

## ***Standard Operating Procedure***

# Proper Labeling, Storage & Management of Chemicals in Labs

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Proper chemical labeling, storage and management is essential for a safe laboratory work environment. Inappropriate storage of incompatible or unknown chemicals can lead to spontaneous fire and explosions with the associated release of toxic gases. The procedures listed below are not intended to be all-inclusive but should serve instead to supplement more specific procedures and recommendations obtained from container labels, SDS, and other chemical reference materials.

### **CHEMICAL PROCUREMENT**

Most chemical products can be purchased without restriction from suppliers through TU marketplace or through TU Purchasing Services. However, some chemicals require notification or authorization to purchase, use and store.

To increase laboratory safety, decrease procurement delays, and reduce potential regulatory deficiencies, include these ordering procedures as part of your process planning.

- Obtain any necessary permits, licenses, or registration prior to ordering. Refer to Special Consideration below for details.
- Before ordering chemicals, carefully plan and outline specific safety precautions in an SOP approved by the Principal Investigator (PI) or Laboratory Supervisor.
- Order only those materials for which adequate safety equipment is available.
- Order the minimum quantity of chemical required.
- Prepare the laboratory prior to receipt of the material (i.e., establish storage location, post appropriate signs, obtain necessary personal protective equipment, etc.).

## SPECIAL CONSIDERATION

Special consideration or authorization is required to purchase, possess, and use the following:

- Chemicals of Interest - The Department of Homeland Security monitors chemicals of interest as they relate to the possibility of theft, release, or sabotage/contamination. See the [Chemical Security program](#) for additional information.
- DEA Controlled Substances-This category includes any drug or materials regulated by the United States Drug Enforcement Agency. See [Controlled Substance Program](#) for Research for additional information.
- Explosives- these items are regulated by the United States Department of Transportation and the Federal Bureau of Alcohol, Tobacco and Firearms.
- Tax Free Ethanol- This category includes alcohol used for education and scientific purposes and is regulated by both the Federal Bureau of Alcohol, Tobacco and Firearms and the Pennsylvania Liquor Control Board. Contact EHRS at 215-707-2520 for information.
- Compressed Gas Cylinders-Gas cylinders should only be purchased through suppliers that have a cylinder return or return authorization program.
- Highly Dangerous Materials-Materials that are extremely hazardous to property, health, or the environment (e.g., pyrophoric, highly water-reactive chemicals, and highly toxic gases, etc.) may not be procured until the necessary administrative, engineering, and environmental controls are in place.

**CAUTION:** The use and possession of radioactive materials and certain toxins and biological materials (e.g. CDC select agents) require prior approval from EHRS. Contact EHRS 215-707-2520 for information.

## RECEIPT AND DISTRIBUTION

Laboratory process planning must include the receipt and distribution of hazardous materials. Follow these guidelines when materials are received in the laboratory or are transported on campus.

- Do not accept any chemical in a damaged or improperly labeled container.
- Obtain and review a SDS or equivalent for all chemical materials.
- Use shock-resistant carriers when transporting materials by hand.

- When transporting materials by cart, ensure the cart is stable enough to prevent tipping and provide containment of any spilled materials.
- When transporting materials on elevators, use freight-only elevators (where possible) to avoid potential exposure to passengers. Do not accompany a compressed gas cylinder on an elevator. Place the cylinder, secured in a cart, in the elevator, attach a sign to the cylinder to let others know not to ride in the elevator with the cylinder.
- Use an appropriate hand truck or cart to transport gas cylinders and Dewar flasks (do not drag or roll), ensure the valve protection caps are in place, and handle only one container at a time.
- Do not transport chemicals in personal vehicles.
- Adhere to permit condition when transporting permitted, licensed, or registered materials.

## **CHEMICAL INVENTORY & THE SAFETY DATA SHEETS (SDS)**

All laboratories must compile and maintain a list of hazardous chemicals or products in each area.

Current chemical inventories must be maintained using the Temple University Chemical Environmental Management System ([CEMS](#)), the University's online chemical inventory system.

CEMS is designed to track inventories during emergencies and assist laboratories in complying with federal, state, and local regulations. Chemical inventories, location contacts, and chemical specific Safety Data Sheets (SDS) must be available to emergency personnel so they know what chemicals may be involved in an accident and whom to contact in the event of an emergency. Laboratories should use CEMS to keep track of chemicals, avoid unnecessary purchases, and prevent keeping legacy or unneeded chemicals. Chemicals that are jointly purchased or shared should be listed in only one chemical inventory, requiring a responsible party to be determined by the purchasers.

Conduct a physical inventory of chemical present in your laboratory each year to identify unsafe conditions such as missing labels, items nearing expiration, and broken or leaking containers.

## **SAFETY DATA SHEETS (SDS)**

Safety Data Sheets (SDS) provide basic information about the safety and health hazards posed by a chemicals and precautions to take when using it.

The OSHA Lab Standard and the Hazard Communication Standard require that:

- SDSs be maintained for every hazardous chemical used and stored in each laboratory.
- SDS be readily accessible to all personnel working in the laboratory and available to all emergency response personnel.
- All laboratory personnel know where the SDSs are kept.

All laboratories should receive a SDS from the chemical manufacturer at the time of purchase. If the SDS is not provided with the chemical shipment, the chemical owner must obtain the SDS within a reasonable amount of time. Chemical owners may obtain a copy of the SDS by downloading it from the manufacturer's website or contacting EHRS for assistance.

Chemical users can obtain SDS by:

- Downloading it from the manufacturer's website,
- Retrieving it from CEMS SDS database from a TU IP-connected computer, tablet, or smart phone via the EHS website (<https://www.temple.edu/ehrs/SDS>), or
- Contacting EHRS for assistance.

***NOTE:** If synthesizing a hazardous chemical, the Principal Investigator (PI), Laboratory Supervisor and/or Instructor must generate a Globally Harmonized System (GHS) compliant label and SDS before shipping or transporting the chemical off campus.*

## CHEMICAL LABELING

All chemicals in the Laboratory are required to have a label that indicates chemical contents and hazard warnings.

## MANUFACTURER LABELING REQUIREMENTS

Chemicals purchased from a manufacturer will have labels that meet the OSHA Hazard Communication Standard labeling requirements:

- The product identifier uses on the safety data sheet,
- Signal word,
- Hazard statement(s),
- Pictograms ([OSHA Pictogram-Quick Card](#)),
- Precautionary statement(s)

- The name, address, and telephone number of the chemical manufacturer, importer, or other responsible party.

## LABORATORY LABELING REQUIREMENTS

Laboratory personnel are responsible for ensuring that all chemical containers produced in the laboratory are properly labeled as follows:

**CAUTION: All chemical container labels must be in English, legible, and easy to read.**

### Portable Containers-Stock or Working Solutions

Laboratories are responsible for labeling chemicals that are transferred from manufacturer containers into a secondary containers or chemicals that are synthesized in the lab. The container must be labeled with the following information:

- Identity of the contents (spell out chemical names-no chemical structures) listed on SDS
- Signal word, if known or suspected (e.g., “danger”. “warning”)
- Pictograms, if known or suspected (e.g., “flammable”, “corrosive”, “irritant”)

Alternate systems such as the National Fire Protection Association (NFPA) 704 hazard rating and the Hazardous Material Information System (HMIS) are permitted.

### Portable Containers for Immediate Use

Portable containers into which hazardous chemicals are transferred from a labeled container, and which are intended only for the immediate use of the laboratory personnel who performed the transfer are not required to be labeled.

### Peroxide-Forming Chemicals

All containers of peroxide forming chemicals must be labeled with the date received and the date of opening.

### CFATS Chemicals

All containers of chemical listed in the Chemical Facility Anti-Terrorism Standard must be labeled with a warning label to remind laboratory personnel that the substances are regulated and cannot

be shipped off campus without prior EHRS notification.

Example: This chemical is federally regulated and cannot be shipped without EHRS notification. Contact EHRS at 215-707-2520 for details.

### **Waste Containers**

Chemical waste containers must be labeled according to the guidelines specified in the Chemical [Waste Management](#) section of the EHRS website.

## **CHEMICAL STORAGE LIMITS AND REQUIREMENTS**

Chemical storage areas in the laboratory setting include storerooms, laboratory work areas (shelves and bench cabinets), storage cabinets and refrigerators/freezers.

### **CHEMICAL STORAGE QUANTITY LIMITS**

Chemical quantities in most University buildings are limited by the local fire code, which is based on the most recent International Fire Code (IFC) adopted by the local jurisdictions. Limits by “hazardous material” classification apply to a control zone that may include a suite of laboratories, one or more floors in a building, or the entire building. Quantity limits may be increased if fire sprinkler protect the entire control area, or in some cases, if hazardous materials are in approved cabinets. Laboratory personnel must cooperate with each other to ensure that quantities do not exceed code limits. This can be aided in maintaining an accurate chemical inventory in CEMS. To assure compliance with the IFC, contact the University Fire Marshal at 215-204-8687.

**CAUTION:** Observe chemical storage limits recommendations for certain types of chemicals obtained from the SDS, container or a Standard Operating Procedure (SOP).

**CAUTION:** A maximum of 10 gallons of flammable and combustible liquids may be stored outside of a flammable liquid container if in approved containers. Flammable liquid containers larger than 5 gallons are not permitted in laboratories unless approved by the University Fire Marshal.

## **GENERAL STORAGE REQUIREMENTS**

***NOTE:*** Consult the Safety Data Sheet (SDS), Chemical Label and Standard Operating

### *Procedures (SOPs) for specific storage information.*

Improper chemical storage is the most frequent problem found during laboratory audits. The proper storage of chemicals is the starting place for their safe use and management. Laboratories must develop a storage scheme in each chemical storage areas to ensure the segregation of incompatibles, and efforts must be made to isolate particularly flammable, reactive, and toxic materials. The following guidelines should be followed regarding chemical storage:

- All chemical containers must be labeled (as discussed in the previous section)
- All chemical containers must remain closed unless they are in use.
- Chemicals on bench tops and in chemical fume hoods must be kept to a minimum to prevent accidental spillage because of clutter and to ensure adequate airflow within the chemical fume hood.
- Chemical storage cabinets should be used whenever possible. When a cabinet is not available, a shelf with a lip to prevent chemical bottles from sliding off should be used for storage.
- Larger containers of chemical should be stored behind smaller container so that the maximum number of chemical labels possible can be read without moving containers.
- Hazardous chemicals and/or liquids must not be stored on the floor unless they are in a secondary container
- Chemical should have a date received placed on them so that users know the age of the chemical they are using. This is especially true of chemical that become hazardous when they expire.
- Chemicals should not be stored on high shelves. Large containers of chemicals must be stored on lower shelves to help prevent injuries. No chemical that may injure the eye should be stored at eye level or above.
- Segregate and store chemicals based first on their hazard class, not simply in alphabetical order.

#### **Laboratory Refrigerators/Freezers use for Chemical Storage**

The use of standard refrigerators to store flammable liquids is prohibited. Use explosion-proof or flammable-proof refrigerators to store flammable liquids that require refrigeration.

**CAUTION:** Laboratory refrigerators must not be used to store food or beverages.

#### **SEGREGATION OF INCOMPATIBLE CHEMICALS**

Chemical must be segregated to prevent mixing of incompatible chemicals in the event that container leak or break. The manufacturer label and SDS will contain information on incompatibilities.

## **CHEMICAL STORAGE ROOMS**

Rooms that are specifically used for chemical storage (stockroom, storeroom, preparation rooms) are required to be controlled access areas that are identified with appropriate signage. The chemical storage procedures and guidelines described above and throughout the manual are required to be implemented. Chemical storage room should be designed to provide proper controls for chemical storage.