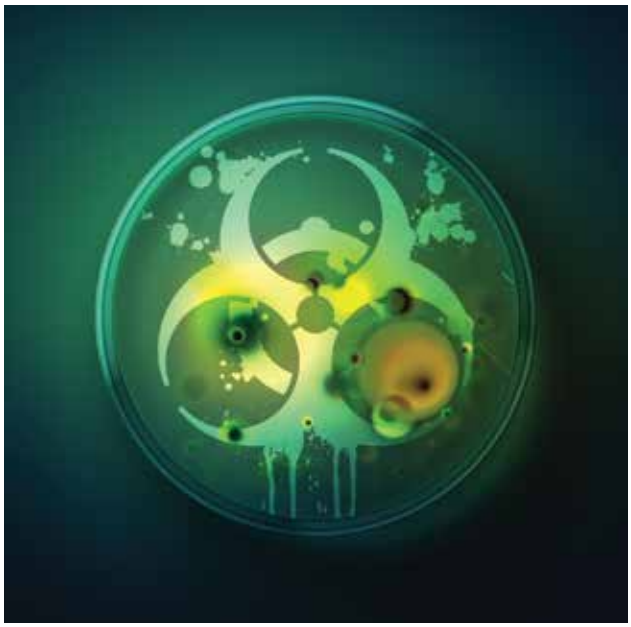
Culturing safety in life science

by Ken Roy



There are common standard operating procedures spanning all science disciplines for hands-on activities and demonstrations at the middle school level. These are based on legal safety standards and better professional practices. One of the best resources for these protocols is the NSTA safety acknowledgement form, Safety in the Science Classroom, Laboratory, or Field Sites (see Resources).

However, teachers must also address safety issues specific to various science disciplines. Life-sciences lessons, for example, often call for hands-on activities that can pose safety hazards. A fungi-study experiment may call for determining the best growth conditions for bread mold. A plant unit may involve the dissection of a flower preserved in formalin. When studying carbohydrates, a life-sciences experiment may require the use of iodine for determining the presence of starch in bread. In preparation for activities such as these, teachers usually develop a set of rules, listed in a safety acknowledgment form, to secure a safer working and learning environment. However, there are some safety issues that need to be addressed in life-sciences labs that go beyond the basic form.

Safety in the life-sciences lab

Assuming middle school science teachers use a form such as NSTA's Safety in the Science Classroom, Laboratory, or Field Sites, what other safety concerns should they address in teaching life sciences? The following list provides some guidelines for safety in the life-sciences lab, which can be added to a general safety acknowledgment form to make it more specific to this discipline:

- Students must wear appropriate eye protection (sanitized, indirectly vented chemical splash goggles), vinyl gloves, and chemical-resistant aprons when working with live or preserved specimens (see Resources for a past Scope on Safety column about personal protective equipment). These specimens may pose biological or chemical hazards.
- Always read chemicals' Safety Data Sheets prior to using them in the lab. Some biological stains, for example, are known carcinogens and mutagens.
- Use only designated, labeled containers to dispose of chemical or biological waste materials. Make sure custodial services are notified and appropriate disposal is in place (see Resources for a Safer Science column about proper disposal of lab materials).
- Sharp equipment, such as probes, scalpels, and scissors, are used for dissections and other activities. Always handle these instruments with caution; they are sharp and can cause severe cuts or punctures if they are mishandled. After use, be sure to soak these tools in sanitizer and dry them to clean them and prevent corrosion or contamination.
- Only use electrical equipment with ground fault interrupter–protected (GFI) circuits to prevent electrical shock when working with computers, centrifuges, hot plates, and microscopes. Never touch both electrical prongs on a plug with your hands. Even in a GFI-protected circuit, a severe and potentially fatal shock could occur.

- Eyepieces on equipment such as binoculars, microscopes, and stereoscopes should be sanitized with alcohol wipes after each use to reduce the risk of eye infections.
- Always take precautions with allergen-producing biologicals such as poisonous plants, pollen, and nuts. Some students may have serious allergies and sensitivities to these allergens. Before using them in the classroom or lab, check to see if any students are allergic to these items (see Resources for a Scope on Safety column about allergies).
- Do not collect, culture, or work with live bacteria in the lab (see Resources for a previous Scope on Safety column about microbes).
- Never eat any plants, vegetables, fruits, or other food used for a lab activity (see Resources for a previous Scope on Safety column about eating in the lab).
- Students should work with live animals only while under the direct supervision of the teacher (see Resources for a previous Scope on Safety column about the use of live animals in the lab, as well as a Safety First column about caring for classroom pets).
- Given the risk of blood-borne pathogen exposure, never do blood typing, cheek-cell sampling, or urine testing in the lab (see Resources for a previous Scope on Safety column about blood-borne pathogens).
- Students must wash hands with soap and water after completing any lab activity (see Resources for a previous Scope on Safety column about hand sanitizers).

In the end

Life-sciences laboratory activities at the middle school level can be fun teaching and learning experiences. However, science teachers must first provide students with safety guidance and training. Once safety procedures are reviewed and modeled, a safety acknowledgment form needs to be provided for students and their parents/guardians to review and sign. The form should contain not only generic science safety protocols but also those specific to the life sciences. These measures will help create a safer environment for both students and teachers. ■

Resources

Roy, K. 2004. Scope on Safety: Responsible use of live animals in the classroom. *Science Scope* 28 (9): 10–11.

Roy, K. 2007. Scope on Safety: Bloodborne pathogens: Be prepared, be protected. *Science Scope* 30 (1): 16–18.

Roy. K. 2008. Scope on Safety: Safety is always in fashion. *Science Scope* 32 (1): 76–77.

Roy. K. 2009. Scope on Safety: Allergies: Nothing to sneeze at. *Science Scope* 32 (5): 66–67.

Roy, K. 2009. Scope on Safety: Rethinking the use of hand sanitizers. *Science Scope* 32 (1): 74–76.

Roy, K. 2013. Safer Science: Waste not, want not. *The Science Teacher* 81 (3): 73.

Roy, K. 2013. Scope on Safety: Pregnant and safe in the lab. *Science Scope* 36 (10): 82–84.

Roy, K. 2013. Scope on Safety: Small microbes pose big problems. *Science Scope* 36 (5): 82–83.

Roy, K. 2014. Safety First: Feather, feet, and fins safety in the classroom. *Science & Children* 52 (1): 82–84.

Roy, K. 2014. Scope on Safety: Eating in the lab: A recipe for disaster. *Science Scope* 37 (5): 82–84.

Roy, K. R. 2007. *The NSTA ready-reference guide to safer science.* Vol. 1. Arlington, VA: NSTA Press.

Roy, K. R. 2012. *The NSTA ready-reference guide to safer science.* Vol. 2. Arlington, VA: NSTA Press.

Roy K. R. 2012. *The NSTA ready-reference guide to safer science.* Vol. 3. Arlington, VA: NSTA Press.

Safety in the science classroom, laboratory, or field sites—*www.nsta.org/docs/SafetyInTheScienceClassroomLabAndField.pdf*.

Question of the month

I am having students bake bread and test factors that affect how it rises. Can students eat the bread after they have completed the activity?

Answer

No. Students should never eat anything in the lab and definitely should not eat food that is the product of activities conducted in the lab.

Do you have a safety question?

Submit questions relative to safety in the middle school science laboratory to Ken Roy at *Royk@glastonburyus.org*.

Ken Roy (*Royk@glastonburyus.org*) is director of environmental health and safety for Glastonbury Public Schools in Glastonbury, Connecticut, and NSTA's chief science safety compliance consultant.