

**University of Saskatchewan
Department of Mechanical Engineering
Standard Operating Procedure # Mat0002**

Procedure Title: General Chemical Usage Guidelines

Minimum Review Requirements: **Annually**

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1. Version History

Version #: .1
Supersedes: n/a

Handwritten amendments to the official procedures can be made by a single line through the text, along with the date, and initialed by the authorized individual making the correction. Changes are to be noted below. Formal changes to this SOP are made on the date of revision or sooner, where required.

Section	Changes made to official copy	Date	Initials

Reference Only

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2. Introduction

This SOP provides general laboratory practice for the handling of chemicals or hazardous substances. It does not address all situations that may arise in the lab, the Laboratory Safety Manual and the Laboratory Safety Course are required to be followed at all times.

Disposal of hazardous materials and basic lab hygiene practices are covered in the Mat0001 SOP which is a requirement for all persons using the materials laboratories.

This document is a supplement to the University of Saskatchewan Lab Safety manual, Chemical Safety Code, Hazardous Waste Disposal Manual and any other safety information provided by the University.

The Mechanical Engineering Safety Webpage contains all of the MSDS information for the department as well as the applicable MSDS and SOPs.

This procedure alone is not sufficient for working with highly hazardous materials. Anything with a health rating of 4 on the NFPA or HMIS hazard classification system (this is listed on the MSDS) requires additional training and documentation. A partial listing of these substances are:

Hydrofluoric Acid	Phosphorus (V) Oxide		

In addition some substances with a health rating lower than 4 may also require additional procedures and training, always check the MSDS for the health rating and with the person in charge of the area before using a substance you are not familiar with or have not used previously in the Mechanical Engineering Materials Labs.

Work involving the use of hazardous materials **must not** be conducted outside of regular business hours (8:00 am – 6:00 pm), and must not be conducted while working alone.

3. Definition

SOP:	Standard Operating Procedure
MSDS:	Material Safety Data Sheet
WHMIS:	Workplace Hazardous Materials Information System
PPE:	Personal Protective Equipment
WSEP:	Workplace Safety and Environmental Protection

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4. Personnel

Persons authorized to perform this SOP:

By signing this form I acknowledge that I have read and understand this SOP, as well as the applicable MSDS's and that I will conduct myself in accordance with this SOP and the general laboratory rules.

NOTE: ALL SIGNATURES MUST BE PRESENT ON THE SOP LOCATED IN THE YELLOW BINDER IN ROOM 2C26 – Mechanical Engineering Materials Lab, digital copies of SOP's are made available for convenience only. Printed SOP's are valid for 24 hours only, after that time their accuracy must be verified with the **OFFICIAL HARDCOPY VERSION**.

Name (Print)	NSID	Dep't	Signature	Date
Robert Peace	Staff	ME		
Akindele Odeshi	Faculty	ME		
J.D. Johnston	Faculty	ME		
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Name (Print)	NSID	Dep't	Signature	Date

Reference Only

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5. Safety

1. All work involving hazardous materials must be conducted in a safe manner. Fume hoods, lab coats and appropriate gloves are the minimal acceptable hazard controls.
2. The relevant MSDS and SOPs must be consulted **PRIOR** to working with a hazardous material. It is the user's and their faculty supervisor's responsibility to be aware of the hazardous involved in the substances used for the research.
3. All users of the materials labs **MUST** use a lab coat and appropriate gloves when working in the materials labs, glove type is material dependent and must be known prior to beginning any work.
4. No Hazardous substances can be used outside of appropriate lab rooms (0C14, 2C26, 2C50).
5. All hazardous chemicals including organic solvents such as **Acetone, methanol, toluene**, etc. **MUST** be used inside a **fume hood**.
6. **Ethanol** in any quantity may be used outside of a fume hood and **Isopropyl alcohol** in small quantities can be used outside of a fume hood in a well ventilated area.
7. Prior to beginning any procedure a waste container of suitable size (**maximum 10 L and have a screw lid**) must be labeled appropriately **with a NEW Chemical Waste Disposal Label**, as discussed in Mat0001. **% of EACH Constituent MUST** be indicated on the label.
8. All substances must be labeled in accordance with the regulations set out in Mat0001.
9. Gloves are for your protection and should be worn when required, however they **must not** be worn in non-hazardous areas, to touch non-contaminated equipment (microscopes, computers etc.) or outside of the lab.
10. **NEVER TOUCH A DOOR HANDLE OR SINK FACUET WITH A GLOVED HAND.**
11. The Mechanical Engineering facilities are **not equipped** to handle substances that require the following:
 - a. **Storage under inert gas.**
 - b. **Storage in a flammables or explosion proof refrigerator.**
 - c. **Radioactive materials**

6. Procedure

6.1 Mixing Liquid Chemicals

- Only open the bottled chemicals inside a fume hood.
- Use small volumes whenever possible.
- Use compatible (glass is preferable for most substances) labware that is appropriately sized.

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- Ensure appropriate labeling is completed before mixing substances (either temporary or WHMIS labeling) (see Mat0001).
- Ensure appropriate clean up and waste collection is completed (Mat0001).
- Do NOT mix incompatible substances.
- Know what the reaction will be prior to mixing the chemicals.
- When mixing acids or bases with water or alcohol always add the acid/base to the water/alcohol.
- Do not add water/alcohol to an acid/base.
- Do not use a glass bottle with a stop cock to store chemicals.
- All substances must be stored in a screw type bottle, preferably plastic (unless compatibility dictates otherwise).

6.2 Weighing Low Hazard Substances

Low hazard substances are determined by the likely-hood of hazardous dust creation, accidental release consequences and the health hazard of the substance itself. Solids with a health rating (HMIS or NFPA) of 0 or 1 would be Low hazard substances. If the substance is not on the following list it must be considered a high hazard.

Table 1: Lower Level Hazardous Substances

Potassium Chloride	Sodium Chloride	Agar
Potassium Ferricyanide		

Low hazard powders can be weighed in a chemical lab on a bench top or in a fume hood provided that any spills are correctly cleaned up, and the scale is also free of any contaminants once weighing is completed.

Procedure:

1. If required label a bag appropriately for waste, i.e. "Trace Potassium Ferricyanide". Potassium Chloride, Sodium Chloride and Agar waste can be thrown in the normal garbage bin without labeling.
2. Using a weigh boat zero the balance being used.
3. Add the substance being weighed slowly so as to not create dust. It is recommended to use a disposable spatula (looks like a spoon straw) and disposable weigh boat.
4. Using a damp paper towel wipe up any spilled material and dispose of the now contaminated paper towel in a labeled disposal bag (if required).

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5. After completion place any contaminated items (weigh boat, spatula) in the labeled disposal bag.
6. Place the disposal bag in a waste disposal bin on the floor.
7. Ensure the balance is 100% free of contamination from the substance being weighed (even potassium or sodium chloride as these can cause rust to form on and inside the balance).

6.3 Weighing Other Powdered Substances

Substance hazards are determined by the likely-hood of hazardous dust creation, accidental release consequences and the health hazard of the substance itself. If a solid or powder is not listed in Table 1 as a Low Hazard substance it must be considered a higher hazard. All items that are carcinogenic are considered to be higher hazard.

High hazard materials must be weighed in a chemical laboratory in a balance with draft shields that fully enclosed the material being weighed. Weighing should be done in either a chemical fume hood or on a dedicated laboratory bench, whichever option is used they must be cleaned and free of contaminants before and after weighing. **If dust generation is possible then a fume hood MUST be used.** Also some **MSDS's specify that a chemical fume hood be used;** in these instances a fume hood **MUST** be used.

Procedure:

1. Label a bag appropriately for waste, i.e. "Trace Nickel Metal Powder".
2. Using a weigh boat zero the balance being used (balance must be in an appropriate clean location).
3. Add the substance being weighed slowly so as to not create dust. It is recommended to use a disposable spatula (looks like a spoon straw) and disposable weigh boat.
4. Using a damp paper towel wipe up any spilled material and dispose of the now contaminated paper towel in a labeled disposal bag.
5. After completion place any contaminated items (weigh boat, spatula etc.) in the labeled disposal bag.
6. Place the disposal bag in a waste disposal bin on the floor.
7. Ensure the balance and work area is 100% free of contamination from the substance being weighed.
8. Turn on the fume hood (if it was turned off for weighing).

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7. Chemical Spills and Accidental Exposures

Emergency Contact Information:

FIRE Pull an alarm station AND call 9-911 (just 911 from pay phone or cell)

CAMPUS SECURITY 966-5555 24 hours a day

AMBULANCE 9-911 (just 911 from pay phone or cell)

CHEMICAL SPILLS 966-8497 or 966-8493 (days)
966-5555 (evenings and weekends)

Small Chemical Spills in the Fume Hood:

Small chemical spills in the fume hood can be cleaned up by the user using an appropriate, **COMPATIBLE SORBENT PADS**, and collecting it as hazardous waste in an approved labeled container. If there is any doubt regarding spill cleanup, contact the WSEP Chemical Spill Team at the numbers listed above.

Large Chemical Spills

DO NOT attempt to clean up a large spill, or a spill containing highly toxic fumes that occurs outside of the fume hood. The WSEP spill team has proper breathing apparatuses to ensure their safety during spill cleanup of these types of spills.

Any HF containing solutions that is spilled outside the fume hood **must** be cleaned by the WSEP Chemical Spill Team. In the event of such a spill leave the immediate area immediately (with signs in place), notify anyone in the vicinity of the danger and contact the WSEP Chemical Spill Team.

Accidental Exposure:

Prior to using any substance the procedure for dealing with an accidental exposure (dermal, ingestion, inhalation etc.) must be known. It is the user's responsibility to know how to act in the case of an accidental exposure. MSDS's have sections on exposure procedures and each of the labs is equipped with a chemical spill kit as well as a standard first aid kit.

Some materials require special exposure protocols and these must be known prior to starting any work with these substances.

Do NOT leave the general area until cleared to do so by the Chemical Response Team, if the immediate area is unsafe due to toxic fumes etc. leave the immediate or unsafe area (in some cases this may be the entire building) but do not leave the general area until you and your clothing are checked and released by the Chemical Response Team.

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See the appropriate **MSDS** for accidental exposure protocol.

8. Equipment or Materials Required (not Inclusive)

- Fume Hood
- **PLASTIC** spill tray inside fume hood
- Lab Coat
- Closed Toed Shoes
- Long Pants
- Face Shield
- This SOP and other relevant SOPs
- MSDS Information
- Operational Safety Shower
- Operational Eye Wash Station
- Appropriate Gloves
- Appropriate spill and/or emergency kit
- **NOTE: NONE OF THE GLOVES USED IN THE LABORATORY ARE INTENDED FOR SUBMERSION USE, THEY ARE FOR SPLASH/SPILL PROTECTION ONLY.**

9. Highlights / Critical Control Points

Users of the labs and their faculty supervisors are responsible for following acceptable laboratory practices at all times, failure to do so will result in the loss of lab privileges.

10. References

University of Saskatchewan WSEP Documents:

Chemical Safety Code (Draft):

<http://www.usask.ca/dhse/chemicalsafety/codes.php>

Hazardous Waste Disposal:

http://www.usask.ca/dhse/file_view/download.php/Hazardous+Waste+Disposal+Manual+Aug+2007.pdf?id=3&view=1

Laboratory Safety Manual:

http://www.usask.ca/dhse/file_view/download.php/Laboratory_Safety_Manual.pdf?id=32&view=1

Canadian Centre for Occupational Health and Safety (MSDS reference):

<http://ccinfoweb.ccohs.ca/msds/search.html>