



## **NSTA Minimum Safety Practices and Regulations for Demonstrations, Experiments, and Workshops**

Science activities, including hands-on investigations, explorations, and demonstrations are essential for high-quality K–12 science instruction. Inherent in conducting science activities, however, is the potential for injury. The National Science Teachers Association (NSTA) sets forth the following minimum safety practices and regulations for all hands-on demonstrations, experiments, and workshops given at NSTA-sponsored events in rooms, other on-site locations, and on the floor of the NSTA exhibit hall.

### **The following materials and practices are not allowed:**

- activities that put parts of the body in danger, such as placing dry ice in the mouth, dipping hands into liquid nitrogen, exposing the hands and face to microorganisms, walking on broken glass or hot coals with bare feet, or lying on a bed of nails;
- live ammunition, firearms, commercially available fireworks, and blasting caps;
- dangerous explosives, such as benzoyl peroxide, diethyl ether, perchloric acid, picric acid, and sodium azide;
- volatile toxic substances, such as benzene, carbon tetrachloride, and formaldehyde;
- activities that could result in the release of harmful quantities of noxious gases into the local air supply;
- plants with poisonous oils (e.g., poison ivy) or saps (e.g., oleander), and other plants known to be generally toxic to humans;
- use of human or animal blood/body fluids or other potentially infectious materials (OPIMs);
- demonstrations or experiments using live vertebrate animals\*; and
- animals that are exploited for advertisement, commercial purposes, or sensationalism\*.

\*Note: Animals should only be used for observational purposes provided that they have been lawfully acquired, are housed in proper containers, and are handled in a humane way following the guidelines set forth in NSTA's position statement, [\*Responsible Use of Live Animals and Dissection in the Classroom\*](#) adopted in 2007. Any certification papers or vaccination documents will need to be made available upon request. In addition, animals should only be used for educational purposes.

## **Please adhere to the following professional practices for all hands-on demonstrations, experiments, and workshops:**

**DO** emphasize and demonstrate appropriate safety precautions throughout the presentation or workshop.

**DO** comply with all local fire and safety rules and regulations.

**DO** wear appropriate personal protective equipment (i.e., eye protection, apron, ear protection, and similar protective gear) for all chemical demonstrations or when appropriate for other demonstrations.

- Safety glasses with side shields (ANSI/ISEA Z87.1 compliant) are to be used when dealing with solids (e.g., projectiles and glassware).
- Indirectly vented chemical splash goggles (ANSI/ISEA Z87.1 compliant) are to be used when dealing with hazardous liquids (e.g., acids, bases, alcohols).
- Splash goggles (ANSI/ISEA Z87.1 compliant) can also be used in lieu of safety glasses with solids.

**DO** provide a gravity-fed eyewash unit or other type of effective emergency eyewash device when hazardous chemicals are used. If in the exhibit hall, **DO** know the location of portable gravity-fed eyewash stations in case of a hazardous chemical splash incident.

**DO** provide personal protective equipment such as eye protection, aprons, and safety equipment for participants who will be handling chemicals or hazardous substances or working with flames. Appropriate personal protective equipment must also be provided for audience members who are considered in the “danger zone” that would result from a splash or other means of contact.

**DO** arrange for proper shielding and protection for demonstrations that involve radioactive powders, liquids, or solutions. Only low-level radioactive sources should be used. **DO** check all state requirements regarding the amounts and kinds of allowable radioactive isotopes.

**DO** provide fire suppression equipment (such as fire extinguishers) with up-to-date inspection tags if flames or flammable materials are used. Presenter is required to provide up-to-date extinguisher training certificate prior to workshop safety compliance approval.

**DO** use a safety barrier when physical, biological, and chemical hazards exist. For example, provide a machine guard when motor-driven discs are revolved at moderate or high speeds and move participants to a safer distance from the rotating disc.

**DO** provide appropriate non-latex gloves and shields when working with hazardous chemicals and biohazards, cryogenic materials, hot materials, radioactive substances, vacuums, or electromagnetic radiation, and when presenting animals for observation.

**DO** review emergency evacuation information with attendees at the beginning of the presentation/demonstration/activity and maintain a clear egress during the demonstration or workshop.

**DO** use only Ground Fault Interrupter (GFI) or Ground Fault Circuit Interrupter (GFCI) protected electrical receptacles when working with liquids or other potential electrical hazards to prevent accidental shock.

**DO** distribute handouts that will give participants detailed instructions about the procedure, safety precautions, hazards, and disposal for each demonstration and workshop.

**DO** recruit assistants for demonstrations and provide them with proper instructions beforehand.

**DO** ask participants and audience members to cover their ears when a loud controlled explosion is anticipated, and alert them at the beginning of the program about the presence or production of allergenic materials, such as chemical emissions, strobe lights, microwaves, “theater” smoke, lycopodium powder, or live animals.

**DO** follow proper procedures for working with pressurized gases and when heating all forms of matter.

**DO** provide service dogs that are present with similar personal protective equipment, appropriate to their size and proximity to the ground. Lasers and similar electromagnetic radiation sources should not be directed downward toward a service dog.

**DO** confer with owners of service animals to make them aware of what will take place during a demonstration so that the animal can be protected and both the presenter and participant will know what to expect from the animal.

**DO NOT** direct lasers into eyes of an observer or from a reflected surface into the eye.

**DO NOT** taste or encourage participants to taste any non-food substances.

**DO NOT** dump or dispose of any hazardous liquid, solid, organic, or recyclable waste in building facilities that contain programming for NSTA conferences and meetings (restrooms, sinks, toilets, water fountains, etc.)

## **NSTA Provides the Following Professional Practices to Help You Prepare for Your Hands-on Demonstration, Experiment or Workshop:**

**DO** practice all procedures prior to presenting them to an audience or having participants try them.

**DO** conduct a safety assessment involving a hazards analysis, risks assessment, and appropriate safety actions. This includes researching and understanding the properties, chemical reactions, and dangers involved in all demonstrations and reviewing Safety Data Sheets (SDS) for ALL chemicals prior to using them. Plan to use correct handling and disposal procedures for all chemicals and biohazards used.

**DO** make arrangements to have a fire extinguisher available whenever the slightest possibility of fire exists. Safety codes require training for use of portable fire extinguishers. Certificate of extinguisher training should be provided as part of the safety compliance approval.

**DO** secure sanitized personal protective equipment (i.e., eye protection, hand protection, apron, ear protection, and similar protective gear) for all presenters and participants when a demonstration involves the use of biological, chemical, or physical hazards. Personal protective equipment should be worn by participants and presenters during the set-up of the activity, hands-on demonstration or experiment, and take down of the activity.

**DO** prepare handouts for demonstrations that give participants detailed instructions about the procedures, safety precautions, hazards, and disposal methods. Safety Data Sheets for chemicals and biohazards should be made available upon request at all times at the site.

**DO** ensure that prudent safety practices are shown in all photographs, slides, and videotapes. Do not remove goggles and other personal protective equipment for aesthetic considerations.

**DO** limit quantities of hazardous materials to the quantity required for the demonstration or experiment, and only those quantities that can be adequately handled by the available ventilation system.

**DO** make arrangements to provide your own fume hood if using nitrogen dioxide, sulfur dioxide, or hydrogen sulfide.

**DO** inspect glassware and equipment to ensure it is not broken or damaged. If glassware is to be heated, Pyrex<sup>TM</sup> or similar product should be used. Properly dispose of broken glassware.

**DO** thoroughly check motor-driven discs that will be revolved at moderate or high speeds. Make sure the disc is sturdy, that it contains no parts that may come free, and that the safety nut is securely fastened.

**DO** make arrangements to use a safety shield and/or eye protection for all individuals in the room for demonstrations that launch projectiles or if there is the slightest possibility of an unsafe explosion.

**DO** ensure that any lasers used are helium-neon lasers with a maximum output power rating not exceeding 1.0 milliwatts.

**DO** label all hazardous chemicals used in presentations and activities in accordance with OSHA's newly revised (March 2012) [Hazard Communication Standard 29 CFR 1910.1200](#) relative to the *Globally Harmonized System of Classification and Labeling of Chemicals* (GHS).

**DO** have an appropriate storage container for waste and make proper arrangements in advance to dispose of any hazardous liquid, solid, organic, or recyclable waste to ensure it is disposed of offsite.

**DO NOT** plan activities that allow direct viewing of the Sun or of infrared or ultraviolet sources.

**DO** receive advance permission from NSTA to use a small unmanned aircraft system (UAS) such as drones, radio controlled aircraft, etc.

**DO** obtain in advance state and/or local permits needed for the firing of model rockets. Activities involving the firing of rockets must follow [Federal Aviation Agency \(FAA\) regulations](#), state and local rules and regulations, and the National Association of Rocketry's (NAR) [Solid Propellant Model Rocketry Safety Code](#). Two informative online resources, include the [Federal Aviation Administration](#) (FAA) and [Alaska Drones](#), developed by Alaska's Unmanned Aircraft Systems Legislative Task Force (UASLTF).

**Outdoor flight:** Outdoor flight is governed by the FAA. In addition, NSTA is required to get permission from local safety compliance authorities. Basic criteria includes—but is not limited to—the following for outdoor flight operators:

- Be at least 18 years old.
- Meet all operator and aircraft requirements and obligations applicable to the aircraft and its specific use as required by the FAA.
- Maintain documentation that certifies that the operator has been trained in the proper and safe use of applicable aircraft.

**Indoor Flight:** Indoor flight is defined as flight occurring inside an enclosed space where the enclosure can be reasonably expected to prevent the flying platform from exiting the enclosure while in flight. While indoor flight is not governed by the FAA, NSTA must seek permission from the local safety compliance authorities. NSTA provides the following safety guidelines for indoor flight operators:

- Ensure that unmanned aircraft is tethered.
- Attach blade guards, if possible.
- Use only nano, micro, or mini drones for indoor flight.
- Ensure that observers, participants or obstacles (furniture, light fixtures, wiring, etc.) are not in the flight path.
- Conduct a preflight inspection in accordance with any guidelines applicable to the aircraft and its specific use as specified by the FAA. At a minimum, conduct a visual inspection of the aircraft and a function test of all controls prior to takeoff.
- Conduct a review of safety procedures with observers prior to flight.
- Conduct only one unmanned aircraft operation at one time.