

FACT SHEET

Classroom Demonstration Safety

There are a number of very exciting demonstrations that have been used over the years to demonstrate various principles in science. Many of these demonstrations can be dangerous and should just not be conducted. A number of significant injuries and even fatalities have occurred during classroom and other demonstrations where proper precaution and forethought were not in place. In 2015, in response to these incidents, the National Fire Protection Association added a new section to NFPA 45 – Standard for fire protection in laboratories using chemicals, which addresses demonstration safety. This fact sheet discusses those and other recommendations.

NFPA 45 requirements

The new section of the standard addresses the responsibilities of instructors in educational and instructional areas where experiments or demonstrations are performed using hazardous materials. Specifically the instructor has the following responsibilities:

- Perform a documented hazard risk assessment
- Provide a safety briefing to students
- Provide adequate personal protective equipment (PPE)
- Place safety barriers as appropriate between students and the demonstration or experiment, to prevent personal injury
- Obtain the required training and/or expertise related to the safety of the experiment or demonstration
- Be knowledgeable concerning emergency plans and procedures associated with the demonstration
- Be knowledgeable in the proper use of PPE
- Know how to conduct a proper risk assessment

Assessing the risk

When considering a demonstration as a means of teaching a scientific principle you must consider the following:

- What is the pedagogical value? Does it outweigh the risk(s)?
- Is the selected scale of the demonstration appropriate? Can it be done on a smaller scale?
- Is the location appropriate? Should it be done somewhere else?

Answer the five questions:

The Five Questions

- Does the demo require a fume hood or other local exhaust ventilation? If yes, no hood, no demo
- What PPE and/or safety equipment is required? For the demonstrator and the students.
- Has a job safety analysis been completed for each demonstration/experiment? (Are there specific hazards associated with the materials used in the demo? How will you control these hazards?)
- How will you dispose of waste materials when you are done with the demo?)

- What emergency protocols must be in place in the event of an emergency? How will you communicate these protocols to the participants?

Just as you must organize your equipment and materials you must also organize your information. A written standard operating procedure and/or job safety analysis must be in place and reviewed prior to conducting any demonstration.

Rules at the U:

Due to the occurrence of a number of severe and fatal injuries associated with certain demonstrations across the country, as well as fire code requirements the following demonstrations are not allowed without prior approval from OEHS:

- Any demonstration involving the use of fire – requires approval from the fire marshal. Some demonstrations such as the “whoosh bottle” (aka the barking dog) will not be approved and are not allowed.
- Any demonstration involving highly hazardous materials or processes.
- The “rainbow” demonstration (use of methanol and metal salts to create a flame “rainbow”) is not allowed under any circumstances.

Prior to conducting any demonstration a written standard operating procedure must be prepared for ALL proposed experiments or demonstrations. And a documented risk assessment must be conducted.

Classroom experiments and demonstrations can be a very effective means of teaching scientific principles and increasing a student’s interest in a given subject. When conducting classroom demonstrations we must remember that part of our purpose in teaching must be to teach our students that science, with its inherent hazards and risks, can be conducted in a manner that keeps everyone safe and healthy.



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