

## **Hazardous Chemicals in a Forensic Laboratory**

The following series will cover the ordering, labeling, working with and disposing hazardous chemicals in a forensic lab starting with this week's topic, the purchase and labeling hazardous chemicals. The following weeks will include the proper use of hazardous chemicals, maintaining hazardous waste area/sites, spills and containment, and lastly, the disposal of hazardous wastes.

### **Part 1: Purchasing, training and labelling hazardous chemicals**

Many forensic labs purchase, store, use, and dispose of hazardous chemicals. Having proper procedures are key to any laboratory safety program, including health and safety issues as they pertain to accreditation. Many labs have not looked as carefully as they should at their use of hazardous chemicals. For example, does your lab use DFO or cyanoacrylate products? Do they make up mixtures and solutions with acetone, ethanol, or methanol? Do they use pentane, motor oil, or heptane? Do they have nitric acid, hydrochloric acid, or acetic acid in the lab? How about presumptive blood test kits or luminol blood reagents? All of these chemicals are hazardous and must be stored, used, and disposed of properly.

#### **Purchasing laboratory chemicals**

To properly handle hazardous chemicals, you must have a procedure in place on who approves the purchase of chemicals used in the lab. Any chemical purchase made should require the approval of a safety officer or someone with similar knowledge to determine the lab's ability to use and store the chemical in question. This process allows for any questions on the storage, usage, and disposal of the item to be taken into consideration before its purchase. The safety officer will confirm that the lab has proper storage space for this chemical and that disposal policies include the chemical in question. Chemicals should never be purchased unless there is proper storage available for the item, including the quantity to be purchased.

Also, does the lab employ just-in-time purchasing/ordering? Just-in-time purchasing is when purchases are made at the time of need rather than ahead of time. This allows for the decrease of laboratory waste by receiving goods only as they are needed. Using a just-in-time procedure also eliminates the over-ordering of chemicals. Over-ordering usually results in chemical disposal, at some point, of unused chemicals. Not only is this a waste of money, but it is also an environmental issue when we dispose of old or outdated chemicals, which should not have been purchased in the first place.

#### **Training personnel**

Once chemicals are purchased the lab must have a policy in place that the individuals who work with the chemicals have read and understand the Safety Data Sheets (SDSs). The OSHA Hazard Communication standard states that "All employers with hazardous chemicals in their workplaces must have labels and safety data sheets for their exposed workers, and train them to handle the chemicals appropriately." Even if you work for a state agency where federal OSHA regulations are supplanted by your state regulations, state regulations may only be stricter than federal regulations rather than less restrictive. Therefore, your lab must follow hazard communication guidelines.

The lab personnel should know where to find the SDSs, especially during an emergency. Are they kept in a binder or are they only available online? Does everyone understand the dangers of what they are working with and do they understand proper disposal procedures? Do you address these issues in an employee orientation, before the employee works with the chemical, as required by OSHA? OSHA requires initial training on hire and when hazards change to the

extent that additional training is required. Do you have policies in place to address these safety concerns?

### **Inventory and safety data sheet management**

An inventory should be kept of all chemicals onsite. The inventory should be updated, at a minimum, annually. This need not be an exact representation on any other day than the date of the inventory, however, it gives a scope of the chemicals stored on-site. This also allows for a review of what is on hand, what is needed, and what may be re-purposed or discarded in the future. If you keep hard copies of SDSs the inventory will help to confirm you have a copy for each chemical stored.

### **Labeling laboratory chemicals**

All laboratory chemicals, in their original shipping containers, must be labeled with the full, complete, name of the item stored in the container. OSHA has adopted the new Globally Harmonized System of Classification and Labeling of Chemicals (GHS). All hazardous chemicals shipped after June 1, 2015, must be labeled with specified elements, including pictograms, signal words, and hazard precautionary statements. Labels must contain the following:

- Name, Address, and Telephone Number (i.e., Lab Chem, Inc., 1010 Jackson's Pike Ct., Zelienople, PA, 16063 Tel: 412-826-5230)
- Product Identifier (i.e., chemical name, Acetone)
- Signal Word (i.e., Danger)
- Hazard Statement (i.e., Highly flammable liquid, causes serious eye irritation may cause drowsiness)
- Precautionary Statement (i.e., Keep away from heat, hot surfaces, open flames, sparks)
- Pictogram (a graphic symbol used to communicate the specific hazard)



However, working solutions need only have workplace labels. The information provided may be all of the information listed above or may use words, pictures, and symbols which convey the pertinent information. The label should include:

- Full proper name (i.e., Ninhydrin 6 g/Acetone 1000 ml Base Solution)
- Hazardous class (i.e., Flammable/Ignitable)
- Signal Word (i.e., Danger)
- Pictogram (use of symbol)

Each of the above requirements, are requirements for best practices. When it comes to chemicals, all aspects from purchasing, inventorying, labeling of, storage of, their use and their disposal of must all be reviewed by everyone who works with and uses hazardous chemicals. There can be no shortcuts when working with chemicals and the health and safety of your workforce. Taking the time to have the proper policies and procedures in place will help to mitigate issues in the future.

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Below are some links to help you further read and understand the issues related to chemical storage in a forensic lab

**OSHA**

[www.osha.gov/Publications/OSHA3636.pdf](http://www.osha.gov/Publications/OSHA3636.pdf)

<https://www.osha.gov/Publications/osha3111.pdf>

**Berkeley**

<https://ehs.berkeley.edu/chemical-safety>

**Indiana University**

<https://ehs.iupui.edu/lab/guidance/storage/index.html>

**OSHA and the Forensic Laboratory**

<https://www.forensicmag.com/article/2004/06/osha-and-forensic-laboratory>

**Chemical Safety in the Forensic Laboratory**

<https://www.forensicmag.com/article/2004/09/chemical-safety-forensic-lab>