science safety

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Triple 'AAA' approach to Safer Labs

The method requires teachers to perform a hazard analysis before each lab demonstration (Minister 2015), as mandated by Standard 45 of the National Fire Protection Agency, then conduct a risk assessment, and take the best possible **safety** action.

In order to perform this 3-step approach to understanding and evaluating hazards, you must follow these steps sequentially:

- **Hazard ANALYSIS** (physical, chemical, biological hazards outlined on SDS and in tandem with teacher experience and safety notes from lab activity) and use of Chemical Hygiene Plan and trusted safety authorities.
- **Risk ASSESSMENT** (use of the SDS sections specifically 2, 5, 6,10, 11 that highlight information for the safer handling, such as hazards, fire safety, accidental spill information, stability, and toxicological info).
- **Safety ACTION** (Determine the appropriate action based on the types of hazards and risks. The top three actions to consider, based on the OSHA's Hazard Prevention and Control (see Resources), include engineering controls, administrative controls, and personal protective equipment (PPE).

The lab can be an unsafe place. Under NSTA's Duty of Care, however, the teacher is required to make labs safer (see Resources). One way of doing so is to follow the analysis, assessment, and action (AAA) method. The method requires teachers to perform a hazard analysis before each lab demonstration (Minister 2015), as mandated by Standard 45 of the National Fire Protection Agency, then conduct a hazard assessment, and take the best possible action.

Analysis

The first step is to analyze the potential hazards. For example, there can be physical impact hazards (labware such as ring stand rod and meter sticks), chemical hazards (corrosives and toxins), and biological hazards (mold and bacteria). The hazards analysis is usually based on the teacher's previous lab experiences, employer-required safety training, Safety Data Sheets and a Chemical Hygiene Plan from the Occupational Safety and Health Administration (OSHA [see Resources]), and internet safety information.

Assessment

Next, assess the risks of potential hazards determined in step one, using the Safety Data Sheets:

- Section 2. Hazards Identification,
- Section 5. Fire-Fighting Measures,
- Section 6. Accidental Release Measures,
- Section 10. Stability and Reactivity, and
- Section 11. Toxicological Information.

Action

Determine the appropriate action based on the types of hazards and risks.
The top three actions to consider, based on the OSHA's Hazard Prevention and Control (see Resources), include engineering controls, administrative controls, and personal protective equipment (PPE).

Section 8 of the Safety Data Sheet can help determine which PPE (safety glasses or goggles) and engineering controls work best. Also, read the labels on hazardous chemicals before working with them. In some cases where risks are too high, the demonstration or activity should be abandoned and replaced with a safer alternative.

Reference

Minister, A. 2015. Unsafe science. *NFPA Journal*. *www.nfpa.org/news-and-research/publications/nfpa-journal/2015/september-october-2015/features/unsafe-science*.

Resources

NSTA's Duty of Care—*www.nsta.org/docs/DutyOfCare.pdf*
Hazard Prevention and Control—*www.osha.gov/shpguidelines/hazard-prevention.html*
Safety Data Sheets—*www.osha.gov/Publications/OSHA3514.html*
Chemical Hygiene Plan—*www.osha.gov/Publications/laboratory/OSHAfactsheet-laboratory-safety-chemical-hygiene-plan.pdf*