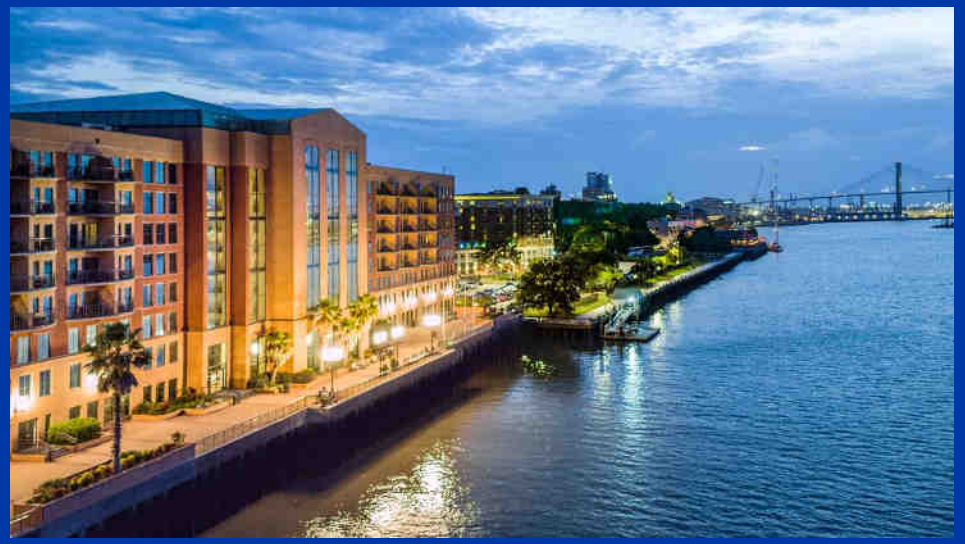
From Rules to RAMP: Embracing Safety Culture's Expanding Frontier as a Recent Graduate



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SERMACS

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ACS Chemistry for Life®

Self Introduction

- University of Virginia '19
  - B.S. in Chemistry with ACS certification

- American Chemical Society (ACS) Intern
  - Scientific Advancement Division

My Perceptions of Lab Safety: **THEN**

General Chemistry and Organic Chemistry

- Safety synonymous with protection – for everyone in the lab
  - My responsibility to respect and adhere to protocol
  - Felt safer knowing that peers were doing the same

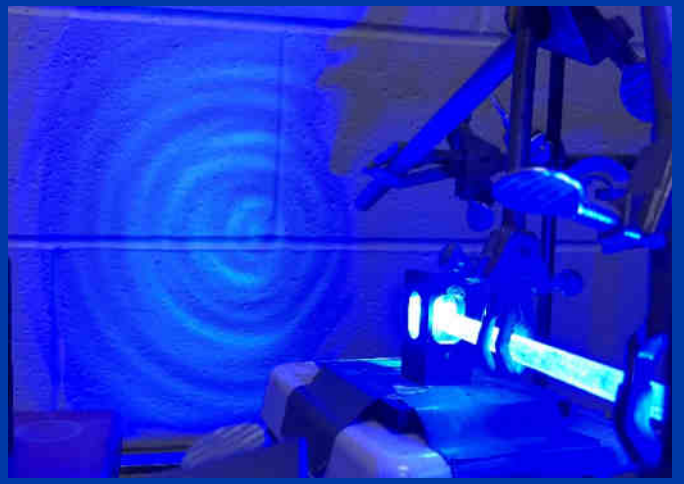
- Safety dictated by rules designed in a top-down fashion
  - Procedures and SDSs provided for chemicals pertinent to experiment
  - Rules to be followed by student, enforced by TA

- Safety nearly guaranteed once hazards are identified
  - Know which PPE and engineering controls apply
  - Consideration of risk was coincidental rather than deliberate

My Perceptions of Lab Safety: **THEN**

Undergraduate Research

- Relationship to safety became more interactive due to experimental design
  - Mentor ≠ enforcer
  - Safety as a variable I had the power to influence



- Safety dependent on more than mere identification of hazards
  - Necessary to gauge the probability of harm from a hazard → Risk assessment puzzle starting to take shape

Hazard – Potential to cause harm

Risk – The combination of the likelihood of an event, its severity, and the frequency of exposure

A Call to Action: Recent Incidents in Academic Chemistry

- In 2008, a research assistant at the University of California, Los Angeles (UCLA) died from injuries sustained while working with *t*-butyl lithium.

- In 2010, a Texas Tech University (TTU) chemistry graduate student was severely injured after an energetic compound detonated.

- An ongoing series of fires during classroom demonstrations have burned students and led to multi-million dollar judgements against teachers and school districts.

Safety as a Core Value

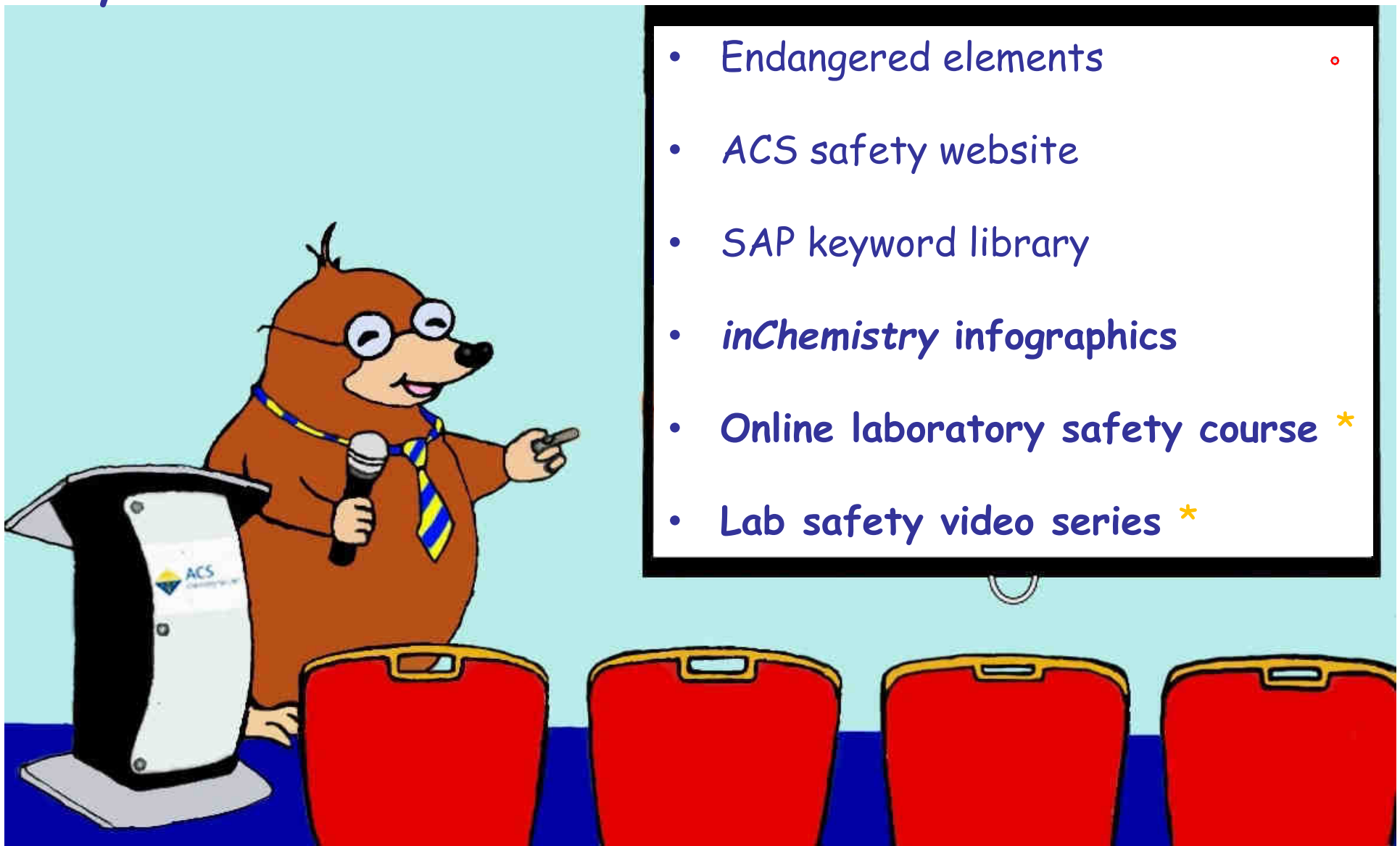
Professionalism, Safety, and Ethics

"We support and promote the safe, ethical, responsible, and sustainable practice of chemistry coupled with professional behavior and technical competence. We recognize a responsibility to safeguard the health of the planet through chemical stewardship."

Office of Safety Programs Mission

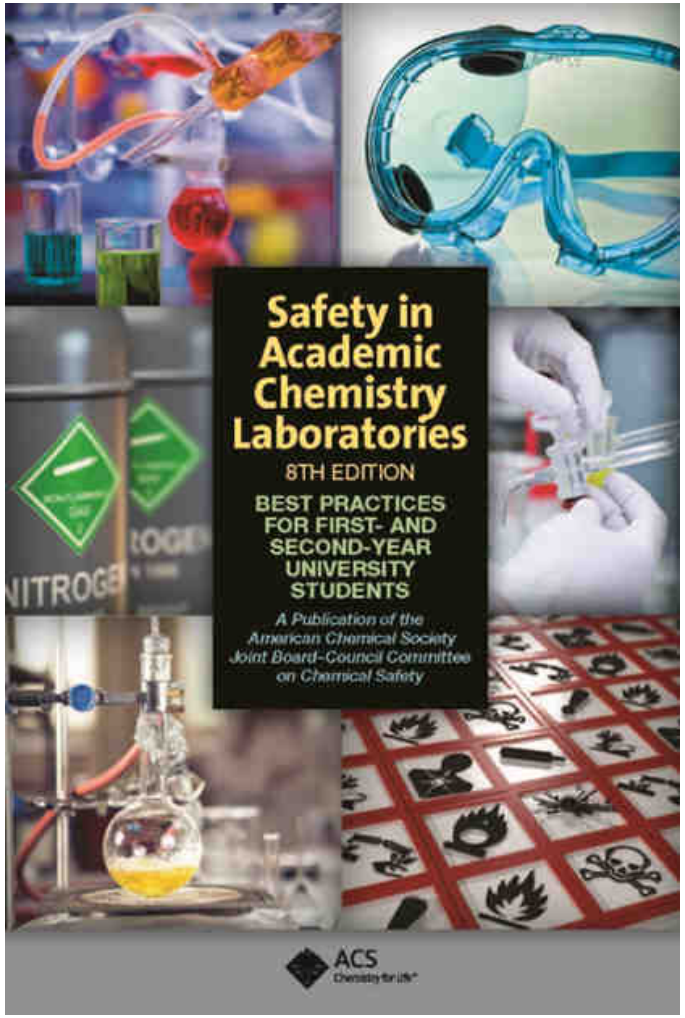
"To build communities and create products and solutions that engage, empower, and equip chemistry educators and practitioners with the skills and attitudes needed to practice chemistry safely."

My Contributions



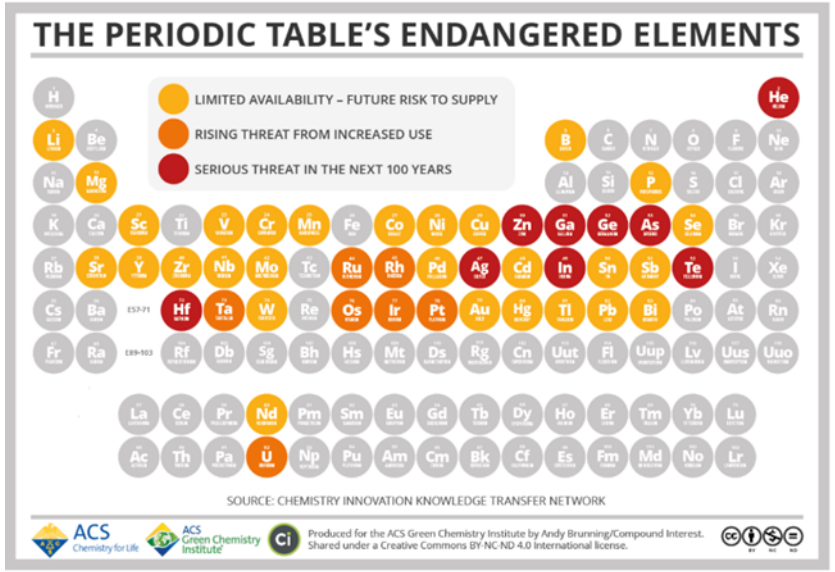
- Endangered elements
- ACS safety website
- SAP keyword library
- ***inChemistry* infographics**
- **Online laboratory safety course** *
- **Lab safety video series** *

"Say hello to my little friend…"

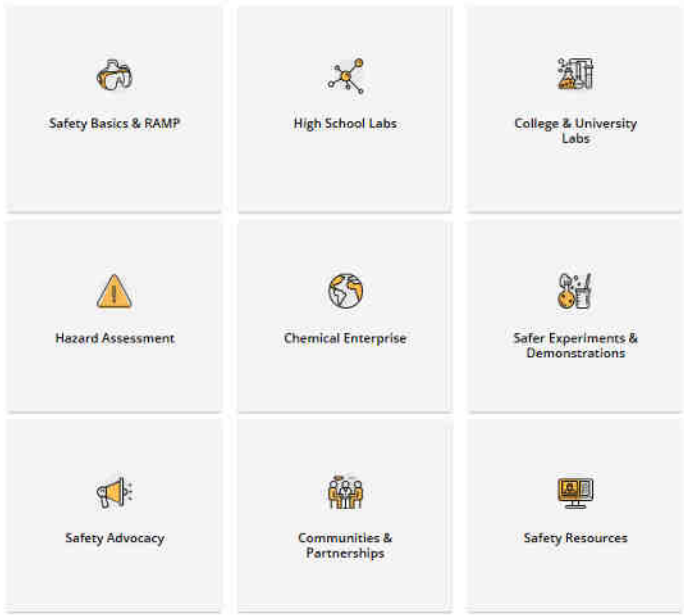


A Heterogeneous Mixture (of Projects)

- Endangered elements
  - Green Chemistry Institute



- ACS safety website



www.acs.org/safety

- Keyword library
  - Safety Advisory Panel

Topics: Hazards: chemical, biological, health 35 choices

1. Acids
2. Acute toxicity
3. Allergens
4. Asphyxiants
5. Bases / alkaline
6. Biological safety / biosafety
7. Carcinogen
8. Consumer chemicals / household products
9. Controlled substances
10. Corrosive
11. Dosimetry
12. Drugs / pharmaceuticals
13. Endocrine disruptors
14. Environmental hazard
15. Explosive
16. Flammable
17. GHS categories
18. Harmful
19. Hazardous catalysts
20. Health hazard
21. Hydrogenations
22. Ionizing radiation
23. Irritants
24. Laser safety
25. Nanomaterials
26. Neurotoxins
27. Non-ionizing radiation
28. Oxidizing
29. Peroxide formers
30. Pyrophoric
31. Radiation safety
32. Reactive
33. Reproductive hazards / teratogenic
34. Research animals
35. Water-sensitive

inChemistry Infographics

- Risk assessment as it applies to:
  - RAMP
  - Mindfulness
  - PPE
  - GHS
  - Emergency Equipment
  - Heating Equipment
  - Chemical Storage
  - Waste Disposal
  - Sharps Safety
  - Fume Hoods
  - Flammability and Flash Point
  - Compressed Gases
  - Pyrophoric Materials
  - Water-Reactive Materials

Online Laboratory Safety Course

- Intended audience:

  Undergraduate students who have completed 2 semesters of general chemistry with lab **and** 1 semester of organic chemistry with lab

- Intended outcome:

  Nurture risk-based safety cultures and improve chemical safety awareness

Safety Video Project: Background

- 6 safety videos at high school level
  - Safety Mindset
  - Safety Data Sheet (SDS)
  - How to Dress for the Lab and PPE
  - Preparing for Emergencies
  - RAMP (for Students)
  - RAMP (for Teachers)
- 2 short animated videos for research audience
  - *Working Alone in the Lab?*
  - *Conducting Lab Risk Assessments*

Laboratory Safety Video Series

- Status: Planning stages
- Intended audience:

  Undergraduate students who are enrolled in general chemistry lab
- Intended outcome:

  Nurture risk-based safety cultures and improve chemical safety awareness

My Perceptions of Lab Safety: **NOW**

ACS Internship

- Safety is an inviting effort
  - Dependent upon shared values, not just actions
  - How safety is prioritized impacts quality of a safety culture
- Safety calls for critical thinking
  - Prepares individuals to adapt to unfamiliar situations in the lab
- Safety cultures normalize risk assessments
  - Rules are justified through an ongoing analysis of relevant risks

Contact us with questions or comments:

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