

ACS' ROLE IN SAFETY

Division of Chemical Health & Safety (CHAS)

Do we, across ACS, share this deeply held belief in the importance of safety, and do we act consistently in that belief?

In response to your general question, the approach to safety is inconsistent across segments of the ACS.

- a) Results from a recent but limited [survey](#) would indicate many ACS members believe safety is important and deserves more attention from their Society. ACS has a joint Board/Council committee, the Committee on Chemical Safety (CCS), and a duly constituted Division (permanent 1979) - Chemical Health and Safety (CHAS). A number of our Division members are very active on the Committee as well as our Division Executive Committee and we can speak from long experience in the Society. What we find is the Society is compartmentalized and inefficient in promoting safety across the chemistry enterprise.
- b) The ACS (through the efforts of CCS and CHAS) is indeed recognized as the definitive resource in the area of chemical safety. Unfortunately, the lack of consistent ACS leadership or guidance as well as the lack of prominently placed and advertised resources on safety limits the impact CCS and CHAS has in providing professional help to our fellow Society members.
- c) Chemical and Engineering News' Safety Zone blog as well as our CHAS listserv (a resource for ~2,200 CHAS and affiliated ACS members) have been extremely valuable to those in the chemistry enterprise worldwide who have an interest in enhancing chemical and laboratory safety and sharing their experiences, concerns, and questions with like-minded professionals.

What more should ACS be doing to promote safety?

Safe and responsible behavior is fundamental to all professional scientific activities (not just chemistry-related work) and as such must be one of the Society's Core Values. ACS must explicitly state what is obvious to most of the Society's members - that safety, ethics, and diversity are foundational elements of our professional activities and as such, should have a prominence that is currently lacking. Specifically:

- The Society should advocate for inclusion of safety in educational curricula and dissertations.
- Safety as an element of any ACS Award should be fully implemented. Indeed, for the creation of an ACS National Award for Safety, related to leadership and creativity in the area of chemical safety, is recommended.
- The Society Board of Directors should have a Board-level assignment for safety.

- ACS should urge academic institutions to recognize activities, which improve chemical safety in theory and in practice, as valid areas of scholarship towards promotion and tenure.

In response to your specific questions, CHAS offers the following comments.

1. Should ACS Publications and CAS increase safety content and considerations in our publications and online information?

We recommend that ACS journal editors and division technical programming chairs require authors to address safety in publications and presentations as applicable. Authors and presenters should be encouraged to share safety-related aspects of their work - either in setup or in terms of experience in conducting their research. Where highly toxic, reactive or energetic materials, and dangerous processes are concerned it should be explicitly noted how these materials were handled and what unique equipment or procedures were involved in the work. Instances of near misses should be included in manuscripts to disseminate information.

The recently published work of Grabowski and Goode¹ demonstrates the lack of safety information in chemical science publications. The recommendations of Grabowski and Goode should be adopted by ACS publications and modified to be applicable for media other than journals. These recommendations are summarized below, with brief explanations as appropriate.

- All compounds, procedures, or processes which require a Standard Operating Procedure should be noted by the manuscript author. This connects safety information directly to the OSHA Laboratory Standard (29 CFR 1910.1450).
- “Instructions to Authors” for every journal should have a separate section that outlines the journal’s safety notification requirements. A reasonable expectation is authors identify hazards that might not be recognized by a first-year graduate student who has been asked to replicate the published procedure. Substances or processes that have potential high risks should be flagged.
- All Materials and Methods sections should have a mandatory safety subsection. Peer review must be designed to critically comment on this section. Reviewer forms should include a separate area in which the reviewer is asked if all high-hazard substances (e.g. pyrophors, carcinogens, reproductive toxins, etc.) and hazardous procedures/processes are flagged with sufficient detail to alert a first year graduate student.
- Media other than journals, including ACS webinars, should contain a safety moment, when applicable. CHAS recommends that safety is part of the fabric of everything the Society is doing.

¹ Grabowski, L.E. and Goode, S.R. Journal of Chemical Health and Safety, Volume 23, Issue 3, May–June 2016, Pages 30–35

2. How can we ensure that all ACS content (print, visual, video) not only conforms to safety best practices, but actively promotes best practices?

Inclusion of appropriate review by those knowledgeable, with expertise in safety and chemistry and with editorial and writing skills. We must redouble our efforts to put ACS staff and leadership in the forefront of watching for errors in behavior or promotional materials that relate to safety. We must all work with our fellow chemists to ensure that safety becomes a norm in our visual and printed content.

3. How might ACS increase its programming related to safety at our national and regional meetings?

- a) Ask divisions to consider adding talks focused on safety in their field or by adding requests to include something about safety at the beginning of talks. This needn't be a requirement but co-sponsorship and combined efforts across divisional programming could indeed be promoted. All technical divisions and committees should have either a sub-group focused on safety or at least a member of the programming team that could coordinate safety promotional efforts and information sharing.
- b) Presentations should be encouraged to include a slide pointing out the safety aspects of the work.
- c) Session organizers should ask a leading question which addresses safety, as appropriate.
- d) CHAS/CCS should develop best practices for including safety in all media and for developing/implementing a Division Safety subcommittee.
- e) Divisions and Local Sections should consider having a safety liaison to assist with safety in the Division.
- f) Local Sections should include safety-related programming in Regional Meeting planning.

4. After the Bhopal, India, tragedy, the American Institute of Chemical Engineers launched its Center for Chemical Process Safety: it is now the “go-to” authoritative source on the subject. Is there an analogous role for ACS in chemical laboratory safety?

CCPS has had a real impact on the chemical industry. It has a substantial staff and provides expertise to members. There is a focus on education and volunteerism for projects relating to process safety. This is an international organization and it sponsors events around the world. Developing analogous expertise for laboratory safety would certainly place ACS on the forefront as the leader in chemical safety. A Board-Level task force should be established to study and plan how this might be accomplished. CHAS believes there would be interest in doing this.

The ACS was charged by the U.S. Chemical Safety and Hazard Investigation Board (CSB) to “Develop good practice guidance that identifies and describes methodologies to assess and

control hazards that can be used successfully in a research laboratory.”² CCS, in close collaboration with CHAS, created this guidance in their document “*Identifying and Evaluating Hazards in Research Laboratories: Guidelines developed by the Hazards Identification and Evaluation Task Force of the American Chemical Society’s Committee on Chemical Safety.*” The document exceeded the CSB’s recommendation and now exists as a well-regarded [web presence](#) in addition to hard copy availability.

5. Through our Committee on Professional Training, ACS approves bachelor's degree chemistry programs. Part of this approval involves examination of safety policies and procedures. All ACS-approved chemistry departments must have a written chemical hygiene plan consistent with Occupational Safety and Health Administration and state standards. Are there ways to measure various institutions' underlying safety culture as well?

Yes.

- a) CPT, in cooperation with CCS, CHED and CHAS should develop leading indicators for evaluating an institution's/department's underlying safety culture. Examples include:
 - Incorporation of safety education into the chemistry curriculum – this could be designed classes or could be intentional incorporation of various safety topics into existing courses throughout the entire curriculum. Collaboration with other laboratory-based science departments would help drive a campus-wide effort.
 - The existence of an active safety committee and promotion of safety through events, meetings and conferences.
 - The practice that research groups have safety moments as part of every group meeting.
 - The inclusion of a safety moment in departmental seminars.
 - The reporting of incidents and investigations to identify root causes and make changes to prevent these incidents from recurring. These should be shared and discussed among students and faculty and considered for sharing outside of the institution.
- b) CPT should develop specific criteria on safety for department chairs to use when completing their 5 year reports to the ACS.
- c) CCS and CHAS should develop and publish a pro forma safety manual which addresses all hazards commonly found in the laboratory. This template would be particularly helpful to smaller institutions which do not have the resources to develop their own or the skill to implement a comprehensive safety program.

² Texas Tech University Chemistry Lab Explosion, FINAL REPORT: Texas Tech University <http://www.csb.gov/texas-tech-university-chemistry-lab-explosion/>

6. Can ACS partner with other organizations to promote tools that will help institutions strengthen their safety programs? The Society of Chemical Manufacturers & Affiliates (SOCMA) provides its ChemStewards technology to industrial laboratories. Does it have applicability in academic laboratories?

- a) SOCMA's ChemStewards program is being proposed for academic laboratories. While this system is a recognized and accepted approach in industry, academic institutions might have difficulties with necessary resources and full participation. ACS should revisit opportunities to collaborate with SOCMA on this program.³
- b) ACS should work with the granting agencies (NSF, NIH, etc.) on refining their grant applications and awards processes. The Society should help agencies develop a consistent and robust set of hazard identification and risk assessment tools to be applied to the intended chemicals/processes contained or implied in the grant application. Defined statements of responsibilities to applicants and recipient institutions which delineate what is meant by conducting research in a safe and ethically sound manner should be included.
- c) The Society should also work with teacher education groups to get more safety-based course work into pre-teacher curriculum. While much of the initial licensing requirements might be state-dictated, groups such as Association of American Educators, National Education Association, National Science Teachers Association, etc. could assist with professional development for new science teachers. ACS should actively engage our AACT membership in this process.

**7. Should ACS include safety explicitly within its core values?
This step will be considered formally by our board during preparation of our 2017 strategic plan.**

YES, without a doubt. ACS must incorporate safety into its core values. Highlighting the importance of safety as a core value for the chemists of ACS would demonstrate the concern we all have for safety.

³ Larry Sloan of SOCMA approached CCS to develop a partnership in 2014 and was rejected. CCS, in cooperation with CHAS, should be encouraged to reopen this partnership and develop it.