Handling Chemicals of Low to Moderate Toxicity

Overview
Chemicals of low to moderate toxicity are commonly used in Weill Cornell Medicine (WMC) laboratories. Low toxicity is defined as chemicals having an LD$_{50}$ orally in rats value of >5g/Kg. Moderate toxicity is defined as chemicals having an LD$_{50}$ orally in rats value of 0.5-5g/Kg. This information can be found on a chemical's Safety Data Sheet (SDS) or by contacting Environmental Health and Safety (EHS). This Update provides basic guidelines for using these chemicals in laboratories. It is to be used as a general Standard Operating Procedure (SOP) in addition to the College’s Chemical Hygiene Plan. More specific SOPs may need to be developed depending upon the hazard.

Applicability
All WMC laboratory students, faculty, staff, and visitors working with chemicals of low to moderate toxicity.

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

Principal Investigators and Laboratory Supervisors establish and enforce practices in compliance with the requirements set forth in this Update and provide training to their personnel, contacting EHS for additional assistance as needed.

Laboratory Personnel will read this update, follow the procedures established in their laboratory and contact their supervisor or EHS for additional assistance.

Procedure

PRIOR TO INITIATION OF EXPERIMENTS
All employees must consult the Safety Data Sheets (SDSs) for all reagents to be used in the protocol. Employees will familiarize themselves with hazards and will use the information contained on the SDSs to select the correct personal protective equipment (gloves, disposable suits, etc.), protective devices and safe storage and disposal practices. Additional assistance can be obtained from EHS.

- All moderately toxic chemicals must be used inside a chemical hood in the laboratory.
- All containers must be labeled, with the full chemical name(s) of the reagents contained within, on permanent labels whenever storage of reagents is practiced.
- All waste containers must be properly and permanently marked with the WCM Hazardous Waste Label (available from EHS), with the full name of all chemicals contained, and will be submitted to EHS for disposal as needed. Preexisting labels on reused containers should be defaced or covered permanently.
- All technical and research personnel will handle moderately toxic chemicals and chemicals used in routine procedures in accordance with information contained in Material Safety Data Sheets provided for these chemicals.
- All employees will read and familiarize themselves with WCM's Laboratory Chemical Hygiene Plan.

GENERAL RULES FOR LABORATORY WORK WITH CHEMICALS

1. Accidents and Spills
   - Eye Contact: Promptly flush eyes with water for a prolonged period (15 minutes) and seek medical attention. Report incident to your supervisor or Principal Investigator and EHS.
   - Skin Contact: Promptly flush the affected area with water and remove any contaminated clothing and seek medical attention. Report incident to your supervisor or Principal Investigator and EHS.
   - Clean up: Follow the guidelines in the EHS Update “Chemical Spill Planning and Response”.

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2. **Avoidance of “Routine” Exposure**
   - Develop and encourage safe habits.
   - Avoid unnecessary exposure to chemicals by any route.
   - Do not smell or taste chemicals.
   - Vent apparatus that may discharge toxic chemicals (vacuum pumps, distillation columns, etc.) into local exhaust devices, such as chemical hoods.
   - Test glove boxes and inspect gloves for proper function before use.
   - Do not allow release of toxic substances in cold rooms and warm rooms, since these have contained recirculated atmospheres, with no dilution of vapors or gases.

3. **Choice of Chemicals**
   - For the chemicals used, assure that appropriate ventilation system is available in the lab.
   - Chemical hoods must be used, if the chemicals are noxious or have toxic properties.

4. **Use of Chemical Hood**
   - Use the hood for all operations which might result in release of toxic chemical gases, vapors or dust.
   - As a general rule, use a hood or other local ventilation device when working with any appreciably volatile substance with a Permissible Exposure Limit (PEL) or Threshold Limit Value (TLV) of less than 50 ppm. Consult the MSDS for TLV or PEL.
   - Confirm adequate hood performance before use. Do not use a hood with flow less than 80 or above 150 linear feet per minute.
   - Keep hood closed at all times except when adjustments within the hood are being made.
   - Keep materials stored in hoods to a minimum and do not allow them to block vents or air flow.
   - Contact EHS to verify chemical hood performance.

5. **Food and Drink**
   - No eating, drinking, or gum chewing is permitted in areas where laboratory chemicals are present.
   - Wash hands before conducting any of these activities.
   - Avoid storage, handling or consumption of food or beverages in laboratory storage areas and refrigerators, or when glassware or utensils are used for laboratory operations.

6. **Equipment and Glassware**
   - Handle and store laboratory glassware with care to avoid damage.
   - Do not use damaged glassware.
   - Use extra care with Dewar Flasks and other evacuated glass apparatus.
   - Shield or wrap them to contain chemicals and fragments should implosion occur.
   - Use equipment only for its designed purpose.

7. **Exiting**
   - Wash hands and areas of exposed skin before leaving the laboratory.
   - Remove laboratory coats before leaving the laboratory.

8. **Horseplay**
   - Avoid practical jokes or other behavior which might confuse, startle or distract another worker.

9. **Mouth Suction**
   - Do not use mouth suction for pipetting or starting a siphon. Use a squeeze bulb, house vacuum, Bernoulli device or pipets for these functions.

10. **Personal Apparel**
    - Application of cosmetics and lotions is prohibited in labs with chemicals.
    - Clothing that leaves large areas of skin exposed is not to be worn for work in laboratories.
    - Personal clothing should always cover 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 falling. Socks should cover the ankles so as to protect one’s skin against chemical splashes.
    - Confine long hair and loose clothing.
11. **Personal Protection**

- Use protective and emergency apparel and equipment as appropriate.
- Assure that appropriate eye protection is worn by all persons, including visitors, where chemicals are stored or handled.
- Use face shields in addition to safety glasses for work with strong corrosives.
- Know the location of emergency showers and eye wash stations and maintain free access to these devices.
- Wear appropriate gloves when the potential for contact with toxic materials exists. Inspect the gloves before each use, and replace them when damaged and signs of degradation appear.
- In the event of an exposure, remove all contaminated clothing immediately.
- Launder or discard disposable coats periodically.
- Use appropriate respiratory equipment when air contaminant concentrations are not sufficiently restricted by engineering controls. Consult Environmental Health and Safety on selection of respirators and their use before ordering or using such devices. A medical evaluation and fit-test are required before using a respirator.

12. **Personal Workspace Maintenance**

- Keep your work area clean and uncluttered, with chemicals and equipment properly labeled and stored. Clean up the work area on completion of an operation or at the end of each day.

13. **Planning**

- Seek information and advice about hazards.
- Plan appropriate protective procedures, and plan positioning of equipment before beginning any new operation.

14. **Obtain Safety Data Sheets (SDSs) and collect them in a central location within your laboratory.**

- Develop a procedure covering use, storage and disposal of chemicals associated with the procedure.

15. **Unattended Operation**

- An unattended procedure is a process or piece of equipment which is left operating when no one is in the lab. If at all possible, avoid this practice. Below are the basic steps that must be taken when running any unattended operation:
  - Design these experiments so as to prevent the release of hazardous substances in the event of interruptions in utility services such as electricity, cooling water, and 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.
  - If an apparatus is likely to be left unattended for long periods of time, electrical overload-protection devices should be used.
  - Leave lights on in the area of an unattended laboratory operation.
  - Placard the door of the laboratory, briefly describing the nature of the unattended operation, a list of the potential hazardous materials which might be associated with an unplanned release and a telephone number of the person(s) to be contacted in an emergency.
  - Open flames must never be left unattended.

16. **Vigilance**

- Be alert to unsafe conditions and see that they are corrected when detected.
- Watch for overcrowding or over storage of hazardous chemicals.
- Do not store incompatibles together.
- Do not store corrosives and poisons above waist height.

17. **Waste Disposal**

- All laboratory operations must include plans and training for waste disposal.
- Contact Environmental Health and Safety for advice on chemical waste disposal before conducting an experiment.
- Deposit chemical waste in appropriate receptacles labeled with the WMC Hazardous Waste Label and follow all other Medical College waste disposal procedures.
- Only approved chemicals may be drained, disposed, or placed in the trash.
- [Chemical Collection Requests](#) may be made online at the Environmental Health and Safety website.
18. **Working Alone**

- Avoid working alone on a project.
- Do not work alone in a laboratory if the procedures being conducted are hazardous.
- Do not work late nights or weekends with toxic or hazardous chemicals, unless the procedure is a standard practice and poses no exceptional risks to personnel.

**References**

- EHS Manual, 4.1 - Laboratory Chemical Hygiene Plan
- EHS Manual, 5.2 - Waste Disposal Procedures
- 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.