



Brock
University

SAFETY IN THE SCIENCES MANUAL

**FACULTY OF MATHEMATICS & SCIENCE
SCIENCE SAFETY COMMITTEE
1992**

*Revised August, 2005
Office of Environment, Health & Safety
www.brocku.ca/oehs*

EMERGENCY INFORMATION

Local Emergency Number	911
Campus Security Services - Emergency/Non-Emergency	3200/4300
Main Campus Emergency Phones <i>(Push button and connect to Campus Security Services)</i>	
All elevators	C-Block, Level 3 (opposite C329)
Parking Lots & Walkways	D-Block, Level 3 (near D305)
A-Block, Level 3 (near A310)	E-Block, Level 3 (near E305)
B-Block, Level 3 (near B313)	F-Block, Level 3 (near F319)
H-Block, Level 2 (near elevator)	
<i>(For a comprehensive list, go to: www.brocku.ca/campussecurity)</i>	
Office of Environment, Health & Safety <i>(Including insurance and risk management matters)</i>	3994
Student Health Services <i>(For students' on-campus medical treatment)</i>	3243
Science Stores <i>(Chemical supplies & information plus lab equipment)</i>	3407
Facilities Management <i>(Customer service for maintenance and facilities)</i>	3717
Technical Services - Electronics/Machine Shop <i>(Design, construction and service of custom teaching and research equipment)</i>	3419/3420
Poison Centre (Ontario Regional Poison Information Centre)	9-1-800-268-9017
St. Catharines General Hospital	9-684-7271
TeleHealth Ontario	9-1-866-797-0000
Inquiry Service for the Canadian Centre for Occupational Health & Safety	9-1-800-263-8466

DEPARTMENT EMERGENCY CONTACT INFORMATION

Laboratory Supervisor:	Name & Email:	_____
	Office/Lab/Home:	_____
Department Safety Officer:	Name & Email:	_____
	Office/Lab/Home:	_____
Department Chair:	Name & Email:	_____
	Office/Lab/Home:	_____

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2.0 FACULTY OF MATHEMATICS & SCIENCE SAFETY POLICY

All faculty, staff and students working in the Faculty of Mathematics & Science share responsibility for protecting those working in labs, others who may be exposed to hazards from the labs and the environment. The rules, procedures and guidelines outlined in this manual apply to all who participate, work, study or visit in the labs and activities of the Faculty.

3.0 GENERAL LAB & ACTIVITY RULES & PROCEDURES

1. **Be prepared!** Know the safety rules and procedures that apply to the work that is being done. Determine the potential hazards, appropriate safety precautions and proper waste disposal techniques well in advance
2. Know the location and proper use of emergency equipment, for example, safety showers, eye wash stations, fire blankets, fire extinguishers, first aid kits and defibrillators, and be familiar with emergency procedures, such as exits, alarm stations, emergency phones, and evacuation
3. CSA rated safety goggles must be worn in all areas where a splash hazard exists, generally where chemicals are used, handled or stored, or alternate appropriate eye protections where particular hazards exist, e.g., UV light, lasers, particulate matter or systems under pressure.
4. Protective clothing should be worn as appropriate to the work being done. Long hair and loose clothing must be confined; shorts, cutoffs or are not permitted in labs without lab coats.
5. Proper protective footwear is required; sandals or high heels should not be worn.
6. Horseplay and pranks are expressly forbidden as outlined by the OHSA.
7. Eating, drinking, smoking or applying cosmetics are not permitted in any lab or chemical storage area.
8. Mouth pipetting is absolutely forbidden.
9. All bottles, flasks and vials containing chemicals, **including wastes**, must be labelled (with information about contents, concentration, date and individual(s) involved). The only exceptions are chemicals that will be consumed in one lab session by one individual.
10. Chemicals from unlabelled containers are not to be used and their presence shall be reported to the lab supervisor.
11. Suitable warning signs must be posted when hazardous situations are present, such as the use of highly toxic chemicals, radioactive substances, biohazardous materials, work involving high pressure, X-rays or lasers
12. All work areas shall be kept clean, free from obstruction and not pose any danger to individuals.
13. Access to exits and emergency equipment, should never be blocked.
14. Spilled chemicals should be cleaned up immediately and disposed of properly. A separate labeled container is to be used for broken glassware.
15. Equipment shall be properly maintained, and used only for its designed purpose. Access to electrical connections and moving parts should be guarded.

16. All accidents will be promptly reported to the lab or activity supervisor, who will administer first aid and/or arrange for further medical attention as well as complete an **Injury/Incident Report Form** (www.brocku.ca/oehs/forms)
17. Undergraduate students must not work unsupervised in a laboratory.
18. Avoid working alone in a laboratory. If it seems necessary, discuss hazard levels and monitoring requirements with supervisor. If unavoidable, institute a buddy system or notify Campus Security Services (ext. 3200) when arriving or departing.
19. Labs, storerooms and high risk equipment must be locked or tagged when unattended.
20. Always thoroughly wash hands with soap and water before leaving the work area. This applies even if one has been wearing protective gloves.
21. Proper, responsible, waste disposal practices must be used at all times, for example, identification classification and registration of waste.
22. Turn off all cell phones, pagers and electronic devices before entering the laboratory.

4.0 CHEMICAL SAFETY

4.1 **HIGHLY REACTIVE CHEMICALS**

- Study and follow all precautions specified by the manufacturer of the substance.
- Identify peroxide formers and store them away from heat and light in closed vessels.
- Store at the minimum safe temperatures to minimize the rate of decomposition (although do not freeze or solidify peroxides since they will become extra-sensitive to shock and heat).
- Keep quantities to a minimum.
- Don't return unused material to the stock container.
- Clean up all spills immediately by recommended procedures.
- Consider use of safety screens and techniques for handling by remote control.
- Perchloric acid may only be used in designated perchloric acid facilities (mostly in Earth Science) Perchloric acid may not be used in ordinary fume hoods.
- Follow recommended, responsible disposal techniques.

4.2 **FLAMMABLE CHEMICALS**

- Study and follow all precautions specified by the manufacturer of the substance
- Handle only in areas free of ignition sources, for example, hot plates, ovens, refrigerators, and static charges)
- Never heat with an open flame
- Use metal safety cans for storage of flammable liquids in amounts greater than 1 litre
- Small quantities should be stored in ventilated cabinets
- Use bonding and grounding straps when transferring quantities greater than 1 litre
- An exhaust hood should be used whenever appreciable quantities of flammable substances are transferred from one container to another, allowed to stand in open containers, heated in open containers, or handled in any other way
- Follow recommended, responsible disposal techniques
- Keep halogenated and non-halogenated solvent wastes separate

4.3 INCOMPATIBLE CHEMICALS

Table 4.3.1: General Chemical Incompatibilities

Acids	Bases
<i>Alkali & alkaline earth metals</i> <ul style="list-style-type: none"> ▪ carbides ▪ hydrides ▪ hydroxides ▪ oxides ▪ peroxides 	Water Acids Halogenated organic compounds Nitric acid, nitrates Perchlorates & chlorates Permanganates Persulfates <i>Oxidizing agents</i> <ul style="list-style-type: none"> ▪ chromates, dichromates, CrO₃ ▪ halogens ▪ hydrogen peroxide
Inorganic azides	Acids Heavy metals & their salts <i>Oxidizing agents</i>
Inorganic cyanides	Acids Strong bases
Inorganic nitrates	Acids Metals Nitrites Sulfur
Inorganic nitrites	Acids <i>Oxidizing agents</i>
Inorganic sulfides	Acids
<i>Organic compounds</i> <ul style="list-style-type: none"> ▪ acyl halides ▪ anhydrides ▪ halogen compounds ▪ nitro compounds 	<i>Oxidizing agents</i> Bases Organic hydroxy and amino compounds Aluminum metals Alkali metals Strong bases
Powdered metals	Acids <i>Oxidizing agents</i>

Table 4.3.2: Specific Incompatible Chemicals:

Acetylene & monosubstituted acetylenes	Halogens Group 3 & 4 metals & their salts
Ammonia & ammonium hydroxide	Halogens Halogenating agents Silver Mercury
Carbon, activated	<i>Oxidizing agents</i>
Hydrogen peroxide	Phosphorus Metals & their salts
Nitric acid	Bases Metals Silicon Sulfuric acid Sulfides Nitrites, other reducing agents Chromic acid & chromates Permanganates
Mercury & its amalgams & its salts	Ammonia & ammonium hydroxide Nitric acid Acetylene Sodium azide
Oxalic acid	Silver & its salts Mercury & its salts
Phosphorus (yellow)	<i>Oxidizing agents</i> Oxygen Strong bases
Phosphorus pentoxide	Alcohols Strong bases Water Halogenating agents
Sulfuric acid	Bases Water Permanganates

Take Precaution!
When transporting, storing, using or disposing of any incompatible substance ensure that the substance does not accidentally come in contact with an incompatible substance

4.4 TOXIC CHEMICALS

- Study and follow all precautions specified by the manufacturer of these substances before use
- Prevent inhalation of vapours or dusts
- Prevent contact with food or skin
- At the first sign of illness, obtain medical advice
- Toxic substances must be rendered harmless before being discharged down the drain
- A second person must be within sight of the work and suitably equipped for taking action in an emergency
- Antidotes shall be readily available
- Warning signs shall be placed at door of small laboratories and locally in larger ones
- All possible work shall be done in a fume hood, but a ventilated glove box will give surer protection against toxic dust and powders

4.5 COMPRESSED GASES

- Handle cylinders of compressed gases as high-energy sources and therefore as potential explosives
- Always wear safety glasses when handling and using compressed gases
- Use toxic, flammable or reactive gases in fume hoods only
- Cylinders of all sizes, empty or full, must be kept from falling by restraining devices
- During storage or movement, the cylinder cap must always be securely in place
- Cylinders shall be moved only when strapped in a wheeled cart
- Use the appropriate regulator on each gas cylinder
- No lubricant shall be used to connect the regulator to the cylinder
- New connections shall be checked for gas leakage
- Close the main cylinder valves tightly when not in use
- The cylinder delivery pressure shall be set to zero before the main cylinder valve is closed. This prevents a rapid release of compressed gas when the cylinder is next opened
- In the event of a fire, the supply of a combustible gas shall be shut off before an attempt is made to extinguish the flames



- A trap shall be used to prevent the back siphoning of chemicals when a very soluble gas is being used
- Empty cylinders shall have the regulators removed, be marked 'MT,' and have the caps replaced
- Unused or partially used cylinders that are not of further use shall be returned to the supplier
- Unidentifiable cylinders shall not be used, and should be immediately reported to stores

4.6 DESIGNATED SUBSTANCES

- The use, handling, storage and exposure to these 11 chemicals is regulated by the Ontario Ministry of Labour
- The appropriate regulations should be consulted before any work with these substances occurs (See Section 9.0, References)
- Worker exposure to these chemicals, in a given time period, should be carefully monitored, prohibited or strictly controlled
- Atmospheric conditions in the lab should be controlled
- Lab instructors have the authority, at any time, to prohibit or restrict the use of the designated substances
- These chemicals must be properly labeled to ensure safe handling
- A current written assessment is required for usage of these substances
- If an assessment shows a risk of exposure, a control program is necessary, which involves air monitoring, medical monitoring, and instituting engineering controls

4.7 FUME HOOD PROCEDURES

- Fume hoods should be utilized for chemicals requiring exhaust protection
- Do not store chemicals in the fume hood
- Work with sash lowered as much as reasonably possible, keeping face outside the sash plane
- Ensure that the fume hood's face velocity is sufficient via quality control methods
- Perform operations at least 30cm back from the air foil and 20cm back from the sash
- Ensure that materials do not block the baffle vents near the back of the hoods
- Do not alter in any fashion the setup of the fume hood in the laboratory
- Report any malfunctions of the fume hood to the lab supervisor

5.0 BIOLOGICAL SAFETY

5.1 EQUIPMENT

- Equipment should be CSA and Hydro approved, inspected and maintained regularly
- Tabletop centrifuges are to be securely anchored in a location where its vibration will not cause bottles or other equipment to fall
- Ensure that the load balances and the balanced tubes are placed opposing one another
- Always close the centrifuge's lid during operation
- Do not leave until full operating speed is attained and the centrifuge appears to be running safely without Vibration
- Stop immediately and check the load balances if vibration occurs
- Regularly clean rotors and buckets with non-corrosive solutions

5.2 BIOHAZARDOUS MATERIALS

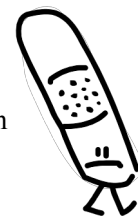
- Study and follow all precautions specified by the supplier of the substance before use
- Study and follow the "Laboratory Biosafety Guidelines", 2004 Health Canada
- Clearly label all such materials as biohazardous
- Work surfaces must be cleaned and decontaminated at the end of the day and after any spill of potentially dangerous material. Ensure that the proper course of action is taken when assessing contamination levels.
- Hazard warning signs indicating the risk level of the agents being used must be posted outside each lab, for example, pathogenicity, mode of transmission, and host range
- Gloves must be worn for all procedures that might involve direct skin contact with toxins, blood, infectious materials or infected animals — they must be decontaminated before disposal or reuse
- All contaminated or infectious liquid or solid materials must be decontaminated wastes using 10% bleach or one of the autoclaves in Mackenzie Chown H321 before disposal or reuse
- Ensure that the autoclave is set to 220°F for 40 minutes and that proper procedure is followed at all times

5.3 LABORATORY ANIMALS

- Study and follow the "Laboratory Biosafety Guidelines" published in 2004 by Health Canada
- Study and follow the Brock Animal Care Standards, the Canadian Council on Animal Care (www.ccac.ca) regulations, relevant provincial legislation and local animal care authority advice
- All those having contact with the animals and waste material must be familiar with and aware of any special precautions and procedures that may be required
- Where possible personnel should be protected by immunization with appropriate vaccines
- All accidents, including bites, scratches or cuts from cages etc. must be reported and recorded
- Extreme caution should be used when handling needles and syringes to avoid autoinoculation and the generation of aerosols
- Needles should not be replaced in the guard, but promptly placed in a puncture-resistant container and decontaminated

5.4 BIOLOGY FIELD TRIPS

- Be prepared for any hazards that might arise
- Footwear should be in good condition and suitable for the terrain
- Clothing should be in good repair, without loose ends to snag
- Wear all appropriate protective equipment
- Travel in pairs, practice a buddy system if the group is splitting up
- If you must travel alone, inform others of your travel plan, with alternate routes, expected time and date of return
- Carry a first aid/survival kit, radio, cell or satellite phone appropriate to the hazards and degree of isolation and **know how to use it**
- Persons severely allergic to insect stings should carry antidote kits
- Practice good marine safety where appropriate
- Practice good traffic safety where appropriate



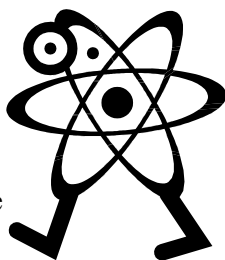
6.0 RADIATION SAFETY

6.1 RADIOACTIVE SUBSTANCES

- All individuals purchasing and/or handling radioactive substances must first obtain a "Radioisotope Permit" from the Radiation Safety Officer of the University
- Subsequent purchases of radioisotopes must be approved by departmental radiation safety officers
- The majority of handling of radioactive materials should be confined to the radioactivity laboratory (H216A) which should be kept clean and decontaminated at all times
- Monitoring film badges and ring badges must be worn when handling radioactive substances.
- Procedures in individual laboratories should abide by the guidelines set out in the manual "Radiation Safety Policy and Procedures" published by the Radiation Safety Committee of the university, as well as Canadian Nuclear Safety Commission guidelines
- Radioactive materials, the vessels in which they are used, and the work area must be clearly labelled as a potential radiation danger
- All waste radioactive materials or materials suspected of being radioactive must be disposed of in the proper, responsible manner

6.2 X-RAY GENERATORS

- Study and follow all precautions specified by the supplier of the instrument before using it
- X-ray safety is regulated by the Ontario Ministry of Labour, all activities must conform with this Regulation
- Monitoring film badges and/or ring badges must be worn when working with X-ray equipment



- Warning signs must be displayed on or near the main power switch of the instrument, and on the entry door to the location

6.3 ULTRAVIOLET LAMPS

- Study and follow all precautions specified by the supplier of the instrument before using it
- Protective safety glasses with UV-filtering lenses should be worn when eyes may be accidentally exposed to light with wavelength shorter than 250 nanometres
- Protect skin areas from the possible burns arising from exposure.
- Be careful of leaving oily fingerprints on the mercury lamp since they can cause spot heating and cracking
- Whenever possible UV sources should be adequately cooled and operated within an enclosure designed to prevent damage by explosion of glass fragments and leakage of mercury vapour

6.4 LASERS

- Study and follow all precautions specified by the supplier of the instrument before using it.
- Always wear goggles that offer protection against the specific wavelength of the laser in use.
- Never look directly at the beam or pump source.
- Never look at the beam pattern directly (use image converter).
- Do not allow any objects that cause reflections to be present in or along the beam (even buttons and screw heads can be dangerous).
- Keep a high general illumination level to avoid pupil dilation.
- Display warning signs in laser areas.

7.0 GEOLOGICAL SAFETY

7.1 *FIELD TRIPS*

- See Section 5.4, Biology Field Trips.
- Study and follow the "Safety Manual: Mineral Exploration in Western Canada" published by the B.C. & Yukon Chamber of Mines' Health and Safety Committee, 2002
- Compass, map, antidote kit, survival kit, sheath knife, waterproof matches, signal flag, flares, heliograph mirror, mosquito net and insect repellent are all essential for back country travel
- Safety glasses must be worn when breaking or hammering rock
- Hard hats must be worn when working near vertical rock exposures, for example, quarry walls, major road cuts and sea cliffs

7.2 *MECHANICAL DEGRADATION*

- See Section 4.1 on vibrating equipment.
- Any dust generating operations should be carried out in a well-ventilated area, preferably a fume hood or outdoors.
- Consult silica and asbestos regulations to ensure compliance.
- Wear safety glasses at all times when breaking or hammering rock.
- Wear hearing protection in any area where it is difficult to converse due to noise.

8.0 LEGISLATION - Occupational Health and Safety Act

8.1 *OCCUPATIONAL HEALTH AND SAFETY ACT*

- **Internal Responsibility System**
- Defined duties and responsibilities with Directors and Officers liability
- Right to Participate
- Right to Know
- Right to Refuse Unsafe Work
- To ensure workers use all safety equipment and clothing
- To advise workers of danger
- To provide written instructions (in some prescribed circumstances)
- To take every precaution reasonable . . .

8.1.1 **Duties of an employer**

- To ensure workplace complies with OHSA and Regulations
- To provide information, instruction and supervision to a worker to protect the health or safety of the worker
- To appoint a competent person as a supervisor
- To provide and ensure the proper use of well-maintained equipment, materials and protective devices as prescribed by the regulations
- To take every precaution reasonable in the circumstances for the protection of a worker

8.1.2 **Duties of supervisor (a person who has charge of a workplace or authority over a worker)**

- To ensure workers comply with OHSA and Regulations

8.1.3 **Duties of a worker (a person who is paid to perform work or supply services)**

- To comply with OHSA and Regulations
- To use equipment and clothing provided
- To report dangers in work place
- Not to make any safety device ineffective
- Not to use any dangerous equipment or machine
- Not to engage in horseplay

8.1.4 **Regulations for Industrial Establishments**

- Safety regulations: e.g. Lockout/Tag Out, Working at Heights, Confined Space Entry
- Building regulations: e.g. Temperature, Facilities, Railings, Toe boards
- Industrial Hygiene e.g. Air quality
- Protective Equipment: e.g. Eyes, skin, head and foot protection

8.1.5 Designated Substance Regulations

- Acrylonitrile, Arsenic, Asbestos, Benzene, Coke Oven Emissions, Ethylene Oxide, Isocyanates, Lead, Mercury, Silica, Vinyl Chloride
- Assessment requirements and Control Program parameters

8.1.6 Asbestos on Construction Projects and in Buildings and Repair Operations

- Detailed Assessment of amount and condition of asbestos
- Asbestos Management Program including to create and maintain records of the location of Asbestos
- Containing Material (ACM), monitor and detect areas of disturbed asbestos, regularly assess the risks of
- ACM and remediate accordingly
- Advise workers, occupants and contractors who may disturb

8.1.7 Workplace Hazardous Materials Information System (WHMIS)

- Inventory - must be complete and updated annually
- Labelling - specific requirements for supplier, workplace or lab sample labels
- Material Safety Data Sheets (MSDS) - must be accessible and understood
- Training and Education- necessary for anyone with a potential exposure

8.1.8 Control of Exposure to Biological or Chemical Agents

- Time-weighted average exposure limits (8hr/day, 40hr/wk)
- Short-term exposure values
- Ceiling limits

8.1.9 X-ray Safety

- X-ray source designation, operation and monitoring
- X-ray worker designation and dosimetry

8.1.10 Smoking in the Workplace

- Limits smoking to designated areas

ADDITIONAL LEGISLATION

8.2 BILL C-45 (The Westray Bill)

- Entered into the Criminal Code in 2004
- Duty on the part of supervisors to take reasonable steps to prevent workplace accidents

8.3 WORKPLACE SAFETY AND INSURANCE ACT

- First Aid: number of kits, number of those trained to provide first-aid
- Accident reporting and investigation
- Rehabilitation and accommodation of injured workers
- Prevention through incentive programs, penalties plus education and support through Safe Workplace
- Associations like Education Safety Association of Ontario

8.4 ONTARIO FIRE CODE

- Use of buildings & space, access and egress
- Detection, Separation, Notification, Evacuation, and Suppression System maintenance

- Storage limits of flammable and combustible liquids
- Storage of recyclable waste

8.5 ONTARIO ENVIRONMENTAL PROTECTION ACT

- Generators of liquid industrial and hazardous waste-specific registration
- Control of Fume hoods and other releases to the environment
- Spill containment and response
- Directors and officers duty of all reasonable care

8.6 CANADIAN NUCLEAR SAFETY ACT

- Radioisotope licensing, labelling, inspection, and committee
- WHMIS

8.7 HEALTH CANADA

- Lab Biosafety Guidelines
- Infectious and Communicable Disease Management

9.0 WHMIS see Glossary of Terms (Appendix 3)

9.1 CLASSIFICATION

- All controlled products are divided into 6 classes: Compressed gases, Flammable/Combustibles, Oxidizers, Toxics (3 sub-classes), Corrosives and Reactives
- Each class and sub-class is assigned a hazard symbol
- See Appendix 2 for elaboration of these classes and symbols

9.2 INVENTORY

- Although not yet mandatory, a current inventory of all chemicals and reagents kept in each laboratory area is desirable
- A copy of the inventory should be kept in a centralized location outside the lab

9.3 LABELS

9.3.1 General Requirements:

- All containers of a controlled product received at a workplace must have a supplier or lab supply house label
- Controlled products placed into another container and those produced by an employer must be labelled with a workplace label unless exclusively used in a laboratory

9.3.2 Supplier Label Requirements:

- Supplier identifier
- Product identifier
- Hazard symbol or symbols (see Appendix 2)
- Risk phrases, for example, causes burn
- Precautionary measures, for example, keep in a cool place
- First aid measures
- Reference to a MSDS
- Cross-hatched border

9.4 MATERIAL SAFETY DATA SHEETS (MSDS)

9.4.1 General Requirements:

- The employer must obtain or supply a current MSDS for every controlled product used in the workplace
- The MSDS must be less than 3 years old.
- The MSDS must be available to and understood by any worker who has the potential to be exposed to the product

9.4.2 Product Information:

- Product identifier
- Product use

9.3.3 Laboratory Supply House Label Requirements:

- Product Identifier
- Reference to the MSDS
- Risk phrases
- Precautionary measures
- First aid measures

9.3.4 Workplace Label Requirements:

- Material identifier or product name
- Reference to a MSDS
- Safe Handling Information

9.3.5 Label Requirements for Samples, Diluted Reagents, Products from Bulk etc. used exclusively within a laboratory:

- Container must be identified by a combination of signage and education that enables lab workers to identify the product and know where to obtain more information about it if needed

9.3.6 Inter-Laboratory Sample Label Requirements:

- For laboratory samples sent to another laboratory, for example, not under original supervisor's control, for analysis, testing, evaluation, education or storage
- Chemical name or generic chemical identification
- Supplier's name
- The following words: "Hazardous Laboratory Sample, for Hazard Information or in an Emergency Call (supervisor's home and office telephone numbers)."

- Manufacturer's name, address and emergency phone number
- Supplier identifier, address and emergency phone number
- Product identification number (PIN)

9.4.3 Hazardous Ingredients

- All hazardous ingredients re: 13(a)(i) to (iv) or 14(a) of the Hazardous Products Act
- CAS (Chemical Abstracts Service) number
- Lethal dose 50 (LD₅₀) - species and route
- Lethal concentration 50 (LC₅₀) species & route

9.4.4 Physical Data

- Physical state (gas, liquid or solid)
- Odor and appearance
- Odor threshold
- Vapour pressure and density
- Evaporation rate
- Boiling point and freezing point
- pH, specific gravity
- Coefficient of water/oil distribution

9.4.5 Fire or Explosion Hazard

- Conditions of flammability
- Means of extinction
- Flashpoint and method of determination
- Upper and lower flammable limits (% by volume)
- Auto-ignition temperature
- Hazardous combustion products
- Explosion data - sensitivity to mechanical impact
- Explosion data - sensitivity to static discharge

9.4.6 Reactivity Data

- Conditions under which the product is chemically unstable
- Name of any substance or class with which product is incompatible
- Hazardous decomposition products

9.4.7 Toxicological Properties

- Route of entry, for example, skin contact or absorption, eye contact, inhalation and ingestion
- Effects of acute exposure
- Effects of chronic exposure
- Exposure limits
- Irritancy of product
- Sensitization to product
- Carcinogenicity, teratogenicity, mutagenicity

- Reproductive toxicity
- Name of toxicologically synergistic products

9.4.8 Preventive Measures

- Personal protective equipment to be used
- Specific engineering controls to be used
- Procedures to be followed in case of leak or spill
- Waste disposal
- Handling procedures and equipment
- Storage requirements
- Special shipping information

9.4.9 First Aid Measures

- Specific first aid measures

9.4.10 Preparation Information

- Name and phone number of group, department or party responsible for preparation of MSDS
- Date of preparation

9.5 TRAINING REQUIREMENTS:

- *All workers who work in the proximity of a controlled product must be instructed in:*
- Content and significance of supplier and workplace labels
- Content and significance of MSDSs
- Procedures for the safe use, storage, handling and disposal of controlled products
- Procedures to be followed in an emergency involving a controlled product
- The worker training program must be developed in consultation with the Joint Health and Safety Committee.
- The worker training program must be reviewed annually or when conditions change.

11.0 THE MANUAL IN PERSPECTIVE

These notes provide basic rules and guidelines for safe practices within the Brock University Faculty of Mathematics & Science. They are required reading for every person working in the Faculty. It cannot be assumed, however, that all necessary rules or warnings are set out here, or that other or additional information or measures may not be required. Any omission is not an excuse for the use of unsafe practices. **The individual lab supervisor is ultimately responsible for all work carried out under his/her jurisdiction.**

There is a safe way to perform each laboratory operation or field activity. It will be assumed that data about the safe handling and ultimate disposal of the chemicals used is known to the responsible faculty member and that this information has been transmitted to those actually carrying out or supervising the operation. It is further assumed that all these persons will, in the light of this knowledge, teach and insist upon the use of such proper procedures and thus eliminate unnecessary hazards.

APPENDIX 1: LABORATORY CHECKLIST

Location _____
Inspector(s) _____

Area Supervisor _____
Date _____

A. GENERAL

1. Housekeeping satisfactory? _____
2. Free paths of egress? _____
3. Hazard warning signs at entrance? _____
4. Laboratory authority list at entrances? _____
5. Work area separate from study/social area? _____
6. Laboratory safety policies posted? _____
7. No food in lab or refrigerators? _____
8. Equipment maintained in good condition? _____
9. Guards on moving equipment? _____
10. Broken glassware properly stored? _____

B. FIRE SAFETY

1. Flammables stored in proper cabinets? _____
2. Class ABC extinguisher? Near egress? _____
3. Fire blankets available? _____
4. Minimal stock of flammable material? _____
5. Suitable refrigerators used for flammables? _____
6. Two well-separated exits, swing out doors? _____
7. Flammables not stored along path of egress? _____

C. CHEMICAL HANDLING

1. Chemicals stored re: compatibility? _____
2. Ethers & other peroxide formers stored properly & dated? _____
3. Containers labelled with contents & date? _____
4. Quantities of chemicals not excessive? _____
5. Chemicals stored safely? _____
6. Waste segregated, labelled & often removed? _____
7. Cylinders secure, capped when not used? _____
8. Perchloric acid minimized, only proper hood? _____
9. Hoods used for all toxic/hazardous work? _____
10. Suitable precautions taken against explosion/implosion? _____

D. VENTILATION

1. Laboratory at negative pressure re: corridors? _____
2. Fume hoods fully operational? _____
3. Fume source >20cm back from hood face? _____

E. ELECTRICAL

1. All apparatus Hydro One approved? _____
2. No circuits overloaded (extension cords, multi-plugs)? _____
3. Apparatus grounded or double insulated? _____
4. Motors, non-sparking? _____
5. Lighting: adequate? vapour protected in hoods? _____

F. SAFETY DEVICES









1. Eye wash station(s) available & well-maintained? _____
2. Deluge shower available & well-maintained? _____
3. First aid kit available & supplied? _____
4. Protective equipment (goggles, masks, gloves, aprons) available and used as needed? _____
5. Evacuation route marked or explained? _____

APPENDIX 2: HAZARD WARNING SYMBOLS: AN EXPLANATION



ESAO
The EDUCATION
SAFETY ASSOCIATION
of ONTARIO

WHMIS SYMBOLS

	RISKS	PRECAUTIONS
Compressed Gas	 <p>MATERIALS WHICH ARE NORMALLY GASEOUS KEPT IN A PRESSURIZED CONTAINER</p> <ul style="list-style-type: none"> • Could explode due to pressure • Could explode if heated or dropped • Possible hazard from both the force of explosion and the release of contents 	<p>ENSURE CONTAINER IS ALWAYS SECURED</p> <ul style="list-style-type: none"> • Store in appropriate designated areas • Do not drop or allow to fall
Flammable And Combustible	 <p>MATERIALS WHICH WILL CONTINUE TO BURN AFTER BEING EXPOSED TO A FLAME OR OTHER IGNITION SOURCE</p> <ul style="list-style-type: none"> • May ignite spontaneously • May be a material which will release flammable products if allowed to degrade or when exposed to water 	<p>STORE IN PROPERLY DESIGNATED AREAS WORK IN WELL VENTILATED AREAS</p> <ul style="list-style-type: none"> • Avoid heating • Avoid sources of sparks / flames • Ensure electrical sources are safe
Oxidizing Material	 <p>MATERIALS WHICH CAN CAUSE OTHER MATERIALS TO BURN OR SUPPORT COMBUSTION</p> <ul style="list-style-type: none"> • Can cause skin or eye burns • Increase fire and explosion hazard • May cause combustibles to explode or react violently 	<p>STORE IN AREAS AWAY FROM COMBUSTIBLES WEAR BODY, HAND, FACE AND EYE PROTECTION</p> <ul style="list-style-type: none"> • Store in proper containers which will not rust or oxidize
Toxic Immediate And Severe	 <p>POISONS / POTENTIALLY FATAL MATERIALS WHICH CAUSE IMMEDIATE AND SEVERE HARM</p> <ul style="list-style-type: none"> • May be fatal if ingested or inhaled • May be absorbed through the skin • Small volumes have a toxic effect 	<p>AVOID BREATHING DUST OR VAPOURS AVOID CONTACT WITH SKIN OR EYES</p> <ul style="list-style-type: none"> • Wear protective clothing which is effective against fumes and vapours • Wear face and eye protection • Work in well ventilated areas and wear breathing protection
Toxic Long Term Concealed	 <p>MATERIALS WHICH HAVE HARMFUL EFFECTS AFTER REPEATED EXPOSURES OR OVER LONG PERIODS OF TIME</p> <ul style="list-style-type: none"> • May cause death or permanent injury • May cause birth defects or sterility • May cause cancer • May be sensitizer causing allergies 	<p>WEAR APPROPRIATE PERSONAL PROTECTION WORK IN A WELL VENTILATED AREA</p> <ul style="list-style-type: none"> • Store in appropriate designated areas • Avoid direct contact • Use hand, body, face and eye protection • Ensure respiratory and body protection is appropriate for the specific hazard
Biohazardous Infectious	 <p>INFECTIOUS AGENTS OR A BIOLOGICAL TOXIN CAUSING A SERIOUS DISEASE OR DEATH</p> <ul style="list-style-type: none"> • May cause anaphylactic shock • Includes Viruses, Yeasts, Moulds, Bacteria and Parasites which affect humans • Includes fluids containing toxic products • Includes cellular components 	<p>SPECIAL TRAINING REQUIRED WORK IN DESIGNATED BIOLOGICAL AREAS WITH APPROPRIATE ENGINEERING CONTROLS</p> <ul style="list-style-type: none"> • Avoid forming aerosols • Avoid breathing vapours • Avoid contamination of people / area • Store only in special designated areas
Corrosive Materials	 <p>MATERIALS WHICH REACT WITH METALS AND LIVING TISSUE</p> <ul style="list-style-type: none"> • Eye and skin irritation on exposure • Severe burns/tissue damage on longer exposure • Lung damage if inhaled • May cause blindness if eyes contacted • Environmental damage from fumes 	<p>WEAR BODY, FACE AND EYE PROTECTION USE BREATHING APPARATUS</p> <ul style="list-style-type: none"> • Ensure protective equipment is appropriate • Work in well ventilated area • Avoid all direct body contact • Use appropriate storage containers and ensure proper non-venting closures
Dangerously Reactive	 <p>MATERIALS WHICH MAY HAVE UNEXPECTED REACTIONS</p> <ul style="list-style-type: none"> • May react with water • May be chemically unstable • May explode if exposed to shock or heat • May release toxic or flammable vapours • May vigorously polymerize 	<p>HANDLE WITH CARE AVOIDING VIBRATION, SHOCKS AND SUDDEN TEMPERATURE CHANGES</p> <ul style="list-style-type: none"> • Store in appropriate containers • Ensure storage containers are sealed • Store and work in designated areas

APPENDIX 3: GLOSSARY OF WHMIS TERMS

Acid: an inorganic or organic compound that has a pH of less than 7, neutralizes bases or alkalis and turns litmus paper red. They are corrosive to human tissue and are to be handled with care.

Acute Exposure: a short-term exposure, usually occurring at high concentration.

Acute Health Effect: an effect that develops either immediately or a short time after exposure.

ALARA: acronym for as low as reasonably achievable.

Alkali: any compound having highly basic properties; with a pH above 7 and turns litmus paper blue. These are very corrosive to human tissue and are to be handled with care.

Analgesia: loss of sensitivity to pain.

Anorexia: loss of appetite.

Anoxia: a lack of oxygen in inspired air.

Antidote: a remedy to relieve, prevent or counteract the effects of a poison.

Asbestosis: chronic lung disease caused by inhaling asbestos fibres.

Asphyxiant: a vapour or gas that can cause unconsciousness or death by suffocation (lack of oxygen).

Asthma: a disease caused by spasmodic contraction of the bronchioles in the lungs.

Ataxia: a loss of muscular coordination.

Autoignition Temperature: the minimum temperature required to initiate or cause self-sustained combustion, in the absence of a spark or flame.

Biohazardous Infectious Material: a material that contains organisms and the toxins produced by these organisms that have been shown to cause disease or are believed to cause disease in either humans or animals.

Body Burden: the total amount of a toxic material that a person has ingested or inhaled from all sources over time.

Boiling Point: the temperature at which a liquid changes from a liquid to a gas, at normal atmospheric pressure.

Bonding: a safety practice where two objects are interconnected with clamps and bare wire. This equalizes the electrical potential between the objects and helps prevent static sparks that could ignite flammable materials.

Carcinogens: agents/compounds that may induce cancer in humans.

CAS Registry Number: a number assigned to a material by the Chemical Abstracts Service (CAS) to provide a single unique identifier.

Chemical Formula: sometimes called the molecular formula, indicates the elements that make up a chemical.

Chemical Name: a proper scientific name for the active ingredient of a product.

Chemical Reactivity: the ability of a material to chemically change. Undesirable and dangerous effects such as heat, explosions or the production of noxious substances can result.

Chloracne: an acne-like eruption caused by excessive contact with certain chlorinated compounds.

Chronic Exposure: a long-term exposure, usually occurring at low concentrations.

Chronic Health Effect: an effect that appears a long time after exposure.

Coefficient of Oil/Water Distribution: the ratio of the solubility of the chemical in an oil to its solubility in water.

Combustible Liquid: a liquid which has a flash point above 37.8°C (100°F).

Compressed Gas: a material which is a gas at normal room temperature (20°C) and pressure but is packaged as a pressurized gas, dissolved gas or gas liquefied by compression or refrigeration.

Condensation: the process of reducing from one form to another denser form such as steam to water.

Controlled Products: under the Controlled Products Regulation, a controlled product is defined as a material, product or substance which is imported or sold in Canada and meets the criteria for one or more of the following classes:

Class A - Compressed Gas

Class B - Flammable and Combustible Material

Class C - Oxidizing Material

Class D - Poisonous and Infectious Material

Class E - Corrosive Material

Class F - Dangerously Reactive Material

Also see "Hazardous Ingredient"

Corrosive Material: a material that can attack (corrode) metals or cause permanent damage to human tissues such as skin and eyes on contact.

Cryogenics: materials that exist at extremely low temperatures, such as liquid nitrogen.

Cyanosis: a dark purplish coloration of the mucous membranes and skin caused by deficient oxygenation of the blood.

Dangerously Reactive Materials: materials that may undergo vigorous condensation, decomposition or polymerization. They may react violently under conditions of shock or increase in pressure or temperature. They may also react vigorously with water or water vapour to release a toxic gas.

Decomposition: the breakdown of a substance, often due to heat, decay, or other effect, with the release of other compounds such as vapours or gases that may be flammable or toxic.

Density: the weight of a material in a given volume. It is usually given in grams per millilitre (g/mL).

Dermal: used or applied to the skin.

Dermatitis: inflammation of the skin.

Dilution Ventilation: dilution of contaminated air with uncontaminated air in a general area, room or building for the purposes of health hazard or nuisance control, and/or for heating and cooling.

Dose: amount of the agent that has entered the body through the various routes of entry.

Dust: solid particles suspended in air formed by mechanical action.

Dyspnea: a sense of difficulty in breathing; shortness of breath.

Edema: an abnormal accumulation of clear, watery fluid in body tissue.

Emetic: an agent which induces vomiting.

Emphysema: an irreversible lung disease resulting in an excessive loss of lung capacity.

Epiphora: excessive flow of tears.

Epistaxis: nosebleed.

Evaporation Rate: the rate at which a liquid changes to vapour at normal room temperature.

Explosive (Flammable) Limits: the lower explosive (flammable) limit (LEL) is the lowest concentration of vapour in air which will burn or explode upon contact with a source of ignition. The upper explosive (flammable) limit (UEL) is the highest concentration of vapour in air which will burn or explode upon contact with a source of ignition.

Exposure Limits: established concentrations which, if not exceeded, will not generally cause adverse effects to the worker exposed. Exposure limits differ in name and meaning depending on origin. For example:

1. The exposure levels for the hazardous chemicals that are included in the Regulation respecting the Control of Exposure to Biological or Chemical Agents - made under the Occupational Health and Safety Act of Ontario, are expressed as follows:

TWAEV Time-Weighted Average Exposure Value: the average airborne concentration of a biological or chemical agent to which a worker may be exposed in a work day or a work week.

STEV Short Term Exposure Value: the maximum airborne concentration of a chemical or biological agent to which a worker may be exposed in any 15 minute period, provided the TWAEV is not exceeded.

CEV Ceiling Exposure Value: the maximum airborne concentration of a biological or chemical agent to which a worker may be exposed at any time.

SKIN: this notation indicates that direct or airborne contact with the product may result in significant absorption of the product through the skin, mucous membranes or eyes. Inclusion of this notation is intended to suggest that preventative action be taken against absorption of the agent through these routes of entry.

2. Threshold Limit Values (TLVs) are exposure guidelines developed by the American Conference of Governmental Industrial Hygienists (ACGIH). They have been adopted by several Canadian governments and others as their legal limits. They are expressed as follows:

TLV - TWA Threshold Limit Value - Time-Weighted Average: the time-weighted average concentration for a normal 8 hour work day and a 40 hour work week, to which nearly all workers may be repeatedly exposed, day after day, without adverse effect.

TLV - STEL Threshold Limit Value - Short Term Exposure Limit: a 15 minute time-weighted average exposure which should not be exceeded at any time during a work day even if the 8 hour TWA is within the TLV. Exposures at the STEL should not be repeated more than 4 times a day and there should be at least 60 minutes between successive exposures at the STEL.

TLV - C Threshold Limit Value - Ceiling: the concentration that should not be exceeded during any part of the working exposure. Other exposure limits include the Permissible Exposure Limits (PEL) which are legal exposure limits in the United States.

Fines: Finely crushed or powdered material or fibres; especially those smaller than average in a mix of various sizes.

Flammable Limits: See "Explosive Limits."

Flammable Substance: one that will readily catch fire and continue to burn in air if exposed to a source of ignition.

1. Flammable Aerosol: a material that is packed in an aerosol container which can release a flammable material.

2. Flammable Gas: a gas which can readily catch fire and continue to burn.

3. Flammable Liquid: a material that gives off a vapour which can readily catch fire and continue to burn. A flammable liquid has a flashpoint below 37.8°C.

4. Flammable Solid: a material which can readily catch fire and continue to burn vigorously and persistently. This may occur from friction, absorbing moisture, from spontaneous chemical change, or by retaining heat from manufacturing or processing.

5. Reactive Flammable Material: a material which is a dangerous fire risk because it can react readily with air or water.

Flashback: this occurs when a trail of flammable materials is ignited by a distant source of ignition. The flame then travels back along the trail of gas, vapour or aerosol to its source.

Flash Point: the lowest temperature of a liquid which it gives off enough vapour to form an ignitable mixture of vapour and air immediately above the liquid surface.

Freezing Point: the temperature at which a liquid becomes a solid, at normal atmospheric pressure.

Fume: an airborne dispersion consisting of minute solid particles arising from the heating of a solid.

Gas: a formless fluid that occupies the space of its enclosure.

Hæmaturia: the presence of blood in the urine.

Hæmolysis: separation of the hæmoglobin from the red blood cells.

Hazard: the potential for harmful effects.

Hazardous Combustion Products: chemicals that may be formed when a material burns. These chemicals may be flammable, toxic or have other hazards.

Hazardous Decomposition Products: formed when a material decomposes (breaks down) because it is unstable, or reacts with materials such as water or oxygen in air.

Hazardous Ingredient: under the Hazardous Products Act, a chemical must be listed in the Hazardous Ingredients section of an MSDS if:

- it meets the criteria for a controlled product;
- it is on the Ingredient Disclosure List;
- there is no toxicological information available;
- the supplier has reason to believe it might be hazardous.

Hazardous polymerization: polymerization is a process of forming a polymer by combining large numbers of chemical units or monomers into long chains (polyethylene from ethylene or polystyrene from styrene). Uncontrolled polymerization can be extremely hazardous. Some polymerization processes can release considerable heat or can be explosive.

HEPA: high efficiency particulate air-purifying respirator equipment.

Hypoxia: insufficient oxygen, especially applied to body cells.

IARC: International Agency for Research on Cancer.

IDLH: immediately dangerous to life and health.

Ignition Temperature: the lowest temperature at which a combustible material will catch on fire in air and continue to burn independently of the source of heat.

Impervious: describes materials which do not allow other substances to penetrate or pass through.

Incompatible: describes materials that could cause dangerous reactions and release of energy from direct contact with each other.

Ingestion: means taking a material into the body by eating it.

Inhalation: means taking a material into the body by breathing it in.

Irritant: some sort of aggravation of whatever tissue the material comes in contact with.

Jaundice: yellowish discoloration of the skin and eyes with bile fluid.

Ketosis: condition marked by excessive accumulation of ketone bodies in the body.

Lacrimator: a material which produces tears.

LC₅₀: the concentration of a material in air which causes death in 50% of a group of test animals. It is usually expressed in air concentration in ppm of material per weight of test animal. LC stands for lethal concentration.

LD₅₀: the weight of material which causes the death of 50% of a group of test animals. It is usually expressed in weight of material per weight of test animal. LD stands for lethal dose.

LEL (Lower Explosive Limit): see "Explosive Limits".

Local Exhaust Ventilation: involves the capture of pollutants at the source.

Material Causing Immediate and Serious Toxic Effects: classified under "Poisonous and Infectious Material" as toxic or very toxic based on information such as the LD₅₀ or LC₅₀.

Melting Point: the temperature at which a solid material becomes a liquid.

Metastasis: the transmission of a disease from one part of the body to another.

Miscible: the extent to which liquids or gases can be mixed.

Mist: suspended liquid droplets in air caused by condensation or by spraying.

Mutagen: an agent that affects the genes or cells of the exposed people in such a way that it may cause cancer in the exposed individual or an undesirable mutation to occur in some later generation.

Narcosis: stupor or unconsciousness produced by narcotics or other materials.

NA Number: see "UN number."

Nephrotoxic: poisonous to the kidney.

Neuritis: inflammation of the nerves.

Neutralize: to return the pH to the neutral level of 7 by adding an acid to a base or vice versa.

NFPA: National Fire Protection Association.

NIOSH: National Institute of Occupational Health and Safety.

Nuisance Particulates: dusts which do not produce significant organic disease or toxic effects from reasonable concentrations or exposures.

Odour Threshold: the airborne concentration, usually in parts per million, at which an odour becomes noticeable.

Oxidizing Material: gives up oxygen easily or can readily oxidize other materials.

Parts Per Million (PPM): represents the concentration of gases or vapour in air. For example, 1 ppm of a gas means that 1 unit of the gas is present for every 1 million units of air.

Permissible Exposure Limits (PEL): Legal limits in the U.S. set by the Occupational Safety and Health Association (OSHA).

pH: a measure of the acidity or basicity (alkalinity) of a material when dissolved in water.

Pneumoconiosis: a respiratory tract and lung condition caused by the inhalation of mineral or metallic particles.

Polymer: a natural or man-made material formed by combining units, called monomers, into long chains.

Polymerization: the process of forming a polymer by combining large numbers of chemical units or monomers into long chains.

PPE: personal protective equipment. Devices or clothing worn to help isolate a worker from direct exposure to hazardous materials.

Pyrophoric: describes materials that ignite spontaneously in air below 54°C.

Sensitization: the development, over time, of an allergic reaction to a chemical.

Siderosis: pneumoconiosis caused by the inhalation of iron particles.

Silicosis: a condition characterized by shortness of breath caused by exposure to silica dusts.

Solubility: the ability of a material to dissolve in water or another liquid.

Solvent: a material which is capable of dissolving another chemical.

Soot: fine particles formed by combustion that consist chiefly of carbon.

Specific Gravity: the density of a liquid compared to the density of an equal amount of water.

Stability: the ability of a material to remain unchanged in the presence of heat, moisture or air.

Sublime: to change from the solid to the vapour phase without passing through the liquid phase.

Tachycardia: excessively rapid heartbeat, with a pulse rate above 100.

Tachypnea: increased rate of respiration.

Teratogen: agents or compounds that a pregnant woman takes into her body that generate defects in the fetus.

TLV: see "Exposure Limits".

Toxicity: ability of a substance to cause harmful effects.

Trade Name: the name under which a product is commercially known.

TWA: see "Exposure Limits".

UEL (Upper Explosive Limits): see "Explosive Limits".

UN Number: a four digit number assigned to a potentially hazardous material or class of materials.

UN (United Nations) numbers are internationally recognized and are used by fire fighters and other emergency response personnel for identification of materials during transportation emergencies.

NA (North American) numbers are assigned by Transport Canada and the U.S. Department of Transport to materials they consider hazardous

and to which a UN number has not been assigned.

Vapour: a gaseous form of a material which is normally solid or liquid at room temperature and pressure.

Vapour Density: the density of a vapour compared to the density of an equal amount of air.

Vapour Pressure: the pressure of a vapour in equilibrium with its liquid or solid form.

Ventilation: the movement of air.

Volatility: the ability of a material to evaporate.

APPENDIX 4: ACADEMIC SUPPORT DATABASE COLLECTION

This collection of databases offers fast, current and comprehensive information. All of the records can be emailed, printed or downloaded. Best of all, there is a FREE reference help desk number that you can call should you need help with your search 1-800-668-4284. These databases can all be accessed on-campus by going to: <http://ccinfoweb.ccohs.ca/asp/> For off-campus access, you must log in by using your Brock University Library account.

International Programme on Chemical Safety (IPCS) INCHEM

IPCS INCHEM is an aggregate database produced in cooperation with the World Health Organization (WHO), the International Labour Organisation (ILO), and the United Nations Environment Programme (UNEP). INCHEM provides quick and easy online access to internationally peer reviewed documents on the sound management, environmental risk assessment and use of chemicals commonly used throughout the world. <http://www.inchem.org/pages/search.html>

ILO Encyclopaedia of Occupational Health & Safety

The ILO Encyclopaedia of Occupational Health and Safety contains over 100 chapters comprising over 1,000 separate full-text articles.

Material Safety Data Sheets (MSDS)

The Material Safety Data Sheets database is an aggregate database of CCOHS CHEMINFO and MSDS datasets. MSDS is a comprehensive database of the most current full-text MSDSs, obtained directly from over 1,200 international manufacturers and suppliers including encompassing all commercially known chemical compounds.

Occupational Health & Safety References Collection

The Occupational Health and Safety References Collection is an abstracting and indexing tool for published research in all aspects of adverse effects experienced by workers.

Registry of Toxic Effects of Chemical Substances (RTECS)

The NIOSH Registry of Toxic Effects of Chemical Substances (RTECS) database contains detailed full-text chemical profiles from over 2,500 sources. Each profile provides relevant toxicological information, hazard classifications, international occupational exposure limits, regulatory information, occupational exposure survey data and references to toxicological reviews and NIOSH and OSHA analytical methods.

Notes:

IN CASE OF EMERGENCY

FIRE PROCEDURES:

IF YOU DISCOVER OR CAUSE A FIRE:

SHOUT and pull the fire alarm

- If possible, advise Campus Security (X. 3200 or emergency phone) or the 911 operator of exact location
- Only fight the fire if the above has been done, the fire is contained and controllable and you have a clear route to an exit, otherwise...

IF YOU HEAR THE FIRE ALARM:

GET OUT, close doors and exit the building

- Individuals are responsible for evacuating themselves and anyone they are supervising at the time the alarm rings
- Help individuals with mobility impairment into a fire-separated smoke-free area (preferably the fire stairwells once most occupants have evacuated) and advise a warden (fluorescent yellow hats) or Campus Security of their whereabouts. They will only be evacuated if they are at risk. It is OK for someone to stay with them.

STAY OUT until told to return

- Brock's alarm bells "rest" due to overheating. Silenced bells do not mean the situation is safe. Wait for the "All Clear" to be given by Campus Security or your warden. This could take more than 20 minutes. It is safe to shelter in unconnected buildings in bad weather

MEDICAL EMERGENCY:

Minor cuts or burns:

- Give **First aid** and seek follow-up medical attention as appropriate

Major injury:

- **Get Help** call 911 for ambulance and X. 3200 to advise Campus Security
- **Give Help** Check breathing, pulse, Stop Bleeding, Give first aid, Do not move unless
- in danger
- **Give Comfort**, keep warm and calm

CHEMICAL EMERGENCY:

SPLASH IN EYE OR ON BODY:

- Rinse immediately and prolifically (minimum 15 min.) at eyewash, shower or sink
- Remove contact lenses or contaminated apparel
- Check MSDS and get medical attention

SPILL:

- Contain rapidly by diking with any handy material
- Warn all those in area
- If volatile — extinguish ignition sources & evacuate
- If toxic — cover to suppress fumes & evacuate
- Check MSDS for clean-up procedures - use kits if available
- All waste labeled and sent to hazardous waste stream

ALL OTHER EMERGENCIES: Call Campus Security at 3200