



NSTA Minimum Safety Practices and Regulations for In-Person and Virtual Sessions

Virtual science activities and video demonstrations are becoming a necessity for remote classrooms due to the emergence of SARS-COVID-19. Although in-person or virtual sessions, video demonstrations, video submissions, investigations, and presentations are essential for high-quality and memorable K–12 science instruction sessions at NSTA-sponsored events, there is the potential for exposure to hazards that may result in injuries by performing unsafe activities. The National Science Teaching Association (NSTA) sets forth the following minimum safety practices and regulations for all in-person or virtual sessions, video demonstrations, video submissions, investigations, and presentations given or shown at NSTA-sponsored events, including on- and off-site locations, personal dwellings, laboratories, classrooms, and on the floor of the NSTA exhibit halls. The NSTA has the expectation that all presenters will be familiar with and follow legal safety standards and better professional practices.

Although verbiage, like “do not try this at home” may be used to deter viewers from attempting something, better legal safety standards and professional practices are expected; for example, video submissions and demonstrations should not occur in kitchens or depict tasting or directly smelling any chemicals or substances used in the video. Additional items that are and are not allowed for any in-person or virtual sessions are shown below.

The following demonstrations and practices are NOT allowed:

- activities that endanger parts of the body, 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;
- activities that involve live ammunition, firearms, commercially available fireworks, and blasting caps;
- activities that involve dangerous explosives, such as benzoyl peroxide, diethyl ether, perchloric acid, picric acid, and sodium azide;
- activities that involve 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;
- activities that involve plants with poisonous oils (e.g., poison ivy) or saps (e.g., oleander), and other plants known to be generally toxic to humans;
- activities that involve the use of human or animal blood / body fluids or other potentially infectious materials (OPIMs);
- demonstrations or investigations using live vertebrate animals*;

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- animals that are exploited for advertisement, commercial purposes, or sensationalism*; and
- flying of drones or other types of unmanned aircraft with the exception of rockets provided the proper procedures illustrated in this document are followed.

*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, revised in 2008. 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 for all demonstrations and practices:

DO emphasize and demonstrate appropriate safety precautions throughout the in-person or virtual session, video demonstration, video submission, investigation, or presentation.

DO comply with all state and local fire, health, and safety rules and regulations.

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

- Eye and Face protection (ANSI/ISEA Z87.1-2015), the American National Standard for Occupational and Educational Personal Eye and Face Protection Devices, is the latest edition of the standard for eye and face protection.
 - Safety glasses with side shields are to be used when dealing with solids (e.g., projectiles and glassware).
 - Indirectly vented chemical splash goggles are to be used when dealing with hazardous liquids (e.g., acids, bases, alcohols).
 - Splash goggles can also be used in lieu of safety glasses with solids.
- Foot Protection (ANSI Z41.1-1991) The American National Standards Institute’s Z41 Committee on Personal Protection-Protective Footwear has merged into ASTM International’s Committee F13. With this merger, F13 oversees the redrafting of ANSI Z41 performance requirements and test method standards for safety footwear.
- Hand Protection (ANSI/ISEA 105) The American National Standard for Hand Protection rates gloves and other cut protective clothing on a consistent numeric rating scheme for mechanical, thermal, chemical, dexterity, and other performance criteria. Therefore, the availability of appropriate gloves of various sizes should be made based on the chemicals encountered (vinyl, nitrile, heat-resistant, etc.).

DO provide a gravity-fed eyewash unit or other type of effective emergency eyewash device when hazardous chemicals are used until an additional eyewash station that could provide 15 minutes of

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continuous eye rinse can be obtained. If on-site at the exhibit hall, **DO** know the location of portable eyewash stations in case of a hazardous chemical splash incident, if unavailable in presentation area.

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 ABC-rated 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 session.

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 or provide information that will give participants detailed instructions about the procedure, safety precautions, the names and chemical formulas of reactants and products involved, hazards, and disposal for each demonstration or session.

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.

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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 any hazardous liquid, solid, organic, or recyclable waste in an inappropriate manner and in any building facilities (restrooms, sinks, toilets, water fountains, etc.) including on-site at NSTA conferences and meetings by adhering to the local and state regulations put forth by the SDS in Section 13 Disposal Considerations.

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NSTA Provides the Following Professional Practices for All In-Person and Virtual Sessions

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

DO conduct a safety assessment involving a hazard analysis, risk assessment, and appropriate safety action. 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 an ABC-rated 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 use caution when using electric candle warmers. Electric candle warmers can provide a safer way to illuminate and produce a scent within a space without lighting the wick. Although fire danger from an open flame is eliminated, never leave a candle warmer unattended or burning for extended amounts of time. Potential hazards include overheating, electrical wire damage, trip hazard from the cord, electrocution from water spills, and smoke from a candle too near the heating lamp.

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 resources for handouts for demonstrations that give participants detailed instructions about the procedures, the names and chemical formulas of reactants and products involved, 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 or during the video.

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 session, 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 for appropriately handling the use of: nitrogen dioxide, sulfur dioxide, or hydrogen sulfide.

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DO inspect glassware and equipment to ensure it is not broken or damaged. If glassware is to be heated, Pyrex™ 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 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 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).

Resources:

- NSTA [Minimum Safety Practices and Regulations](#): January 2017
- NSTA [Safety in the Media](#): April 2019

References:

- Prosser, W.L., W.P. Keeton, D.B. Dobbs, R.E. Keeton, and D.G. Owen. eds. 1984.
- Prosser and Keeton on torts. Eagen, MN: West Group. Ryan, K. 2001. Science classroom safety and the law: A handbook for teachers. Batavia, IL: Flinn Scientific, Inc.

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