

TRENT UNIVERSITY

Personal Protective Equipment

A guide to the use of PPE in the lab

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Personal Protective Equipment

Preamble:

This guide, Personal Protective Equipment (PPE), is to be read by those persons who will be using some form of PPE in their work or studies. The information in this guide are provided to assist the user in choosing and wearing the correct PPE for their work situation. Any deviations from this guide should always be towards a safer situation.

This document forms an integral part of the Science Health and Safety Program, which is outlined in the document called the Trent University Science Health and Safety Program. It should be reviewed by all personnel who will be using PPE and must be reviewed by those whose supervisors have indicated that the worker is required to have this training as part of their individual Health and Safety Training record. Supervisors shall determine what training is required by their personnel working in their labs.

Acknowledgement: Much of the material in this Guide has been taken from Health Safety Programs at other universities such as University of Guelph, Western University and University of Ottawa.

1.0 Introduction

Personal Protective Equipment (PPE) is considered to be the last line of defence against exposure to hazardous materials following the implementation of proper engineering controls, administrative procedures and good practices and procedures. PPE should never be considered as the only option for personnel protection. Due to the wide range of hazards found in Science laboratories and research it is difficult to give specific recommendations for the selection and use of PPE. The following is provided to assist supervisors and their lab personnel in selecting and using PPE. It should be noted that the proper selection of the appropriate PPE is important in ensuring the PPE protects as it should. A selection of the wrong material or device can, in fact, result in catastrophic consequences. All up to date information regarding the best practice for the use of PPE should be consulted. It is the Supervisor's responsibility to ensure the PPE will protect for the hazard identified.

2.0 Eye and Face Protection

Canadian Standards Association (CSA) approved eye protection is to be worn by students, employees and visitors in all areas where hazardous or unknown substances (either chemical or biological) are being stored, used or handled, where there is a risk of splash, projectiles or air borne particles or where there is harmful radiant energy.

Minimum eye protection worn in the laboratory consists of approved safety glasses with permanent side shields. Safety glasses are designed to protect against impact and do not provide significant splash protection. Therefore safety glasses should only be worn in cases of light work not involving significant volumes of liquids.

- Goggles are to be worn when there is a risk of splashing a hazardous material. Indirect vented goggles are preferred.
- Eye protection is to provide adequate impact and splash resistance appropriate for the work being done.

- Ultraviolet (UV) protective eyewear is required where there is risk of exposure to UV light.
- Face shields are to be used if an explosion or significant splash hazard exists such that there is a need to provide further protection to the face.
- Face shields are to be used in conjunction with primary eye protection (safety glasses or goggles depending on the hazard).
- Full size shields that can be placed directly in front of the hazard may also be used to provide additional protection to the entire body. These too, are only to be used in conjunction with goggles, lab coats, etc.

While wearing contact lenses is not prohibited in laboratories, an assessment of the specific circumstance or environment is to be made to decide whether or not wearing contact lenses presents a hazard to the worker and therefore if it should be prohibited. Contact lenses themselves do not provide eye protection. Further information regarding the wearing of contact lenses in laboratory situations may be found at the following websites:

Canadian Centre for Occupation Health and Safety – OSH Answers:

http://www.ccohs.ca/oshanswers/prevention/contact_len.html

CDC-NIOSH – Contact Lens Use in a Chemical Environment:

<http://www.cdc.gov/niosh/docs/2005-139/>

2.0 Hand protection

Selection of Gloves

Gloves are to be used to provide protection against chemical or biological hazards and exposure to extreme temperatures, abrasions or lacerations. Table 3 provides a general guideline to describe appropriate hazard-based selection of gloves.

Table 3 Guide to Hazard Based Glove Selection

Hazard	Degree of Hazard	Protective Material
Abrasion	Severe	Reinforced heavy rubber, staple-reinforced heavy leather
	Less Severe	Rubber, Plastic, Leather, Polyester, Nylon, Cotton
Sharp Edges	Severe	Metal mesh, staple re-inforced heavy leather, Kevlar, Aramid-steel mesh
	Less Severe	Leather, Terrycloth (aramid fiber)
	Mild with delicate work	Lightweight leather, Polyester, Nylon, Cotton
Chemicals and Fluids	Risk varies according to the chemical, its concentration and time of contact among	Dependent on Chemical. Examples include: Natural rubber, neoprene, nitrile

	other factors. Refer to the manufacturer and to the Chemical MSDS	rubber, butyl rubber, PTFE, Teflon, Viton, PVC, Polyvinyl alcohol etc...
Cold		Leather, insulated plastic or rubber, Wool, Cotton
Electricity		Rubber-insulated gloves tested to appropriate voltage (CSA Standard Z259.4-M1979) with Leather outer glove.
Heat	Greater than 350 deg C	Zetex
	Up to 350 deg C	Nomex, Kevlar, heat resistant leather with linings
	Up to 200 deg C	Nomex, Kevlar, heat resistant leather, Terry cloth (aramid fiber)
	Up to 100 deg C	Chrome-tanned leather, Terry cloth
General Duty		Cotton, Terry cloth, Leather
Product Contamination		Thin-film plastic, lightweight leather, Cotton, Polyester, Nylon
Radiation	Depends on the type of radiation	Lead-lined rubber, Plastic or Leather

Modified table taken from <http://www.ccohs.ca/oshanswers/prevention/ppe/gloves.html>

2.1 Use and Care of Gloves

The following guidelines should be considered when using gloves:

- 1.0 Inspect for damage prior to use. Any sign of deterioration, such as holes, tears or discoloration, should prompt immediate replacement of the gloves.
- 2.0 Ensure appropriate fit and thickness to allow for the required tactile sensitivity.
- 3.0 Ensure appropriate length so as to provide adequate protection of the arm.
- 4.0 To remove: pull the gloves inside out to prevent exposure to any contaminants during removal.
- 5.0 Remove gloves prior to touching computers or phones, opening doors or otherwise contacting items that would be expected to be free of contamination (either biological or chemical).
- 6.0 Wash hands thoroughly after removal of gloves.
- 7.0 Never reuse disposable gloves.
- 8.0 Reusable gloves should be stored and maintained in such a way as to prevent exposure (e.g. in a Ziploc bag) and should be stored within the laboratory or work area. Manufacturer's instructions are to be followed as applicable.

2.2 Body Protection – Lab coats and aprons

- 1.0 Lab coats and long pants are to be worn whenever hazardous chemicals, radiological or biological substances are being used or handled. Shorts do not provide protection of the lower legs.
- 2.0 Lab coats with snaps are preferred over lab coats with buttons to allow for quick removal of the clothing in the case of an emergency.
- 3.0 Lab coats should have snaps fastened at all times while working in the lab.
- 4.0 Lab coats are to be stored in the laboratory area to prevent biological or chemical contamination of non-lab areas.
- 5.0 Lab coats are to be cleaned regularly and are to be laundered separately from all other clothing.
- 6.0 Lab personnel should be aware (as with gloves) that different materials for lab coats have different protective properties and the selection of a lab coat should be made based on the hazardous materials being worked with.

Aprons should be worn in addition to lab coats in situations where there is an elevated splash hazard or the risk of injury following a splash is high. Acid resistant aprons should be worn when working with large volumes (i.e. greater than four litres) of concentrated inorganic acids e.g. HCl, H₂SO₄. The use of aprons alone is discouraged as they provide inadequate protection of the arms.

Coveralls are generally not recommended in laboratory situations where flammable or corrosive liquids are being handled because of their potential for difficult removal should contamination occur.

3.0 Respiratory Protection

There are several types of respiratory protection that are appropriate for use in a laboratory setting depending on the work being performed. The use of a respirator should only be considered when permanent engineering controls are inadequate or non-functional e.g. emergency spill situations. Fit-testing is required for all respirators and is provided by the Science Facilities Assistant (SFA). Contact the SFA at ext. 6253 for more information.

Disposable dust masks are to be used when nuisance quantities of non-toxic dust are generated from the material(s) being used.

For situations where the air contains unacceptable or unknown concentrations of vapours or fine air-borne particles, a respirator may be required. An assessment of this kind of situation should be done to determine the appropriate type of respiratory protection required (Contact Risk Management or Science Facilities for assistance with this).

Respirators are to be stored such that they do not accumulate dust, i.e. in a drawer or box that allows sufficient ventilation to prevent growth of bacteria or mold. Respirators should be labelled with the name of the user. When being used, detection of an odour is confirmation that the respirator is either not providing a good fit or that the filter cartridges have expired. Specific care requirements will be in the instructions for each respirator.

4.0 Footwear

Closed-toed, closed-heeled shoes constructed of a resistant material are required while in all laboratory areas. Steel-toed, chemical resistant safety shoes may be warranted in specific cases as determined by the laboratory supervisor. Sandals do not provide adequate protection and are not to be worn in any laboratory situation. High-heeled shoes are strongly discouraged as they increase the potential for tripping or falling.

5.0 Hearing Protection

Equipment such as grinders, homogenizers, pumps and sonicators in laboratories may warrant the use of hearing protection. Hearing protection may consist of ear plugs or ear muffs depending on the amplitude and frequency of the noise. Hearing protection must be worn in areas where the eight hour time weighted average noise level is greater than 85 dB. Noise monitoring can be performed by RMO personnel if required. Contact the SFM at x 7061 or the EHSO at x7373 for details.