OSHA Revises the Hazard Communication Standard

By Kathryn Craig

OSHA's Hazard Communication Standard (HCS), enacted in 1983, is often referred to as "the employee right to know" act. All employers that store and process hazardous chemicals in their workplace are required to have a hazard communication program, including container labels, material safety data sheets, and employee training. All employers with employees exposed to hazardous chemicals must operate a hazard communication program and ensure that exposed employees are provided with labels, access to MSDSs, and training on the hazardous chemicals in their workplace. Tufts University has had a written Hazard Communication Program in place for over 20 years. All new employees at Tufts receive training during orientation.

In the spring of 2012 OSHA finalized changes to the HCS is an attempt to bring the United States into alignment with the Globally Harmonized System of Classification and Labeling of Chemicals (GHS). GHS is an internationally agreed upon system created by the United Nations. It is designed to replace the various classification and labeling standards used in different countries.

GHS provides a single set of harmonized criteria for classifying chemicals according to their health and physical hazards and specifies hazard communication elements for labeling and safety data sheets. GHS offers consistent criteria for classification and labeling on a global level.

Hazard pictograms are one of the key elements for the labeling of containers under the GHS. There are 9 standard pictograms to depict if the chemical is a physical, health or environmental hazard. These pictograms must have a red border. Along with the pictograms, other requirements are:

- an identification of the product;
- a signal word – either **DANGER** or **WARNING** - where necessary
- hazard statements, indicating the nature and degree of the risks posed by the product
- precautionary statements, indicating how the product should be handled to minimize risks to the user (as well as to other people and the general environment)
- the identity of the supplier (who might be a manufacturer or importer)

The GHS labeling requirements are intended to replace older systems of hazard pictograms or labeling systems, such as the National Fire Protection Association's (NFPA) labeling system. However, NFPA didn't agree with all these changes and is keeping their own labeling criteria.

The NFPA identifies the hazard of a chemical in terms of three principal categories: health hazard (blue diamond), fire hazard (red diamond) and reactivity (yellow diamond). Within each category the chemical is ranked and placed into a class. There are 4 classes, with 4 being the most toxic or hazardous and 0 being nontoxic or least hazardous.

The NFPA is a private business, not a government agency. Although the NFPA has no regulatory authority, many fire departments and local ordinances require that laboratories post the NFPA 704 red-yellow-blue symbol on the door to alert emergency responders to the hazards found in the laboratory. Therefore, for the three Tufts campuses, complying with NFPA's labeling and classification system will remain a requirement.

The problem is, under the GHS system the highest hazard is given a rating of 1. Therefore, the highly hazardous chemicals will be assigned a rating of 1 under GHS and a 4 under NFPA. So now there are two required and contradictory labeling requirements for chemicals.

The new SDSs produced by Sigma Aldrich contain both rating systems. One way to remember it is; GHS is a global system, we have one planet so our no.1 hazards are assigned a 1.

MSDSs will now be called Safety Data Sheets (SDS) and the format has changed. The new SDSs have 16 sections, but only sections 1-11of the SDS are mandatory. Sections 12-16 are non-mandatory since they contain information not related to worker health protection. Other than the name change and the order in which information is given, not much has changed.

Below is a summary of the major changes to the Hazard Communication Standard:

- Hazard Classification: Chemical manufacturers and importers are required to determine the hazards of the chemicals they produce or import. Hazard classification under the new, updated standard provides specific criteria to address health and physical hazards as well as classification of chemical mixtures.

Caption describing picture or graphic.

- Labels: Chemical manufacturers and importers must provide a label that includes a signal word, a standard pictogram (9 to choose from and they must have red border), hazard statement, and precautionary statement for each hazard class and category.
- Safety Data Sheets: Previously called Material Safety Data Sheets or MSDS. The new format requires 11 specific sections, ensuring consistency in presentation of important protection information.
- Information and training: To facilitate understanding of this new system, employers are required to train workers by December 1, 2013 on the new label elements and safety data sheet format. This is in addition to the current training requirements.
- OSHA is requiring compliance with all of the provisions for preparation of new labels and SDSs by 6/1/2015. Employers will be given an additional year (6/1/2016) to update their hazard communication programs or any other workplace signs if applicable.
- Tufts will have to review the written hazard communication program by December 1, 2013. Chemical users at Tufts should start to update Safety Data Sheets as the new format becomes available. Also, the new regulation implies that all chemicals must have the new

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labels by June, 2016. This raises the question "do we need to go through our chemical inventory and re-label all of our existing chemicals?" There has been talk that OSHA will issue a letter of interpretation on this and it will hopefully only apply to newly purchased chemicals, which will be labeled this way by the manufacturer.

These new labeling requirements are another reason why buying chemicals in bulk and storing them for a potential future use is not a good practice. We recommend you just order what you need, and then use what you order. Try to maintain an up to date written inventory with fewer containers of chemicals and smaller amounts in each. "Less is Better" is the way to go for all reasons-safety, environmental and financial. Laboratory workers must also comply with OSHA's Laboratory Standard and the OSHA required Tufts University chemical hygiene plan which can be found on TEHS chemical safety webpage at http://publicsafety.tufts.edu/ehs/chemical-safety

Lab workers must take annual lab safety training, keep updated chemical inventories and submit them to TEHS annually. Also high hazard substances must be reported to TEHS on the High Toxic Chemical/Carcinogen Registration Form and have a written safety plan.

OSHA has stated that the Hazard Communication Standard in 1983 gave workers the "right to know," but the new Globally Harmonized System gives workers the "right to understand." Whether or not it really will give workers "the right to understand" remains to be seen. However, every year since 1983 violations of the Hazard Communication have been in OSHA's top 10 most frequently cited violations. To an OSHA inspector this standard is "low hanging fruit," so it's best to take all possible steps to be in compliance with this regulation.

The Effects of Laser Light on the Eye

By Geoffrey C. Sirr

Laser light of sufficient intensity and exposure time can cause irreversible damage to the eye. Laser effects are thermal or photochemical and dictated by the laser photon wavelength, exposure time and mode of operation (i.e. whether the laser is functioning in pulsed or continuous wave mode).

Lasers may interfere with vision either temporarily or permanently in one or both eyes. At low-power levels, lasers may produce a temporary reduction in visual performance. For high-power lasers, where outputs are greatly exceeding maximum permissible exposure limits, the effect can result in long term visual loss or permanent blindness.

The principal thermal and photochemical effects of laser exposure depend upon the following factors:

1. Absorption and scattering coefficients of the tissue or media of concern (e.g. cornea, lens, vitreous fluid, blood, retina)
2. Vascular flow
3. Irradiance (W/cm2) or radiant exposure (J/cm2) of the laser beam
4. Duration of the exposure
5. Area of exposure

Figure 1

Figure 1 shows a laser beam striking the corneal surface. What percentage of the laser beam intensity is absorbed, transmitter or scattered? This really depends on the impingent photon wavelength and the material or medium that is impacted.

The Eye and Wavelength Relationship

Figure 2 is a simple schematic of the eye. The following parts of the eye are important with regard to laser effects:

- The **Cornea**, a transparent front part of the eye, and transmits most laser wavelengths except < 300nm, or > 3000nm.
- The **Lens**, a transparent structure located behind the pupil, which focuses light on the retina, allows visible and near-infrared energy to pass through while absorbing near-ultraviolet radiation (absorbs 300-400nm, 1400-3000nm).
- The **Retina**, the back of the inside of the eye where images are formed, has a high concentration of photoreceptor cells. Wavelengths not absorbed by the lens (400 – 1400 nm) are deposited on the retina and known as the retinal hazard region.

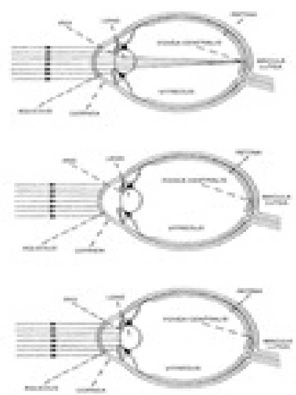

Figure 2

Laser Wavelength and the Eye's Response

- ***Ultraviolet***: Lasers operating in the ultraviolet spectrum (below 400 nm) are absorbed in the anterior segments of the eye, primarily by the cornea, as well as by the lens.
- ***Visible***: Laser radiation in the visible region of the spectrum (400-780 nm) is absorbed primarily within the retina. An ideal eye can focus a collimated visible beam by as much as 100,000 times.
- ***Near Infrared***: Laser radiation in the near-infrared region of the spectrum (700-1400 nm) is absorbed primarily within the retina. An ideal eye can focus a collimated near-infrared beam by as much as 100,000 times. This portion of the spectrum is a very dangerous area. The eye will focus the energy, but it is not visible and thus creates a very dangerous situation.
- ***Far Infrared***: Laser radiation in the far-infrared region of the spectrum (1400+ nm) primarily affects the cornea.

References: ANSI Z136.1 – 2000; American National Standard for Safe Use of Lasers