NCW and Community Activity
SAFETY GUIDELINES

These guidelines are based on the premise that all presenters care very much about the safety of their audiences and participants during demonstration shows and hands-on activities. Although these guidelines are primarily for the presenters of chemistry outreach programs, the responsibility for presenting safe chemistry programs falls on a much larger group of individuals. Local section leaders, community activity coordinators, volunteers, and even participants and their parents share the responsibility of ensuring safe environments for these programs and activities. The information presented in these guidelines will help in the selection and presentation of programs and activities to keep community activities safe.

For the purpose of these guidelines, a chemical is defined as any material used during the course of a demonstration or a hands-on activity. Material Safety Data Sheets (MSDS) should be available for all chemicals used in demonstrations and hands-on activities. Because these activities involve "doing science," presenters and participants will be required to do what scientists do—wear appropriate personal protective equipment that includes, at a minimum, chemical splash (cover) goggles that conform to the American National Standard Institute (ANSI) Z87.1 standard, types G or H.

The guidelines presented here are divided into four sections, two for types of facilities and two for types of activities.

Follow all guidelines appropriate for both *site and type* of activity. For example, a hands-on activity at a shopping mall would need to follow both the guidelines from Section 2 and those from Section 3, always using the more stringent rules of the two guidelines.

If you observe any activity that puts the audience at risk, we encourage you to take action. If the situation is deemed immediately hazardous, take appropriate measures to stop the activity. If such action is taken, report the circumstances of the activity to the community activities coordinator and the local section executive committee. If you have concerns about other issues related to safety, address them to the presenter in a timely manner.

See the Appendix: Liability Insurance for a description of the Liability Insurance Coverage carried by ACS and instructions for how local sections may obtain a Certificate of Insurance.

Presentations and Activities at Scientifically Equipped Facilities

Scientifically equipped facilities include:

- science facilities at colleges, universities, secondary schools, and science museums;
- research and manufacturing facilities; and
- any other type of facility that has laboratories.

It is assumed that these facilities generally have:

- extensive emergency equipment, including fire extinguishers;
- chemical supplies;
- adequate ventilation and air circulation;
- disposal procedures for chemical waste; and
- rules concerning personal safety of visitors and employees during community activities.

1. Secure pre-approval for use of the facilities.
Secure pre-approval of all hands-on activities and demonstrations from the laboratory safety director or other management official. Make facility security/safety officers aware of the planned activity.

2. Prepare supplies in an appropriate area.
Carry out demonstration and activity preparations in an area designed for working with chemicals. Put controls in place to ensure that the types and quantities of chemicals brought into the area are appropriate and kept to a minimum. Make certain that all chemicals are appropriately labeled including appropriate safety hazard warnings. Make MSDS available for all chemicals in the activity area.

3. Pretest demonstrations and activities.
Pretest programs, if possible, in the area in which they are to be performed. The pre-testing will help identify potential safety hazards.

4. Carefully review activities that produce loud noises.
Consider moving these activities outside. If they are carried out inside, be certain to notify management and security. In all cases, alert the audience to expect a loud noise and to cover (protect) their ears.

5. Identify issues related to chemical waste.
Establish in advance the types of chemical waste that will be produced and the procedure for waste disposal. Be certain to follow the federal, state, and local regulations for waste disposal.

6. For demonstrations, provide adequate shielding for the audience and the demonstrator.
The safety of the audience is paramount. It must not be assumed that the members of the audience are protected by distance. Protection could be achieved by shielding the audience and by the demonstrator wearing chemical splash (cover) goggles (ANSI Z87.1) types G or H. Alternately, chemical splash (cover) goggles could be worn by all participants (demonstrator and audience). Have a goggle sanitation plan for goggles used by multiple persons. One possible method of sanitation is to immerse the goggles in diluted household laundry bleach (1 part bleach to 9 parts water), followed by thorough rinsing and drying. Know the location of the nearest eye wash fountain and safety shower and ensure in advance that the eyewash and safety shower are working properly. Discuss safety precautions with the audience as well as the locations of the nearest restrooms.

7. If the activity is hands-on, provide adequate personal protective equipment for the participants, the leader(s), and any assistants.
The safety of all persons involved is paramount. All participants, helpers, and presenters must wear eye protection in the form of chemical splash (cover) goggles (ANSI Z87.1) types G or H. Prepare and execute a goggle sanitation plan for goggles used by multiple persons. One possible method of sanitation is to immerse the goggles in diluted household laundry bleach (1 part bleach to 9 parts water), followed by thorough rinsing and drying. If the activity is likely to be messy, consider providing disposable laboratory aprons and gloves. If aprons are to be reused, be certain to label the front of the apron. Never reuse disposable gloves. Prior to the activity, discuss safety precautions with the audience as well as the locations of the nearest restrooms.

8. Perform programs in areas with adequate ventilation.
Make certain the facility being used for the activity or demonstration has adequate ventilation for the chemicals being used.

9. Make plans in advance for adequate crowd control.
Make advance plans and provide personnel to ensure that the audience size is maintained at a predetermined level for the activities. This includes control over the entrances to limit the number of persons admitted to the area. Make certain that the number of volunteers is appropriate for the activities and for the expected size of the audience. For hands-on activities, it is very important to control the number of persons having access to the area of the activity.

10. Plan exit routes.
Make certain that there is easy access to and exit from the area of the demonstration or activity. Include an explanation of exit procedures and have adequate personnel to supervise evacuation in case of an emergency. Be aware of all on-site fire regulations regarding audience size and emergency evacuations.

11. Do not allow consumption of food or drink in the demonstration/activity area.

12. Have spill kits available that are appropriate for the chemicals to be used.

13. Ensure that fire protection is readily available in the immediate area.

14. Distribute handouts complete with safety recommendations.
If the description of the activity is distributed, make sure that the procedure is well tested and details all safety related concerns. All ACS materials have undergone safety review and contain appropriate guidelines.

Presentations and Activities at Non-scientifically Equipped Facilities

Non-scientifically equipped facilities include

- elementary schools
- exhibit halls
- hospitals
- museums
- libraries
- senior citizen centers
- shopping malls
- sports facilities
- theaters

These facilities generally lack

- extensive emergency equipment, including fire extinguishers;
- chemical supplies;
- adequate ventilation and air circulation;
- disposal procedures for chemical waste; and
- rules concerning personal safety of visitors and employees during community activities.

1. Secure approval in writing for use of the facility from its management.
Make management fully aware of the specific demonstrations and activities that are planned, any inherent hazards, and the precautions being taken to mitigate those hazards. Make facility security/safety officers aware of the planned activity.

2. Inspect the facility to ensure its adequacy.
Make no assumptions about the facility that will be used. Prepare a checklist of items necessary for the activities to be carried out, including basics such as water and electricity. Keep in mind that non-scientific facilities have inadequate ventilation and air exchange compared with scientific facilities. Make certain an appropriate fire extinguisher is available in the immediate area even if you must supply one.

3. Be aware of audience size limitations set by local fire regulations. Fire regulations may also determine what materials can be brought into the facility.

4. Use care in selecting the demonstrations/activities to be done in this type of facility.
For example, avoid reactions that produce loud noises, flames, smoke, and fumes.

5. Pretest demonstrations and activities.
Because it may not be possible to pre-test the demonstrations and activities in the facility to be used, pre-test them with an age-appropriate helper in a similar area. During the pre-testing process, identify and correct potential safety problems. Pre-testing will also ensure that the planned activity produces the expected results.

6. Minimize on-site reagent preparation.
For example, pre-weigh samples in bottles to which water may be added on-site to prepare solutions. This eliminates the need to bring large quantities of solution to the facility.

7. Consider the time length of demonstrations and activities.
In a facility that has a large turnover of people, consider the use of brief demonstrations and activities. This is important for crowd control.

8. Do not take flammables or combustibles [as defined by the National Fire Protection Association (NFPA); www.nfpa.org] into a non-scientifically equipped facility.

9. Do not use flames of any type.
Caution must also be exercised when using hotplates. Never use a hotplate to heat flammable materials.

10. Carefully review activities that produce loud noises.
Consider moving these activities outside. If they are carried out inside, be certain to notify management and security. In all cases, alert the audience to expect a loud noise and to cover their ears.

11. Use plastic, non-breakable containers and supplies.
Keep use of glass to a minimum. Use glass only when necessary and with appropriate safety precautions.

12. Consider issues related to the transport of chemicals and removal of waste.
The transport of chemicals to the event site and removal of waste afterwards present potential problems, including legal problems, to those in charge of the programs.

A. To minimize the potential problems associated with the transport of chemicals to the facility, give careful consideration to the planned activities and demonstrations. You should strongly consider developing demonstrations and activities that use chemicals that may be purchased at local stores such as hardware, grocery, and discount stores. Be aware that there could be potential problems associated with transporting these chemicals to the facility, although some of these chemicals (e.g., drain cleaner, muriatic acid) would not be appropriate for use in community activities. Make certain that all chemicals are appropriately labeled. Include any hazard and handling information. When practical, make MSDS available for all materials used.
B. If possible, develop demonstrations and activities that "neutralize" the wastes that are produced. Depending on the nature of the liquid wastes, it may be possible to dispose of some or all of the wastes on-site through the sanitary sewage system, provided permission to do so has been obtained from local sewer/sanitation authorities. This must not be done unless you have previously secured management approval. If the waste is transported off-site, it is important to observe all federal, state, and local regulations governing such transport.
C. Label all waste and dispose of it in accordance with EPA or equivalent local regulations.
D. Follow the rule "if you take it in, you must take it out" as much as possible and always for any hazardous and potentially hazardous substances.

13. For demonstrations, provide adequate shielding for the audience and the demonstrator.
The safety of the audience is paramount. The audience must be kept a minimum distance from demonstrations; a minimum of five feet is recommended. It must not be assumed that the members of the audience are protected by distance. Protection could be achieved by shielding the audience and by the demonstrator wearing chemical splash (cover) goggles (ANSI Z87.1) types G or H. Alternately, chemical splash (cover) goggles could be worn by all participants (demonstrator and audience). Have a goggle sanitation plan for goggles used by multiple persons. One possible method of sanitation is to immerse the goggles in diluted household laundry bleach (1 part bleach to 9 parts water), followed by thorough rinsing and drying. Know the location of the nearest eye wash fountain and safety shower and ensure in advance that the eyewash and safety shower are working properly. Discuss safety precautions with the audience as well as the locations of the nearest restrooms.

14. If the activity is hands-on, provide adequate personal protective equipment for the participants, the leader(s), and any assistants.
The safety of all persons involved is paramount. All participants, helpers, and presenters must wear eye protection in the form of chemical splash (cover) goggles (ANSI Z87.1) types G or H. Prepare and execute a goggle sanitation plan for goggles used by multiple persons. One possible method of sanitation is to immerse the goggles in diluted household laundry bleach (1 part bleach to 9 parts water), followed by thorough rinsing and drying. If the activity is likely to be messy, consider providing disposable laboratory aprons and gloves. If aprons are to be reused, be certain to label the front of the apron. Never reuse disposable gloves. There should be a discussion with the audience of the safety precautions being taken as well as the locations of the nearest restrooms.

15. Make plans in advance for adequate crowd control.
Make advance plans and provide personnel to ensure that the audience size is maintained at a predetermined level for the activities. This includes control over the entrances to limit the number of persons admitted to the area. Make certain that the number of volunteers is appropriate for the activities and for the expected size of the audience. For hands-on activities, it is very important to control the number of persons having access to the area of the activity.

16. Plan exit routes.
Make certain that there is easy access to and exit from the area of the demonstration or activity. Include an explanation of exit procedures and have adequate personnel to supervise evacuation in case of an emergency. Be aware of all on-site fire regulations regarding audience size and emergency evacuations.

17. Do not allow consumption of food or drink in the demonstration/activity areas.

18. Have spill kits available that are appropriate for the chemicals to be used.

19. Distribute handouts complete with safety recommendations.
If the description of the activity is distributed, make sure that the procedure is well tested and details all safety related concerns. All ACS materials have undergone safety review and contain appropriate guidelines.

Guidelines for Hands-on Activities

When hands-on activities are planned, regardless of the location, certain precautions must be taken to protect the participants and those directing and assisting with the activity. The protection is necessary regardless of the nature of the activity, even if the "safest of chemicals" are being used. These guidelines must be used in conjunction with one of the two facility guidelines.

1. Pretest all planned activities to ensure that they work and to identify and eliminate any safety problems.

2. Select chemicals that carry a minimum of risk for use in hands-on activities.
Keep in mind common allergies such as those to different varieties of nuts, latex, and sulfites.

3. Explain the procedures clearly to ensure that all participants understand and agree to follow the procedures before beginning the activity.

4. Make provisions to ensure that adequate experienced help is available to carefully oversee the experimenters carrying out the hands-on activities.

5. Supervise participants.
Do not allow unsupervised activity. Do not allow any extension of the planned activity unless approved by the presenters. Prior to starting any activity, discuss safety precautions with the audience as well as the locations of the nearest restrooms.

6. All participants, helpers, and presenters must wear appropriate personal protective equipment.
The safety of all persons involved is paramount. All participants, helpers, and presenters must wear eye protection in the form of chemical splash (cover) goggles (ANSI Z87.1) types G or H. Have a goggle sanitation plan for goggles used by multiple persons. One possible method of sanitation is to immerse the goggles in diluted household laundry bleach (1 part bleach to 9 parts water), followed by thorough rinsing and drying. If the activity is likely to be messy, consider providing disposable laboratory aprons and gloves. If aprons are to be reused, be certain to label the front of the apron. Never reuse disposable gloves.

7. Make all participants aware of all safety precautions.
Do not allow anyone to participate in any activity if they have missed procedural and safety instructions.

8. Exercise caution with flames.
Never use alcohol burners in any type of activity. It is inappropriate to use a flame in a non-scientific facility. If burners are used in a laboratory setting, make certain that the experimenters are old enough to understand the use and dangers involved. Be careful of loose-fitting clothing, and make certain that long hair is tied back or otherwise prevented from hanging down when using burners. Caution must also be exercised when using hotplates. Never use a hotplate to heat flammable materials.

9. Carefully control activities using the sense of smell.
Prepare in advance any activity that involves smelling any substances. Allow only safe, commercially available substances to be smelled. Additionally, these should be at minimal concentrations even if dilution is required. Teach participants about the dangers of smelling chemicals and instruct them in the proper technique—wafting a small amount of vapor from the container to the nose rather than placing the nose directly over the container. Use professional discretion in selecting substances for these types of activities being particularly aware of chemical sensitivities (allergies).

10. Do not perform activities that involve tasting.
This guideline is consistent with the earlier guideline that prohibits the consumption of food or drink in the demonstration areas. In keeping with standard, safe chemical practice, chemists do not taste substances used in their activities.

11. Instruct all participants to wash their hands immediately upon completion of the activity and before leaving the facility in which the activity takes place.

Guidelines for Chemical Demonstrations

When demonstrations are planned, regardless of the location, certain precautions must be taken to protect the presenters, participants, and audience. Protection is necessary regardless of the nature of the activity, even if the "safest of chemicals" are being used. It is recommended that highly hazardous, highly flammable, or carcinogenic substances, such as benzene, carbon tetrachloride, carbon disulfide, and formaldehyde, not be used in any demonstration activity.

These guidelines must be used in conjunction with one of the two facility guidelines.

Minimum Safety Guidelines for Chemical Demonstrations
ACS Division of Chemical Education

Chemical Demonstrators Must:

1. Know the properties of the chemicals and the chemical reactions involved in all demonstrations presented.
2. Comply with all local rules and regulations.
3. Wear appropriate eye protection for all chemical demonstrations.
4. Warn members of the audience to cover their ears whenever a loud noise is anticipated.
5. Plan the demonstration so that harmful quantities of noxious gases (e.g., $N0_2$, $S0_2$, H_2S) do not enter the local air supply.
6. Provide safety shield protection wherever there is the slightest possibility that a container, its fragments or its contents could be propelled with sufficient force to cause personal injury.
7. Arrange to have a fire extinguisher at hand whenever the slightest possibility for fire exists.
8. Not taste or encourage spectators to taste any nonfood substance.
9. Not use demonstrations in which parts of the human body are placed in danger (such as placing dry ice in the mouth or dipping hands into liquid nitrogen).
10. Not use open containers of volatile, toxic substances (e.g., benzene, CCl_4, CS_2, formaldehyde) without adequate ventilation as provided by fume hoods.
11. Provide written procedure, hazard, and disposal information for each demonstration whenever the audience is encouraged to repeat the demonstration.
12. Arrange for appropriate waste containers for and subsequent disposal of materials harmful to the environment.

Revised 4/1/95

Appendix : Liability Insurance

A. COMPREHENSIVE BUSINESS POLICY—GENERAL LIABILITY

The American Chemical Society (ACS) maintains a Comprehensive Business Insurance Policy. One of the coverages included in this policy is General Liability, which protects ACS, Local Sections, and Divisions against liability claims arising from negligent acts by ACS or its agents that cause bodily injury or property damage.

This coverage is NOT an accident policy, which pays anyone who is injured regardless of how the injury was caused or who was at fault. It is a legal liability policy, which pays when the SOCIETY or *someone acting on its behalf* fails to exercise reasonable care. The resulting damage must stem from this negligence.

The limits of insurance for the Society's commercial general liability coverage are:

General Aggregate	$3,000,000
Products—Completed Operations	$1,000,000
Personal and Advertising Injury	$1,000,000
Each Occurrence Limit	$1,000,000
Fire Legal Liability (per occurrence)	$50,000
Premises Medical (per person)	$15,000

B. CERTIFICATES OF INSURANCE

A Certificate of Insurance is a document that provides evidence that ACS maintains a certain type of insurance coverage. It does not change the coverage in any way; it only provides proof of existing coverage.

When the ACS or one of its Local Sections or Divisions sponsors an event, the owner of the property or establishment where the event is being held may request a Certificate of Insurance. This request is often mentioned in the contract or agreement between the Society and the property owner.

If a Certificate of Insurance has been requested, a request form must be completed and submitted to the ACS Treasurer's Office at least 30 days prior to the event. This form can be faxed or mailed by contacting the Office of the Treasurer at 202-452-2125. The information typically required on the form is as follows:

- The event (name)
- Date and location
- Person to contact for further information with their telephone number and address
- Company or individual requesting the certificate, with their address and telephone number
- Has the requesting party asked to be a "named insured"?
- Has the requesting party specified minimum coverages?...types of coverage?...dollar amounts?

C. CLAIMS

Any incident that may result in a claim against the Society should be reported immediately to the ACS Treasurer's Office at 800-227-5558 x2125 or 202-452-2125. Additionally, a full report should be sent in writing to the following address:

American Chemical Society
Office of the Treasurer
1155 Sixteenth St., NW
Washington, DC 20036
fax 202-872-4604

The report should include the date and time of the incident; a comprehensive statement that details events immediately preceding and following the occurrence; and the names, addresses, and phone numbers of those present. Please contact the ACS Treasurer's Office for a form.

D. GENERAL INSURANCE REQUIREMENTS FOR OTHERS DOING BUSINESS WITH ACS

Just as ACS may be asked to provide proof that we maintain adequate insurance coverage, we must require the same type of proof of others. All independent contractors and service agents hired by ACS should provide a Certificate of Insurance indicating the following minimum coverage:

1. Comprehensive General Liability
$1,000,000 Combined Single Limit Bodily Injury and Property Damage

Certificate must indicate that coverage is afforded for Completed Operations and/or Products Liability and Blanket Contractual and Personal Injury.

In addition, you should ask that ACS be added as Additional Insured and that ACS be indemnified for the independent contractor's negligent acts.

2. Comprehensive Automobile Liability
$1,000,000 Combined Single Limit Bodily Injury and Property Damage

Certificate must indicate that coverage is afforded for all owned, non-owned, and hired automobiles.

3. Workers' Compensation
Certificate to show coverage in compliance with Workers' Compensation statutes

4. Employers' Liability (Stop-Gap Liability in Ohio)
$500,000 each accident

5. Dishonesty Bond

If the Independent Contractor or Vendor handles ACS property or money, a Bond should be required in an amount sufficient to protect the Society's interest.

All certificates are to have a 30-day notice of cancellation in the Society's favor and, except for 3 and 4 above, name ACS as Additional Insured.

All requests for ACS to indemnify another party should be given to the Treasurer's Office for review prior to signing.

E. WORKERS' COMPENSATION

Local Sections or Divisions employing staff must provide their own workers' compensation and other insurance coverage as required by the state of operation.

F. CRIME (BOND) COVERAGE

Local Sections or Divisions must provide their own crime (bond) coverage.

G. DIRECTORS' AND OFFICERS' LIABILITY

Local Sections or Divisions must provide their own directors' and officers' liability coverage.

Any questions concerning the Society's insurance coverage should be directed to the Office of the Treasurer at 800-227-5558, x2125 or 202-452-2125.