

RAMP\* is an acronym to help educators and students keep science safety in the forefront of their work in a laboratory environment.

Robert H. Hill and David C. Finster coined the term in their textbook *Laboratory Safety for Chemistry Students*, which provides safety education information and guidelines for the undergraduate chemistry major.

Detailed information on best practices for safety in high school chemistry laboratories is available in *Guidelines for Chemical Laboratory Safety in Secondary Schools*. Information for undergraduate teaching labs is found in *Guidelines for Chemical Laboratory Safety in Academic Institutions*.

Both of these documents can be downloaded from [www.acs.org/safety](http://www.acs.org/safety)

\* RH Hill, DC Finster, *Laboratory Safety for Chemistry Students*, 2nd edition, John Wiley & Sons, Hoboken, NJ, 2016



**RAMP**  
concept for  
scientific  
safety

# R

## RECOGNIZE Hazards

*Hazard — any source of potential damage or harm to a person's health.*

- Use labels on bottles and containers to identify the most important hazards of the contents. Use Safety Data Sheets (SDSs) to identify Globally Harmonized System (GHS) hazards of the chemicals you will be using. These include physical, health, and environmental hazards. The main hazard categories are flammables, explosives, corrosives, oxidizers, irritants, and toxicants.
- Understand the nature of the hazard (its chemistry and/or toxicological/biological effects).
- Identify the most important physical hazards from equipment, conditions, and procedures. These include electrical and mechanical hazards and high or low temperature or pressure.

# A

## ASSESS Risks from Hazards

*Risk — the probability of harm or damage from a hazard.*

- Assess the risks presented by the most important hazards.
- Use SDSs and the GHS Hazard Categories and Statements to determine the relative risk of the hazards.
- Check to be sure all glassware and equipment are in good shape and working condition.

# M

## MINIMIZE Risks of the Hazards

- Identify methods and safe practices to minimize the risks from exposures to chemicals and from physical hazards.
- Understand the nature and limitations of personal protective equipment, chemical hoods, and other safety equipment.
- Locate online and printed materials to identify safe practices, and consult with more experienced chemists.
- Wear personal protective equipment such as splash goggles, lab coats or aprons, and appropriate gloves. The dress code in a lab should be such that there should be no exposed skin below chest level.
- Use appropriate waste containers when discarding chemicals.

# P

## PREPARE for Emergencies

- Know and practice the procedures for handling common emergencies such as spills, cuts, burns, exposures, and fires.
- Discuss emergency procedures with students, both in a general way and with regard to each experiment.
- Ensure that all safety equipment, such as eyewash, fire extinguisher, first aid kit, and safety shower, is present and in working order.