



Laboratory Activation

VEHS Fact Sheet

Vanderbilt Environmental Health and Safety

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ADMINISTRATIVE/GENERAL

Hazard Signs. Hazardous work areas and equipment must be posted for biohazards, carcinogens, radiation, and lasers. Make sure the proper signs are obtained and posted. Contact VEHS with any questions concerning proper hazard signage. (322-2057)

Emergency Evacuation Plan: Every department should have an Emergency Evacuation Plan that addresses all work areas within the department. When relocating to a new area, the Principal Investigator or Laboratory Instructor should be notified to update the existing department plans to incorporate new locations and procedures. The locations of safety showers, eyewashes, fire extinguishers, pull stations, and spill kits, all available means of exit from laboratories and the building, and evacuation assembly areas must be reviewed with employees in the new lab. Have your supervisor document your review for inclusion in your Laboratory Chemical Hygiene Plan.

Location of Emergency Equipment: An emergency eyewash and shower should be working and accessible within 100 feet of your lab and require no more than 10 seconds to reach. Be sure the water runs clean out of these devices and access to them is not blocked. Arrange with your department's administrative office to have Plant Services or Plant Operations correct any problems. No point in the laboratory should be more than 50 feet from the nearest ABC fire extinguisher. Consult Plant Services or Plant Operations for proper location and mounting of fire extinguishers.

Aisle Clearance: There must be a minimum of 22" clearance in the aisles.

Storage Areas: The following safety elements should be included in setting up storage areas in your new lab.

- Lab / Office furniture (i.e.: computer desk, rolling carts, printer stands, plant stands, etc) should not be used for permanent storage of hazardous chemicals.
- Store large or heavy bottles and containers close to the floor and secure overhead objects.
- Shelves should be secured (bolted) to a wall.
- Storage area should be well lit, properly ventilated, and have an even temperature.
- Secondary containment of chemical containers in polyethylene trays is recommended for spill protection.
- Shelves above eye level (approx. 60") should have fall guarding attached.

PERSONAL PROTECTIVE EQUIPMENT:

If you are employing personal protective equipment (PPE) in the laboratory (i.e.: respirators, laser eye wear, protective gloves, etc.) before using these items in the new laboratory, consult VEHS on their adequacy and proper usage.

HOODS:

Before laboratory functions begin in the new laboratory an inspection of all fume hoods shall be performed by VEHS.

CHEMICAL

Segregation by Hazard Class: Segregate incompatibles and store by hazard class. DO NOT STORE CHEMICALS ALPHABETICALLY, except within a hazard class. Recommended general hazard classes for storage are listed below along with storage guidelines for each class. The storage and segregation of chemicals are also addressed in the Chemical Hygiene Plan Guide.

Acids: materials with $\text{pH} < 5$. Examples include acetic, hydrochloric, and hydrofluoric.

- Separate from bases and materials, which could evolve toxic vapors on contact (i.e., sodium cyanide).
- Store large bottles low to the ground—at least below eye level.
- Separate inorganic acids from organic acids (i.e., acetic, oxalic, etc.).
 - Acetic acid can be stored with flammable and combustible solvents.
- Separate from active metals (i.e., sodium, potassium).
- Store perchloric and nitric acid as oxidizers.

Caustics (Bases): materials with $\text{pH} > 9$. Examples include ammonium hydroxide, calcium hydroxide, and sodium hydroxide.

- Separate from acids.
- Store solutions of inorganic hydroxides in polyethylene containers.
- Store large containers below eye level.

Flammable/Combustibles: vapors ignite easily at room temperature. Examples include alcohols, esters, ketones, ethers and pyrophorics.

- Store flammable liquids in approved safety cans or cabinets.
- Keep away from heat, sun, flame, and spark sources.
- Separate from oxidizers.
- Use only UL or Factory Mutual approved “flammable storage” or “spark-proof” refrigerators for cold storage of flammables.

Oxidizers: materials, which yield oxygen: react with water, fire, flammables and combustibles. Examples include inorganic nitrates (nitric acid), permanganates, inorganic peroxides, persulfates, and perchlorates (perchloric acid).

- Keep separate from flammables and other organic materials.
- Keep separate from reducing agents (i.e., zinc, alkaline metals, formic acid).
- Do not store directly on wooden surfaces

Poisons (Highly toxics): dangerous if inhaled, swallowed or absorbed through the skin. Examples include phenol and hydrazine.

- Store according to label directions.

- Keep tightly sealed.

Water Reactives: react with water to yield flammable or toxic gases, or other hazardous conditions. Examples include sodium, potassium, metal hydrides and hydrolysable halides (titanium tetrachloride, phosgene etc.)

- Keep away from water sources—do not store above or below sinks.
- Use dry chemical extinguisher for fire.

Storage of Flammable Liquids: Prudent laboratory practice dictates that flammable storage in the lab should be kept to a minimum.

- Glass containers storing flammable liquids shall not exceed 1-quart (liter) in volume. EXCEPTION: For conditions where chemical purity is a concern, glass containers holding flammable liquids shall not exceed 1-gallon (4-liters).
- More than 5-gallons of flammable liquids present outside of safety cans (based on 5-gallons per 100 square feet of area of lab area), requires the use of a flammable-liquids storage cabinet.
- Flammable-liquids storage cabinets are not intended for the storage of highly toxic materials, acids, bases, compressed gases or pyrolytic chemicals
- Quantities in excess of ten gallons should be stored in flammable liquid storage cabinets.

Unstable Chemical Compounds: Organic peroxides are a class of compounds that have unusual stability problems that make them among the most hazardous substances found in the laboratory. As a class, organic peroxides are considered to be powerful explosives and are sensitive to heat, friction, impact, and light, as well as to strong oxidizing and reducing agents. Common compounds that form peroxides during storage include:

Ethyl ether	Dioxane	Tetrahydrofuran
Isopropyl ether	Acetal	Divinyl acetylene
Potassium metal	Butadiene	Vinylidene chloride
Vinyl chloride	Vinyl ethers	Cumene
Cyclohexene	Styrene	Sodium amide
Dicyclopentadiene	Diacetylene	Methyl acetylene
Vinyl acetylene	Vinyl acetate	Methylcyclopentane

- Peroxide formers should be labeled with date received and opened
- Peroxide formers should be discarded as waste within three to six months of opening.
- Unopened peroxide formers should be discarded within 12 months of receipt.

Storage of Hazardous Waste In the Laboratory: Each lab should have a designated location in which to store hazardous materials to be discarded (do not keep radioactive waste and hazardous chemical waste in the same place). This location should be out of the way of normal lab activities, but easily accessible and recognizable by VEHS staff. Refer to the Hazardous Waste Fact Sheet guidelines for hazardous waste storage.