

Handling Chemicals of Low to Moderate Toxicity



Overview

Chemicals of low to moderate hazards are commonly used in Weill Cornell Medicine laboratories. They are categorized based on their health and/or physical hazards. This Update provides guidelines on how to identify and safely handle such chemicals. It should be used as a general Standard Operating Procedure (SOP) in addition to the WCM [Chemical Hygiene Plan](#). More specific SOPs may need to be developed depending upon particular hazards of the chemical.

Applicability

This Update applies to all WCM laboratory students, faculty, staff, and visitors working with low to moderate toxicity chemicals.

Responsibilities

Principal Investigators and Laboratory Supervisors are responsible for establishing and enforcing compliance with this Update, providing training to their personnel, and contacting EHS for additional assistance.

Laboratory Personnel must:

- Handle chemicals safely according to this Update, the [WCM Chemical Hygiene Plan](#), and their laboratory procedures.
- Contact their supervisor or EHS for assistance if needed.

Environmental Health and Safety (EHS) assists in implementing this Update and monitors WCM for compliance with all relevant regulations, policies, and procedures.

Hazard Identification

Using the Globally Harmonized System of Classification and Labeling of Chemicals is the primary means of identifying low and moderate toxicity chemicals. Health and physical hazards are assigned hazard codes (H codes) and hazard statements, shown on a chemical's Safety Data Sheet (SDS). Tables 1 and 2 below list the H codes and pictograms of low and moderate toxicity ratings. Not all chemicals have H codes, and other sources of information can help assess a chemical's toxicity, such as lethal dose, lethal concentration or other reported effects. Note that High Hazard Substances are covered in the [High Hazard Operating Procedures](#) EHS Update, and additional information about Particularly Hazardous Substances is covered in the [Working with Carcinogens and Reproductive Toxins](#) EHS Update.

Table 1: Acute Ingestion, Dermal and Inhalation Toxicity

Toxicity	GHS Category	Code	LD ₅₀ Oral (mg/kg) ¹	Code	LD ₅₀ Dermal (mg/kg)	Code	LC ₅₀ Gases (ppm) ²	LC ₅₀ Vapors (mg/l) ³	LC ₅₀ Dusts & Mists (mg/l)	Pictogram
Moderate	3 - Toxic	H301	50 - 300	H311	200 - 1000	H331	500 - 2500	2 - 10	0.5 - 1	
Moderate	4 - Harmful	H302	300 - 2000	H312	1000 - 2000	H332	2500 - 5000	10 - 20	1 - 5	
Low	5 - May be harmful	H303	2000 - 5000	H313	--	H333	--	--	--	none

¹ LD₅₀ = lethal dose 50; mg/kg = milligrams per kilogram

² LC₅₀ = lethal concentration 50; ppm = parts per million

³ mg/l = milligrams per liter

Table 2: Other Toxicity Types

Toxicity	GHS Category	Code	Code Description	Pictogram
Moderate	1A, B, C	H314	Causes severe skin burns and eye damage	
Low	2	H315	Causes skin irritation	
Low	3	H316	Causes mild skin irritation	None



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Environmental Health and Safety

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Table 2, continued: Other Toxicity Types

Toxicity	GHS Category	Code	Code Description	Pictogram
Moderate	1	H317	May cause an allergic skin reaction	
Moderate	1	H318	Causes serious eye damage	
Low	2A	H319	Causes serious eye irritation	
Low	2B	H320	Causes eye irritation	None
Moderate	1	H334	May cause allergy or asthma symptoms or breathing difficulties if inhaled	
Low	1	H335	May cause respiratory irritation	
Low	1	H336	May cause drowsiness or dizziness	
Moderate	1A, 1B	H340	May cause genetic defects	
Low	1A, 1B	H341	Suspected of causing genetic defects	
Moderate	1A, 1B	H350	May cause cancer	
Low	1A, 1B	H351	Suspected of causing cancer	
Moderate	1A, 1B	H360	May damage fertility or the unborn child	
Low	1A, 1B	H361	Suspected of damaging fertility or the unborn child	
Moderate	1	H370	Causes damage to organs	
Moderate	2	H371	May cause damage to organs	
Low	2	H372	Causes damage to organs through prolonged or repeated exposure	
Low	2	H373	May cause damage to organs through prolonged or repeated exposure	

Procedures

ACCIDENTS AND SPILLS

Employees involved in an exposure or spill incident must find the emergency shower and eyewash and follow the procedure outlined in the WCM [Exposure and Spill Response Guide](#).



- **Eye Contact: Promptly flush eyes with water for a prolonged period (15 minutes) and seek medical attention.** Report incident to your supervisor / Principal Investigator and EHS.
- **Skin Contact: Promptly flush the affected area with water, remove contaminated clothing and seek medical attention.** Report incident to your supervisor or Principal Investigator and EHS.

LABELING AND SAFETY DATA SHEETS

Safety Data Sheets



- **Label all containers with the full chemical name(s).** If abbreviations are used, post a list of abbreviations and corresponding chemical names in the lab.
- **Ensure that a Safety Data Sheet (SDS) for each chemical is readily accessible** by all employees and reviewed prior to starting work. SDSs are available in [ChemWatch](#) from any device connected to the WCM secure network.

EXPOSURE PREVENTION

- **Maintain work areas clean and uncluttered.** Clean up the work area at the end of an operation, or at the end of each day.
- **Plan experiments and manipulations** including mock/dry runs as much as possible, especially before conducting new protocols or working with new chemicals to identify potential failure points.
- **Develop and encourage safe habits.**
- **Avoid unnecessary exposure to chemicals by any route.** Do not smell or taste chemicals.



ENGINEERING CONTROLS

Use a chemical fume hood to:

- Work with moderately toxic chemicals;
- Perform operations that may release toxic chemical gases, vapors, or dust.
- Vent equipment that may discharge toxic chemicals (e.g., vacuum pump, distillation column);
- Work with volatile substances with Permissible Exposure Limit (PEL) or Threshold Limit Value (TLV) of less than 50 ppm (Consult the SDS for TLV or PEL).

Fume hood tips:

- Do not use a fume hood if the flow is less than 80 or more than 150 linear feet per minute.
- Keep the hood sash closed except when actively working in the hood.
- Do not obstruct hood vents or airflow by excessive storage or large equipment.

Cold / warm rooms: do not work with volatile toxic substances in cold rooms and warm rooms as they recirculate the space air.

Glove box: test glove boxes and inspect gloves before use.

GENERAL LAB SAFETY

- Be alert to unsafe conditions and correct them immediately when detected.**
- Practice good hand hygiene.** Wash hands before conducting any of these activities and after removing PPE.
- Avoid working alone on a project.
- Do not work alone in a laboratory if the procedure is hazardous.**
- Do not work late nights or weekends with toxic or hazardous chemicals** unless the procedure is standard practice and poses no exceptional risks to personnel.
- Do not eat, drink chew gum, store food/drink, or apply cosmetics/lotions in the laboratory.**
- Label microwave ovens used for lab purposes with “not for human use”.
- Do not use damaged glassware.
- Use extra care with Dewar flasks and other evacuated glass apparatus, and shield them to contain chemicals and fragments should implosion occur.
- Do not use mouth suction for pipetting or starting a siphon.** Instead, use a squeeze bulb, house vacuum, Bernoulli device or pipets for these functions.
- Avoid practical jokes or other behavior which might confuse, startle, or distract another worker.

PERSONAL APPAREL AND PERSONAL PROTECTIVE EQUIPMENT (PPE)

- Choose PPE based on the hazards of the chemical and likely routes of exposure.**
- Wear clothing that covers the body to prevent exposure from spilled materials in the laboratory.
- Wear shoes that cover the entire foot. Perforated shoes, open-toe and open-heel shoes, sandals, high heels, or clogs are not permitted. Shoes should have stable soles to provide traction on slippery or wet surfaces in order to reduce the chance of slipping and falling.
- Confine long hair and loose clothing.
- Use face shields in addition to safety glasses when working with strong corrosives.
- Wear appropriate gloves when the potential for contact with hazardous materials exists. Inspect the gloves before each use and replace them when damaged.**
- Lab coat: refer to the [laboratory coat program](#) for information on ordering and uses. Launder lab coats or discard disposable coats periodically. **Remove lab coats before leaving the laboratory.**
- Consult EHS for respiratory protection needs as a medical evaluation and fit-test are required prior to using a respirator.





UNATTENDED OPERATION

An unattended procedure is a process or piece of equipment operating when no one is in the lab. If this is unavoidable, follow the basic steps below:

- Design the experiment to prevent the release of hazardous substances in the event of interruptions in utility services such as electricity, cooling water, or inert gas.
- Provide for the containment of toxic substances in the event of failure of a utility service to an unattended operation.
- Equipment such as power stirrers, hot plates, heating mantles, and water condensers should not run unattended without fail-safe provisions.
- Use electrical overload-protection devices for long periods of unattended equipment operation.
- Leave the room lights on in the area of unattended laboratory operation.
- Placard laboratory door with the nature of the unattended operation, a list of the hazardous materials that may be released, and a telephone number of the person(s) to be contacted in an emergency.
- Do not leave open flames unattended for any period of time.

STORAGE

- Do not store corrosives and poisons above waist height.**
- Do not store incompatible materials together.**
- Watch for overcrowding or over storage of hazardous chemicals.**
- Do not store hazardous chemicals past their expiration date.**

WASTE DISPOSAL

- All laboratory operations must include plans and training for waste disposal.** Contact EHS for advice on chemical waste disposal before conducting an experiment.
- Label all waste containers with the [WCM Hazardous Waste Label](#)** (available from EHS). The label must include the full name of all chemicals. If you re-use containers, deface the original label and replace with a new, updated label.
- Refer to the [Hazardous Waste Manual](#) for information on chemicals authorized for drain or regular trash disposal.
- Request collection via [Salute](#).

HAZARDOUS WASTE	
Weill Cornell Medicine	
Contact Name:	Contact Number:
Principal Investigator:	
Hazard Characteristics (check all that apply):	
<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>
Chemical Name(s):	
For assistance, contact Environmental Health and Safety 646-962-7233 ehs@med.cornell.edu https://ehs.weill.cornell.edu	

References

- EHS Update: [High Hazard Operating Procedures](#)
- Sigma-Aldrich GHS Poster https://www.sigmaaldrich.com/content/dam/sigmaaldrich/docs/promo_NOT_INDEXED/General_Information/1/h_overview.pdf
- WCM Chemical Hygiene Plan [EHS Manual, 4.1](#)
- WCM Waste Disposal Procedures [EHS Manual, 5.2](#)
- Occupational Safety and Health Administration (OSHA) [29 CFR 1910.1450 – Occupational Exposure to hazardous chemicals in laboratories, Appendix A](#), Section E.1 – General Rules for all Laboratory Work with Chemicals.
- Casarett & Doull's Toxicology: The Basic Science of Poisons, 3rd Edition Klaasen Et. Al.; Macmillan Publishing.