. [acs-secondary-safety-guidelines.pdf](https://www.acs-secondary-safety-guidelines.pdf)

ACS Lab Safety Video Series

Use these six free videos to introduce RAMP-based laboratory safety to help your students to move from merely obeying safety rules to thinking critically about recognizing hazards and minimizing the risks of these hazards. Access these videos at www.acs.org/safetyvideos

Student Laboratory Code of Conduct and Safety Acknowledgment Form

Use this template to design your own safety protocols for student behavior in the chemistry laboratories and other locations where chemicals are in use.

[Student Laboratory Code of Conduct](#)

Safety Rubric for Assessing Chemical Demonstration Videos

Use this rubric to evaluate the safety and pedagogy of chemical demonstration videos to determine whether they should be used in the classroom.

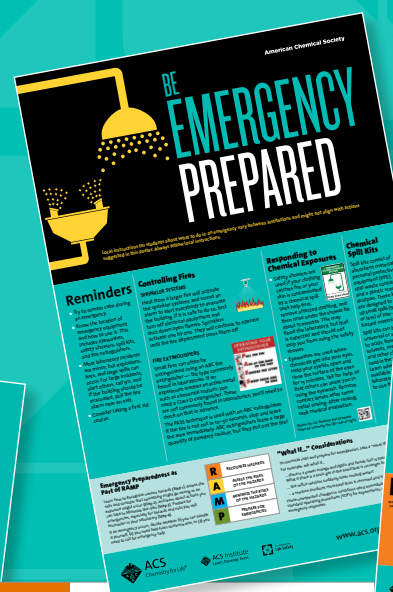
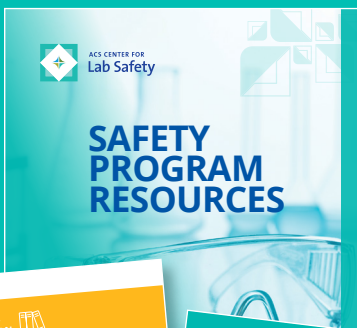
www.acs.org/content/dam/pldp/center/lab-safety/publications/acs-2019-safety-rubric-assessing-chemical-demonstration-videos.pdf

Foundations for Storing, Organizing and Disposing of Chemicals in Educational Settings

From purchasing to disposal, chemicals must be safely and responsibly managed in educational storerooms and laboratories. This free online, self-paced course follows a high school teacher as she RAMPs up safety in her classroom. Learn with the teacher and discover where to find authoritative information about chemical hazards, what regulations apply to academic laboratories, why inventory control is needed, how to organize chemical storage areas based on chemical hazards, and who is responsible for each aspect of hazardous waste management.

A resource library provides “talking points” to help teachers when requesting resources, printable flow charts that can help with decision making about storage and determination of hazardous waste, and useful links that point to where more information or assistance can be found. The course should take about 10 hours to complete. A certificate of completion and documentation that can be used to obtain continuing education credits are provided. The course is free of charge. For more information about the course and to register please see the course website at institute.acs.org/foundations-for-storing-organizing-and-disposing.html. For more information about this course, please contact safety@acs.org





R	RECOGNIZE HAZARDS
A	ASSESS THE RISKS OF THE HAZARDS
M	MINIMIZE THE RISKS OF THE HAZARDS
P	PREPARE FOR EMERGENCIES

ACS has a wealth of resources to support laboratory safety education and practice.

For complete information or questions about programs and resources in the ACS Center for Lab Safety, see institute.acs.org/lab-safety.html or contact safety@acs.org



ACS CENTER FOR
Lab Safety

www.acs.org/rampupsafety

American Chemical Society