

DEPARTMENTAL SAFETY REPORT DEPARTMENT OF CHEMICAL ENGINEERING MCMASTER UNIVERSITY

Everyone in chemical engineering is required to fill out a departmental safety report before they start their research. In our department we have two types of reports: computational work and experimental work.

Each experimental safety report will be reviewed and may be returned for revision before acceptance.

EXPERIMENTAL REPORT

If you are performing experimental work, a concise safety report is to be prepared and submitted to your research supervisor(s) for approval. The standard “Departmental Safety Report” cover sheet must be attached to the front of the safety report, filled out and signed by the researcher and the supervisor(s).

No one can commence their experimental work until the required training is taken and their safety report is submitted and approved by the supervisor, Tim Stephens (stepht2@mcmaster.ca) and Lisa Laframboise (lisa.laframboise@mcmaster.ca)

<https://hr.mcmaster.ca/app/uploads/2019/02/Corporate-Training-Matrix.pdf>

The supervisor should review the safety report with the researcher and ensure that the researcher understands the safety hazards, the key elements of the SDS sheets and other safety documents. To facilitate this, the researcher should highlight the SDS and the other safety documents to indicate the most significant hazards. Copies of highlighted SDSs together with the report must be given to the supervisor for his/her records.

Copies of SDS sheets must be kept by the researcher and be readily available. After the above review and approval by the supervisor(s) the completed safety report without SDSs must be submitted to Tim Stephens and Lisa Laframboise. Whenever there is a significant change in the research project an addendum should be submitted using the same format.



FREQUENCY

A safety report must be submitted prior to the start of a research project. Whenever there is a significant change in a research project (that is, when the potential hazards change) the researcher must submit an addendum. If there is no significant change in experimental work, it is still necessary to submit the Safety Report on a yearly basis. A statement signed by the researcher and the supervisor that there was no significant change in the experimental work. The "Departmental Safety Report" cover sheet can be used for addenda and reaffirmation that there is no change.

SDS SHEETS

If you work with hazardous chemicals, you must obtain the SDSs, read and understand them before experimenting. Do not attach the safety data sheets to the report submitted to Tim and Lisa, unless requested.

DESIGNATED SUBSTANCES

When a designated substance is being used in research, a designated substance assessment must be attached to the report. The assessment must be reviewed and approved by the Joint Health and Safety Committee (JHSC) for the faculty of engineering before such substance may be used. (see appendix A)

RADIOACTIVE SUBSTANCES

Any use of radioactivity must be approved by Health Physics and the specific required training must be taken.

APPLICABILITY

A safety report is to be prepared and submitted to Tim Stephens and Lisa Laframboise by each supervised researcher in the Department. The term "supervised researcher" includes but is not restricted to graduate students; undergraduate students; visiting scholars; post-doctoral fellows; visiting scientists; research associates; research engineers; research assistants; technicians.

AREAS TO BE ADDRESSED

1. **Research Objective:** In a few sentences describe your research project.
2. **Experimental Design:** Describe, briefly, your lab project and the kinds of processes, reactions, and measurements that you will carry out. Include the names of chemicals, instruments, and machinery to be used during your work.
3. **Potential Hazard Under Routine Operation:** These are the day-to-day potential hazards not associated with an emergency.
4. **Laboratory Protective Devices in Use: for example:** fume hood; fire extinguisher (stating type and capacity rating); flammable gas detector; toxic gas monitor.
5. **Personal Protective Devices in Use: for example:** safety glasses; safety goggles (indirectly ventilated or non-ventilated); face mask (including overall-size and skull cap type); air pack; half-face mask respirator; full-face mask respirator; gloves (specifying material type); lab coat; safety shoes; safety helmet; radiation monitoring badges.
6. **Emergency Procedures:** What types of accidents are possible and what are their consequences. What are the types and quantities (if applicable) of potential hazards? In other words, list a credible “worst-case” scenario. For example: clean-up methods; neutralization procedures, evacuation plans.
7. **Chemical and Biohazards:** Fill in tables on template outlining specific details on chemicals and biohazards used in experiments. Fill in table on template outlining GHS ratings
8. **Hazardous Materials Disposal:** The most important Hazardous waste materials from Laboratories include chemicals, sharps, solid wastes, and biohazards. None of these materials should be thrown in the garbage, down a drain, or outside.
9. **Samples:** test samples, including vials, bags, pails or containers of liquids, polymers, or soils, should not be retained beyond the need for testing. Accumulations of these samples may become a hazard. Samples should be disposed of periodically, or, at the end of your research. If not disposed of, then custody of samples must be transferred to another person working in your group or sent back to their points of origin. Samples should be disposed of in accordance with their hazard classification.

TYPES OF POTENTIAL HAZARDS TO BE ADDRESSED

The main likely type of potential hazards encountered in the laboratory include but are not limited to:

- **Fire/Explosion:** List the flash point and the autoignition temperature. List the fire hazard rating code. List the lower explosive limit (LEL) and the upper explosive limit (UEL)
- **Toxic:** The category usually comprised chemicals: For chemical hazards a Manufacturer's Safety data Sheet (MSDS) must be read but does not have to be attached to the report. List the acceptable exposure values, i.e. threshold limit value (TLV) or time-weighted average (TWA).
- **Radioactive:** List the acceptable exposure values.
- **Electrical**
- **High Pressure**
- **Mechanical**
- **Falling Objects**

NEAR-BY ASSISTANCE

If the experimental work is potentially hazardous (either the equipment and/or experiment is potentially hazardous) you must not work alone. It is necessary to have available a "qualified" person near-by who understands safety procedures. In this section you must address how such assistance will be available during normal working hours and outside normal hours. Experimenting after regular working hours must be approved by the supervisor(s).

- **Normal Working Hours:** usually there will be qualified people in the same lab, or on the same floor; please identify them.
- **Outside Normal Working Hours:** Comment on how you will ensure that a "qualified" person is available.

MINIMUM SAFETY TRAINING REQUIRED (MOSAIC → AVENUE TO LEARN)

- ✓ Health and Safety Orientation
- ✓ SAFE (asbestos awareness, ergonomics, fire safety and slips, trips and falls)
- ✓ Chemical Handling & Spills
- ✓ WHMIS 2015
- ✓ Violence and Harassment in the Workplace
- ✓ AODA
- ✓ Biosafety (only if working in CL1 or CL2 lab)

SPECIAL TRAINING REQUIRED

Please list all the special training attended by including a copy of your mosaic training.

APPENDIX A: DESIGNATED SUBSTANCES

If you plan to use a Designated Substance you must prepare an assessment report before the experimental work starts. "Designated Substance" has a legal definition under the Occupational Health and Safety Act of Ontario. This act has defined eleven substances "...to which the exposure of a worker is prohibited, regulated, restricted, limited or controlled" [quoting from the Act, 1(1)]. The eleven substances are:

- **acrylonitrile**
- **arsenic**
- **asbestos**
- **benzene**
- **coke oven emissions**
- **ethylene oxide**
- **isocyanates**
- **lead**
- **mercury**
- **silica (crystalline, inhalable [i.e. less than 5 µm])**
- **vinyl chloride**

The designated substances most likely to be used in Chemical Engineering are benzene and isocyanates. Occasionally someone may want to use acrylonitrile or inhalable crystalline silica. Mercury is seldom an issue anymore since the university has phased out mercury thermometers and decent quality alternatives are now available.

There is no lower limit on the reportable amount of a designated substance. Nor is there any differentiation made as to its form (except for silica). For example, lead contained in solder is deemed to be a reportable designated substance.

You can get more information about designated substances at: https://hr.mcmaster.ca/employees/health_safety_well-being/our-safety/lab-safety/hazardous-materials/

The designated substance assessment form listed in RMM 500 can be found at: <https://hr.mcmaster.ca/app/uploads/2019/01/RMM-500-Designated-Substances-Control-Program-August-2010.pdf>

Prepared by Safety Committee (October 2001 – Dr. Dickson, J. Derkach, D. Keller, E. Takacs)

Revised by Lisa Laframboise and Tim Stephens (September 17, 2024)