

Standing Operating Procedures for Chemistry Demonstrations

This SOP is intended to insure that chemistry demonstrations meet the department's standards for scientific content and accuracy, instructional effectiveness, and safety and security. Before performing any demonstrations, please contact the Chemistry Demonstration Coordinator (preferably by email) to insure these standards are being met. This step is required regardless of whether the demonstrations are supported by the department facility or prepared solely by the presenter. This should also be done in the planning stages in case changes in procedure or equipment need to be made.

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Safety of demonstrations is of paramount concern. The following basic safety requirements are mandatory for all demonstrations and must be thoroughly understood by all presenters and the sponsor (instructor, circus organizer, etc.) of the event.

1. When notifying the demo coordinator, be sure to let her know:
 - a. The name and description of the demonstration including a write up that states safety measures, personal protective equipment (PPE), and waste collection plans. For department supported demos, the coordinator will already have this information, and demos must be presented in accordance with her procedure.
 - b. The name of the presenter and their classification (students are not allowed to perform demos unsupervised), when the demo will be and where, and the purpose of the demo (principles illustrated, entertainment, etc).
 - c. If you require the demo coordinator's (Debra's) help in performing the demos, you may need to adjust to her schedule.
2. **In case of a classroom or laboratory accident, EHS must be contacted immediately and all students receiving injuries of any kind must be encouraged to seek medical attention at University Health Services. The 24-hours EHS number is 471-3511.**
3. In some small rooms, demos tend to set off emergency alarms, so they must be called in to fire safety. Coordinate this step with the demo coordinator. Also, call in a note for evening and weekends, even if the room doesn't tend to set off alarms.
4. If presenting outside, be aware of building air intake areas so smoke, etc., isn't sucked into the building air supply. Also, call in the alarms to let them know about the activity when it is outside.
5. GENERAL rules for PPE.
 - a. Clothing should generally include a lab coat over proper clothing (usually pants with closed-toe or protective shoes) plus goggles and nitrile gloves.
 - b. For cold or hot items use leather or insulated gloves instead of nitrile gloves.
 - c. For demonstrations with the potential to cause flying glass, flame, or other hazards, proper use of an appropriate safety shield is mandatory.

- d. IN ADDITION—almost every demo requires some additional PPE, including but not limited to the following: tongs, ear plugs, hair or head protection (hair spray is flammable!), and extension poles (for igniting the demo, for example.)
6. Upon completing the demo:
 - a. Label the waste so you or Debra knows how to segregate it and fill out the paperwork for pick up by EHS.
 - b. Clear up all materials and carefully place them on the cart or in the designated boxes such that they do not spill or cross contaminate each other
 - c. Clean surfaces that were used – pick up all debris and place in the appropriate receptacle or gather for disposal as needed.
 - d. Be sure that stage doors are locked when you leave.

These rules are basic demonstration guidelines for every event and must be augmented or modified appropriately for the unique requirements of each demo. Some additional information is provided below for your use in designing or preparing demonstration events.

Additional Safety and Procedural Guidelines Available on the Internet

The following additional references are provided for more detailed guidelines on demonstration safety and procedures. All demonstrators are encouraged to apply the pertinent guidelines to their demonstration events.

Minimum Safety Guidelines for Chemical Demonstrations ACS Division of Chemical Education

http://portal.acs.org/portal/fileFetch/C/WPCP_008395/pdf/WPCP_008395.pdf

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., NO₂, SO₂, H₂S) 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, CCl₄, CS₂, 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.

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Flinn Scientific Inc.

http://www.flinnsci.com/sections/safety/chemicalSafety/L678_MS_SciSafetyArt.pdf

1. Always practice all demonstrations before performing them in front of students. A demonstration should only be attempted after all the potential pitfalls and hazards have been identified.
2. Never attempt a demonstration that will place you or your students at risk.
3. Have students wear safety goggles or use a safety shield if there is the slightest possibility that a container, its fragments or its contents could be propelled with sufficient force to cause personal injury. A good rule of thumb is if heat or pressure are involved, audience protection is required.
4. If heat is involved in the demonstration, make sure all glassware is borosilicate (e.g., Pyrex®) glass and check for chips and cracks before using.
5. If a flammable liquid is used in a demonstration, make sure to cap all reagent bottles after dispensing the appropriate quantities and be aware of heat sources and flammable vapors. Never repeat a demonstration using flammable liquids until all containers and surfaces are cool to the touch.
6. Use fresh chemicals and clean glassware to prevent possible contamination.
7. All demonstrations should have an educational objective. If the demonstration uses toxic chemicals or a potentially hazardous procedure, review the demonstration again and be sure it has educational benefits.
8. Always ensure that electrical devices are properly grounded and inspect every electrical circuit before turning the current on.

NCW and Community Activity SAFETY GUIDELINES

http://portal.acs.org/portal/fileFetch/C/WPCP_008395/pdf/WPCP_008395.pdf

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

1. Guidelines for Presentations and Activities at Scientifically Equipped Facilities
2. Guidelines for Presentations and Activities at Non-scientifically Equipped Facilities
3. Guidelines for Hands-On Activities
4. Guidelines for Chemical Demonstrations (ACS Division of Chemical Education)