



THE UNIVERSITY OF
SYDNEY

SAFETY REGULATIONS HANDBOOK
FOR THE FACULTY OF PHARMACY
(JULY 2013)





EMERGENCY TELEPHONE NUMBERS

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Fire Brigade (Newtown)	9557 5260
Fire Brigade (Glebe)	9660 7156
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When dialing from outside, extensions beginning with
 1 = 935x xxxx 4 = 911x xxxx 6 = 906x xxxx

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INTRODUCTION

Safety in the laboratory is a matter of commonsense and good organisation. It is the responsibility of all individuals to ensure they work safely. Both State and Federal legislation cover laboratory safety. The following regulations have not been written from a legal point of view and are not intended to be a comprehensive compilation of safety practices and techniques, but rather as a general guide designed to prevent accidents.

The laboratories of the Faculty of Pharmacy can be divided into two classes, undergraduate laboratories (first to fourth year) and research laboratories. For safety purposes, fourth year honours students working in research laboratories are treated as research students. This handbook deals with regulations relevant to the research and teaching laboratories.

The University has a statutory obligation to provide a safe working environment. Safety in the workplace is a cooperative venture, and staff and students have obligations to contribute towards and maintain safety.

GENERAL PRECAUTIONS

1. RESPONSIBILITIES

All staff and each student of the Faculty of Pharmacy is responsible for ensuring that his or her own work environment is conducive to good work health and safety by:

- Complying with work health and safety instructions, including the regulations and procedures as set out in this handbook. Safety regulations are in place to protect all members of the Faculty and will be strictly enforced by the Dean.
- Taking action to avoid, eliminate or minimise hazards
- Reporting hazards to the relevant supervisor, manager or service unit
- Making proper use of safety devices and personal protective equipment
- Not wilfully placing at risk the health, safety or well-being of others at the workplace
- Seeking information or advice where necessary, particularly before carrying out new or unfamiliar work
- Wearing appropriate clothing and protective equipment for the work being carried out, where this is required
- Consuming or storing food and drink only in those areas designated for this purpose
- Being familiar with emergency and evacuation procedures, and if appropriately trained, the location of and use of emergency equipment
- Co-operating with directions from emergency wardens and other emergency personnel

ACADEMIC STAFF - RESEARCH

Academic supervisors are required to:

- Provide leadership and set a good example for staff and students with relation to safety issues.
- Consult with the staff and students under their control to identify, assess and control hazards.
- Maintain a safe working environment, providing such supervision and instruction to all research students and staff working under their supervision so that they understand the nature of experiments they perform and are aware of any potential dangers.
- Enforce strictly both general safety regulations and any special regulations pertaining to laboratories under their control.

- Ensure that all research students and staff working under their supervision comply with the risk assessment and labeling procedures.
- Reviewing and signing off on Hazard Assessment Sheets completed by the staff and students under their control.

ACADEMIC STAFF – TEACHING

Academic staff are responsible for:

- Providing leadership and set a good example for staff and students with relation to safety issues.
- Consulting with the staff/students under their control to identify, assess and control hazards.
- Maintaining a safe working environment and providing such supervision as is necessary to ensure the health and safety of all personnel within their area of supervision.
- Ensuring that all activities have written risk assessments; these must address the hazards associated with the experiment set-up (by technical staff); completion of the experimental process (by students); and the disposal of waste residues. The assessments must be available for inspection within the laboratory.
- Ensuring that the laboratory script has adequate safety warnings and that these are reinforced during the pre-laboratory talk.
- Ensuring that all demonstrators have adequate safety training.

TECHNICAL STAFF

Technical staff in charge of laboratories are responsible for the safety of those working under their direct supervision and others that are working within their area of control, except during undergraduate experiments when the academic in charge assumes responsibility.

- Provide leadership and set a good example for staff and students with relation to safety issues.
- Consult with the staff and students under their control to identify, assess and control hazards.
- Maintaining a safe working environment and providing such supervision as is necessary to ensure the health and safety of all personnel within their area of supervision.
- Enforce strictly both general safety regulations and any special regulations pertaining to laboratories under their control.
- Anyone wishing to work in their area of responsibility must first obtain their permission.

ADMINISTRATIVE STAFF

Administrative staff are responsible for:

- Complying with safety instructions.
- Taking action to avoid, eliminate or minimize hazards.
- Report hazards to their supervisor.

RESEARCH STUDENTS & OTHER RESEARCHERS

Researchers are responsible for:

- Complying with safety instructions
- Taking action to avoid, eliminate or minimize hazards
- Reporting hazards to their supervisor
- Completing risk assessments for all experimental work.
- Working alone or after-hours is only permitted with the prior permission of the academic supervisor.
- Researchers may only act as demonstrators in laboratory classes after the successful completion of the demonstrator training program.

COURSEWORK STUDENTS

Coursework students are responsible for:

- Complying with safety instructions.
- Taking action to avoid, eliminate or minimize hazards.
- Reporting hazards to their supervisor.
- Coursework students must not start any practical work until they have read, understood and signed the document "Faculty of Pharmacy Laboratory Safety".
- Enclosed shoes must be worn at all times during laboratory classes. Safety glasses and laboratory coats must be also be worn as instructed.

VISITING RESEARCHERS, VISITING LECTURERS AND OTHER VISITORS

All visitors are obliged to follow the safety regulations and procedures detailed in this document.

- Visitors to laboratories must be provided with safety glasses.
- Visiting lecturers, demonstrators and researchers are required to follow the safety rules and regulations as laid down in this handbook. Visiting lecturers, demonstrators and researchers must liaise with those members of staff responsible for bringing them to the Faculty, in conjunction with the Faculty Safety Officer where appropriate.
- School students visiting/working within the Faculty must be under the direct supervision of a staff member at all times; prior to the commencement of any practical/experimental involving school students work, the supervisor must have completed and documented a thorough risk assessment; any required PPE must be provided by the Faculty.

2. EMERGENCIES

All newcomers to the Faculty should make sure that they know the locations of the nearest fire exits and Break Glass Alarms (Alarm Points).

All accidents, floods, fires, etc., (even if apparently trivial) are potentially dangerous situations and must be reported immediately to your supervisor and the Safety Officer.

Any faulty equipment must be reported to the laboratory personnel or Safety Officer immediately. Faulty items should be clearly labelled with 'Out of Service' tags.

IF YOU DISCOVER A FIRE OR OTHER EMERGENCY SITUATION:

- a) Warn anyone in immediate danger.
- b) If safe and if trained, take reasonable action to control the emergency.
- c) Evacuate if in danger or when instructed.
- d) Raise the alarm immediately by activating a Break Glass Alarm (breaking the glass cover on an alarm point).
 - University Security can be reached on 13333. If necessary Fire, Police or Ambulance can be called by dialing 0 (for an outside line), then 000, and asking to be connected to the appropriate service.
 - Other emergency numbers are listed on the inside cover of this booklet.
- e) Notify the Chief Warden as soon as possible.
- f) First-aid treatment is available. The list of qualified people is given on the inside cover of this booklet.

EVACUATION

The Safe Evacuation Area for Pharmacy is the open area between the Holme and Old Geology Buildings. Please do not stand on Science Road as this blocks access by emergency vehicles.

If the fire/emergency alarm system is activated you may be required to evacuate the building. You should:

- 1) When you hear a "Beep, Beep" signal (ALERT)
 - a) turn off all non-vital equipment
 - b) secure all dangerous processes
 - c) check if other processes in your vicinity have been attended to
 - d) collect or lock away personal or valuable items and prepare to evacuate the building at the direction of your Floor Wardens
- 2) When you hear a "Whoop, Whoop" signal (EVACUATE)
 - a) Evacuate in an orderly manner using your nearest safe exit and proceed to a Safe Evacuation Area.
 - b) Do not attempt to collect personal belongings at this point.

3. DISCIPLINE

- a) Any person found damaging or improperly using any safety equipment, or defacing safety signs and instructions will be liable to prosecution.
- b) Mischievous conduct, skylarking, riding of bicycles, skateboards, scooters etc., playing ball games or running in the building is not allowed.
- c) Standing on seats, desks or benches in lecture theatres and laboratories is hazardous and is not permitted.
- d) For safety reasons, appropriate dress, including covered footwear, must be worn at all times in laboratory areas. Bare feet, sandals or thongs are not acceptable.
- e) Fire exits, corridors, aisles and doorways must be kept clear at all times.
- f) Stairways must not be obstructed, nor used for seating.
- g) Laboratories, workshops, stores etc., are to be kept clean and tidy.
- h) No eating or drinking is allowed in laboratories. Food may only be prepared and consumed in designated areas, such as the Common Room and offices. Laboratory beakers, etc. must not be used for drinking.
- i) University regulations prohibit smoking in any building.
- j) Liquor may not be consumed in the Faculty of Pharmacy without the permission of a member of the academic staff authorised by the Dean.
- k) Non-qualified persons must not operate or handle workshop equipment at any time.

4. SCREEN BASED EQUIPMENT GUIDELINES

One of the more common complaints which staff experience are problems associated with spending long periods at a computer, microscope, laminar flow or other static task. If you are to avoid aching muscles and tired eyes, it is important that you adopt appropriate work practices.

Check your posture

- Adjust the chair height so that your arms are approximately parallel with the floor
- If the front of the chair is causing pressure on the back of your thighs or behind your knees, you may need a footstool.
- Adjust the chair backrest to support the lower back while you sit in the typing posture
- Locate the computer screen approximately one full arm's length away and position it so that your line of sight to the screen is slightly below horizontal
- Relax the shoulder muscle and check your wrist and forearms are still approximately parallel with the floor, then commence typing.

Relax those muscles!

- As muscles tire from holding the keying posture they need to relax regularly during the day - 2-3 minute breaks are recommended every 15-20 minutes

- When tight or tired muscles are felt, it is good to stretch, relax, stretch, relax the muscle area to relieve the tiredness
- Exercise can be done regularly and unobtrusively when required.
- A total of 4 hours (not including breaks) of intensive keyboard work is the maximum time recommended each day.

Are your eyes tired?

- General room lighting is usually quite suitable for working at a computer.
- The computer should be located so that you do not face directly at a window when looking at the screen, nor should a window be directly behind you.
- If overhead lights are reflected in the screen, tilt the screen forwards to minimize the reflections.
- The eyes need to relax from working at a fixed focal length hence look away from the computer screen regularly.

5. LABORATORIES

Particular laboratories have special rules which are to be observed. In addition the following general rules apply.

- a) Safety glasses must be worn at all times whilst in a chemistry laboratory and whenever carrying out practical tasks in microbiological or radiation laboratories.
- b) Enclosed shoes must be worn at all times. Thongs and high-heeled shoes are not acceptable footwear in any laboratory.
- c) Long hair and loose clothing must be confined; shorts, cutoffs or miniskirts are not recommended.
- d) The **Work Health and Safety Act 2011** requires each workgroup to maintain a register of all substances listed or assessed as hazardous substances or dangerous goods (local chemical register), to have a material safety data sheet (MSDS) for those substances available, and to label all containers for hazardous substances in an appropriate manner. Access to the **ChemAlert** database for MSDSs and the production of labels is provided at: <http://chemalert.ucc.usyd.edu.au/chemalert/index/index.do>
Further details on the Hazardous Substances Regulations are available at: <http://sydney.edu.au/whs/guidelines/chemical/index.shtml>
- e) No experiment may be commenced without first assessing the hazards of all materials involved and the risks associated with the experimental procedures. The risk assessment procedures which must be followed are detailed in.
- f) Research students and research workers working in a laboratory outside normal working hours must comply with the regulations.
- g) Repairs to faulty equipment, particularly electrical equipment, should not be attempted except by suitably trained and qualified personnel, faulty equipment must be removed from use and arrangements made for repair by an appropriately qualified person.
- h) Electricity cables must not be run across the floor. The use of double adaptors in the Faculty is prohibited; only powerboards with overload protection should be used.

1. GENERAL

- a) Appropriate Personal Protective Equipment (PPE) must be worn in laboratories.
- i. Eye protection must be worn at all times in all laboratories where chemicals are being used or in any situation where there is a risk of exposure via the eye.
 - ii. Gloves and protective clothing should be worn when handling chemicals or biological agents. It should be noted, that latex gloves are permeable to organic (or organic-soluble) substances and therefore offer only limited protection; they should be used as a line of last defense only and must be replaced immediately if contamination by an organic substance occurs.
 - iii. Enclosed shoes must be worn at all times. Thongs and high-heeled shoes are not acceptable footwear in any laboratory.
 - iv. Long hair and loose clothing must be confined; shorts, cutoffs or miniskirts are not recommended.
 - v. **Laboratory coats must be worn at all times in laboratories. Laboratory coats (and gloves) must not be worn outside laboratories except for trips between laboratories.** On no account should laboratory coats be worn in offices or staff rooms. The same applies to all other items of protective clothing or apparatus.
 - Gloves must be removed before touching objects such as door handles and should never be worn whilst using telephones, computers, photocopiers etc.
 - **You must wear a clean laboratory coat.** It is not acceptable for you to continue to wear a lab coat on which chemicals have been spilled. You can get a clean lab coat on level 4.
 - If a supervisor feels that the wearing of lab coats should not be mandatory in certain rooms, then a risk assessment must be carried out and documented in support of the decision.
- b) First aid kits are placed in a number of locations throughout the Faculty.
- c) No eating, drinking, smoking or applying cosmetics is permitted in any laboratory or in any other chemical storage area.

2. CLEANLINESS

Cleanliness is essential to protect you and others from exposure to hazardous substances and to ensure an optimal operation of equipment.

- a) Work areas (benches, fume cupboards etc) should be cleaned as soon as work is finished.
- b) Thoroughly wash and rinse all glassware as soon as you have finished with it - do not let it accumulate on the sink

SPILL MANAGEMENT

- a) All spillages must be cleaned up immediately.
- b) In general, the following principles should be applied to managing spills:
 - Contain the spill, if necessary evacuate the area and seek assistance.
 - If the spill is too large or hazardous to manage internally, contact NSW Fire Brigade for assistance (0-000).

If the spill can be managed internally:

- Arrange for an assistant / observer.
- Use appropriate personal protective equipment (PPE).
- Treat or absorb the spill with an appropriate absorbent material.
- Collect, package and label the absorbed material and used PPE as waste.
- Decontaminate the area of the spill and ventilate the area.
- Dispose of waste as hazardous material.
- Raise an incident report form.

Notes

- Apply liberal amounts of solid sodium hydrogen carbonate or sodium carbonate to acid spills. Do not use water as this only spreads the acid further.
- Similarly, for alkali spills apply liberal amounts of solid boric acid.
- In the event of a spillage of mercury, every effort must be made to recover every trace of the mercury since mercury is a highly toxic cumulative poison. Inform the Safety Officer Immediately and refer to the University's Guidelines for the clean-up of spills of inorganic mercury.

<http://sydney.edu.au/whs/emergency/mercurys.shtml>

- Various Spill Kits are available in the following locations:

Chemical	N410B, Solvent store
Microbiological/Biological	S208, S222, N409
Radiochemical	S211
HAZCHEM (general)	Solvent store, level 3 near N355 and level 2 next to S221

3. CHEMICAL STORAGE AND USE

- a) A local chemical register must be filled according to the Material Safety Data Sheets (MSDS) for every chemical housed in this faculty. As the MSDSs are expired after 5 years there is no need to keep records of the MSDSs as long as the local chemical register is updated and the users have access to ChemAlert.
- b) All workers are required to be familiar with the hazards associated with the use of common reagents and of the specific chemicals used in their work. Many of the compounds used daily in the laboratory may be hazardous or dangerous, for example corrosive, toxic, inflammable or carcinogenic.
- c) All workers are required to know the location and proper use of emergency equipment (safety showers, eyebaths, fire blankets, extinguishers, first aid kits etc.) and be familiar with emergency procedures (exits, alarm stations, evacuation etc.)
- d) Safety glasses or goggles will be worn in all areas where chemicals are used, handled or stored, or where particular eye hazards exist e.g. UV or laser light, particulate matter or systems under pressure.
- e) Unlabelled solutions represent a hazard. Label all solutions, samples etc with exact contents, your name and the date. Unlabelled items will be disposed of at your expense. You can print out labels from ChemAlert.
- f) Solvent vapours, many of which are cumulative poisons, must not be inhaled. Where possible, all operations involving volatile solvents should be confined to a fume cupboard.
- g) Flammable solvents must be stored in approved flammable liquid cabinets, well away from any ignition sources.
- h) Vessels containing more than 2.25 litres of flammable solvent may not be stored in laboratories. The working volume in any laboratory must not exceed 10 litres / 50m².
- i) Bottles containing flammable solvents on open shelves should be kept to a minimum; the container volume must not exceed 500 ml.
- j) Empty bottles of flammable solvents must be stored safely as they may contain explosive vapour. Bottles must be triple-rinsed or evaporated dry (in a fume cupboard) and the labeling removed or defaced prior to disposal.
- k) Only the minimum volume of solvents required for efficient working may be stored in laboratories.
- l) Corrosive materials should be stored in/on chemically resistant vessels or trays that can contain the entire contents in the event of a spillage. Acids and alkalis should be adequately segregated. Large volumes (> 10 L/Kg) should be stored in an approved corrosives cabinet.
- m) Incompatible chemicals that could react violently or explosively or might produce toxic or corrosive products must be adequately segregated by distance or bunding.
- n) Do not pipette anything by mouth. Use pipette filler.
- o) Perchlorates are classified as Class A explosives and all experiments with perchlorates must first be discussed with the Safety Officer. In general, perchlorates should only be used as a last resort, and even then only on a small scale <100 mg.
- p) Liquid nitrogen must never be used in unventilated areas.
- q) All reagents and products must be clearly labelled with a description, appropriate Risk and Safety Phrases (Refer to Appendices 1 & 2), the owner's name and the date.
- r) Refrigerators are not designed for the long term (> 1 year) storage of chemicals. All items stored in refrigerators must be clearly labelled as to contents (as above), owner (academic staff are the responsible persons) and date. Technical staff will routinely check refrigerators and may remove incorrectly labelled items for disposal. Refrigerators used for chemicals must be clearly labelled NO FOOD or DRINK.

4. RADIOACTIVE SUBSTANCES

All persons intending to use radioactive isotopes, are required by law to hold an appropriate Environment Protection Authority (EPA) license to allow them to purchase and use radioactive materials. To become Registered with the EPA users first undertake the University of Sydney Radiation Training Course (contact Jon D'Astoli, ext 13763, jdastoli@usyd.edu.au).

Work with Radioisotopes is only permitted in labs that are registered with the EPA. Currently the following labs are registered for radiation work N257E and S211.

Before work commences researchers and students must first discuss the methods and procedures for handling and disposal with their supervisor and the **Faculty Radiation Safety Officer**. The person will be then issued with a personal radiation monitor (detects beta radiation only) which must be worn at all times when using radioactivity. The maximum Dose Limit for staff working with ionizing radiation is set at 20 milliseverts (mSv) per annum for a whole body dose. The ICPR recommendations for workers during pregnancy is 2 mSv per annum (measured at the surface of the abdomen). The health risk to the foetus is greatest between week 8 to week 25. If you may be pregnant it is recommended that you inform your supervisor or the Safety Officer so that your work environment can be assessed.

- a) All persons using radioactive isotopes must attend the University Radiation Training Course
- b) All isotopes coming into the Faculty must be recorded in the Radioactive Record Book held by the Faculty Radiation Safety Officer.
- c) Great care must be taken when unpacking radioactive materials as leakage may have occurred in transit. Packaging should be checked for contamination, and if "clean", the packaging should be disposed of correctly (remove labelling).
- d) Appropriate protective clothing and dosimeters must be worn.
- e) Any equipment used for handling radioactive substances must be clearly labelled as such.
- f) Work only in approved rooms and areas (fume cupboards etc.).
- g) Contain radioactive materials in defined work areas. Wherever possible work over a spill tray
- h) Laboratory benches and adjacent areas should be monitored before and after use and any contamination immediately cleaned up. Report all spillages immediately to both your supervisor and the Faculty Radiation Safety Officer and Faculty Safety Officer, **NO MATTER HOW MINOR**.
- i) 'Radioactive' tape should be used to identify work areas where radiation is used.
- j) Avoid contaminating clean sites. Avoid using glass containers, *e.g.*, centrifuge tubes, where there is a possibility of breakage.
- k) Appropriate shielding should be used for the radiation. (eg. Perspex for ^{32}P and lead impregnated perspex for ^{125}I)
- l) Ensure that all radioactive waste is disposed of correctly (see SECT III, 13, b).
- m) Radioactive waste that is not able to be disposed of immediately needs to be stored correctly, ie in a suitable container labeled with your name, the isotope, the activity at the date of generation, and the date when activity will be acceptable for disposal (<100Bq/g). Please see the Radiation Safety Officer for further information. This information should also be recorded in the Radioactive Record Book held by the Faculty Radiation Safety Officer.

5. BIOLOGICAL LABORATORIES

The basic approach to working with microorganisms is to regard them all as potential pathogens and to handle them with standard microbiological techniques to minimise the risk to laboratory staff and the environment.

CLASSIFICATION OF MICROORGANISMS BY RISK GROUP

The following classification has been drawn up for Australia and New Zealand and is based on the pathogenicity of the agent, the mode of transmission and host range of the agent, the availability of effective preventive measures, and the availability of effective treatment.

- a) Risk Group 1 (low individual and community risk) - a microorganism that is unlikely to cause human, plant or animal disease.
- b) Risk Group 2 (moderate individual risk, limited community risk) - a pathogen that can cause human, plant or animal disease, but is unlikely to be a serious hazard to laboratory workers, the community, livestock or the environment; laboratory exposures may cause infection, but effective treatment and preventive measures are available, and the risk of spread is limited.
- c) Risk Group 3 (high individual risk, limited community risk) - a pathogen that usually causes serious human or animal disease and may present a serious hazard to laboratory workers. It could present a risk if spread in the community or the environment, but there are usually effective preventive measures or treatment available
- d) Risk Group 4 (high individual and community risk) - a pathogen that usually produces life-threatening human or animal disease, represents a serious hazard to laboratory workers and is readily transmissible from one individual to another. Effective treatment and preventive measures are not usually available.

A comprehensive list of organisms classified into their Risk groupings is provided in AS2243.3. The Risk groupings include lists of bacteria, fungi, viruses and prions.

<http://sydney.edu.au/whs/guidelines/biosafety/microbiol.shtml#classification>

CLASSIFICATION OF LABORATORIES

AS2243.3 specifies four levels of physical containment for laboratories.

Physical Containment Level 1 (PC1)

A Physical Containment Level 1 laboratory is suitable for work with microorganisms where the hazard levels are low, and where laboratory personnel can be adequately protected by standard laboratory practice. The organisms used are not known to cause disease in healthy adults (i.e. organisms in Risk Group 1). Work may be carried out on the open bench. Specimens that have been inactivated or fixed may be handled in a level PC1 laboratory.

Physical Containment Level 2 (PC2) (Faculty of Pharmacy, Rm S208, S222, S226, N423 and N412)

A Physical Containment Level 2 laboratory is suitable for work with material likely to contain microorganisms which may be present in the community, where the microorganism may be associated with animal, plant or human disease of moderate severity (i.e. organisms in Risk Group 2). With good microbiological techniques, work with these agents may be carried out on the open bench. If there is a significant risk from the production of aerosols, a biological safety cabinet must be used.

Physical Containment Level 3 (PC3)

A Physical Containment Level 3 laboratory is suitable for work with indigenous or exotic microorganisms, and where there is a risk of serious infection to humans, animals or plants (i.e. organisms in Risk Group 3). A Physical Containment Level 3 laboratory provides safeguards to minimise the risk of infection to individuals,

the community and the environment. The University currently has one PC3 facility. This is located in the Biochemistry and Microbiology Building (G08).

Physical Containment Level 4 (PC4)

A Physical Containment Level 4 laboratory is suitable for work with dangerous microorganisms that pose a high individual risk of life-threatening disease and may be readily spread to the community (i.e. organisms in Risk Group 4). A Physical Containment Level 4 laboratory is a facility situated in a building separate from other laboratories or constructed as an isolated area within a building. The University has no PC4 facilities.

GENERAL PROCEDURES

Only work with Risk Group 1 or Risk Group 2 microorganisms may be carried out within the Faculty of Pharmacy, and only within an appropriate facility. All work with microorganisms must be in accordance with the PC1 or PC2 requirements of AS2243.3 – Safety in laboratories: Part 3 Microbiological aspects and containment facilities. Some of the general requirements include, but are not limited to the following:

- Laboratory doors must be closed when work is in progress.
- Laboratory coats or gowns must be worn during work and removed before leaving the laboratory.
- Hands must be washed with soap and warm water when leaving the laboratory and after handling cultures.
- All microbiological waste must be sterilized before disposal.
- Equipment used for handling cultures or contaminated material used which is not readily steam sterilized must be disinfected after use. A suitable disinfectant for glassware is provided by a 5% sodium hypochlorite solution. The 5% sodium hypochlorite solution must be made up fresh, daily and allowed to contact for 30 minutes.
- Work benches and surfaces must be decontaminated with a disinfectant solution.
- Any container of viable microorganisms to be taken from the laboratory must be transported within in a second closed, unbreakable outer container.
- All technical procedures must be performed in a way that minimises the creation of aerosols.
- All cultures should be labelled clearly with the name of the microorganism and the user's name.
- Cultures no longer required should be autoclaved and disposed of as soon as practicable.
- Spilt bacterial cultures require particular attention so that appropriate chemical (**FRESH** 5% sodium hypochlorite) disinfection can be carried out as quickly as possible. All accidents must be reported immediately to your supervisor.

SPILLS OUTSIDE OF A BIOLOGICAL SAFETY CABINET

The emergency response for an accidental spill of material containing microorganism in the laboratory will depend upon the hazard of the material and the volume. A small spill of material containing Risk Group 1 microorganisms may be simply cleaned up with a paper towel soaked with an effective decontaminating agent. A larger spill or a spill involving Risk Group 2 organisms should be treated in accordance with the following general principles:

- Leave the laboratory immediately and allow 30 minutes for any aerosols to settle.
- Prevent others from accessing the laboratory until the spill has been cleaned up.
- Put on appropriate protective equipment (eg. gloves, gown, safety glasses)
- Place absorbent material wetted with suitable disinfectant over the spill. Allow 10 minutes for the disinfectant to work.
- Remove any sharp objects with forceps and discard as contaminated sharps.
- Collect the contaminated absorbent material for disposal.

- Use the disinfectant solution to wipe over the area likely to have been contaminated.
- Remove and dispose of protective equipment, and wash hands.

GENE TECHNOLOGY WORK

All work involving genetically modified organisms (GMOs) must be approved by the University of Sydney Institutional Biosafety Committee (IBC). The appropriate application forms must be submitted to the IBC & you must have received written approval from the IBC prior to commencing work. Some work with GMOs will be required to be undertaken in a PC2 Laboratory that has been approved by the Office of the Gene Technology Regulator (OGTR). Further information can be obtained from the University's Biosafety website http://sydney.edu.au/whs/guidelines/biosafety/gene_technology.shtml.

6. TYPES OF WORK

Work can be divided into five general classes depending on the type of activity and associated risk. These classes relate to both the Faculty regulations for conducting procedures outside normal working hours and for Risk Assessment and Labelling of Procedures.

Class 0 (no chemical/biological/radiation risk)

Non-laboratory work. This is work where no foreseeable chemical or physical hazard is involved. Work in this class includes use of computers, the library, or other office work. Such work can be performed at any time. **NO LABORATORY WORK CAN BE CONSIDERED AS CLASS 0** (even washing up, running spectrometers or preparing simple solutions).

Class 1 (minimal risk)

Work where no untoward chemical, biological, radiation or physical hazard is involved. Work in this class includes use of instruments not involving ionising radiation or cryogenic liquids and the preparation of samples for use on instruments (*eg* simple chemical transfer or dilution is permitted as a Class 1 activity provided the sample is not potentially explosive and the quantity of solvent is restricted to less than 50 mL). Likewise the operation of spectrometers (NMR, FTIR, UV/VIS, *etc.*) is allowed provided no transfer of cryogenic liquids takes place. Such work can be performed at any time, **provided that another person in the building knows that you are working**. The rationale behind this class is that if an accident occurs it is unlikely to be incapacitating and you know where to find another person in the building for assistance.

Class 2 (low risk)

Normal laboratory work that does not involve the use of known acutely toxic, explosive or highly corrosive substances, unsealed radioisotopes or pressure reactions. The use of cryogenic liquids in small quantities (<5 litres) for the cooling of solvent traps, is included in this class. Reactions involving small quantities of inflammable solvents (<500 mL), or the evaporation or distillation of up to 2 litres using normal procedures, falls into this class. The use of non-commercial compounds where no safety data are available, but which are considered low risk based on generic assumptions, falls into this class. The use of sealed radiation sources, X-ray diffractometers and laser spectrometers are all defined as Class 2 activities. All work involving the use of animals should be regarded as Class 2, except when procedures involve the use of gaseous anesthesia (see below). Class 2 manipulations should normally be completed by 12:00 midnight and not be recommenced before 7:30 am.

After hours Class 2 work is permitted provided that another person is within earshot and/or line of sight at all times.

Class 3 (significant risk)

Work involving the use of unsealed radiation sources, pressure reactors and large quantities of flammable solvents or cryogenic liquids (greater than the volumes specified for Class 2 procedures), or experiments of any scale which involve the use of infectious biological materials, chemicals with the following properties: acutely toxic; highly corrosive or irritant; stench; carcinogenic; teratogenic; mutagenic; oxidising; pyrophoric; potentially explosive; react violently with water; and non-commercial compounds with a high risk based on generic assumptions. Any animal work that involves gaseous anesthesia should be considered as Class 3. Work in this category is not permitted before 7:30 am or after 7:00 pm except with the express permission of a member of the academic staff authorised by the Dean.

In this case, particular attention must be paid to the Faculty policy that at least one other person must be working within easy earshot and/or line of sight of such work at all times.

Class 4 (high risk)

Procedures which involve Notifiable or Prohibited Carcinogens or radioactivity above specified levels.

7. WORKING OUT OF HOURS

Research often involves working outside normal working hours. The following guidelines are not intended to discourage after hours work, but rather to ensure that such work is carried out safely. The normal working hours in the Faculty are Monday to Friday 8.00 am to 5:30 pm.

Anyone working outside these hours will be required to sign in/out.

The sign-book is located in the glass cabinet inside the front entrance, and requires a simple entry of Date, Name, Time in, Location, and finally Time out. Any infringement of this policy will lead to disciplinary action, and repeated infringements may result in exclusion from the laboratories.

- Working after hours for Class 2 activities is only permitted when at least two people wish to work in the same area (*i.e.* within earshot and/or line of sight of each other at all times). Staff and students are requested to complete all Class 2 activities by 12:00 midnight and not to carry out Class 3/4 work after 7:00 pm.
- Research students may perform Class 2 experiments in laboratories until 12:00 midnight, although it is envisaged that such activities will not occur on a regular basis. Working after this time can involve an unacceptable risk due to fatigue of the worker. Only under exceptional circumstances, and with the express permission of a member of the academic staff authorised by the Dean, may students perform Class 2 experiments after 12:00 midnight.
- Saturdays, Sundays and public holidays are treated as a normal after hours period.
- Class 3/4 experiments may only be carried out with permission of a member of the academic staff authorised by the Dean.
- Class 2 experiments should be completed by 12:00 midnight unless permission of a member of the academic staff authorised by the Dean is obtained.

8. HAZARD ASSESSMENT AND LABELLING OF PROCEDURES

Risk Categories

The form requires you to state the risk category of the experiment. These categories are as follows:

- A. Experiments that may not be carried out without close supervision.
- B. Experiments which may not be carried out without the supervisor's advice (postgraduate).
- C. Experiments with some risks (other than categories A or B) where care must be observed but it is considered that workers are adequately trained and competent in the procedures involved.
- D. Experiments which consist of general laboratory activities requiring minimum training or which are considered to have very low levels of risk even without training.

SIMPLE ASSESSMENTS

A simple risk assessment involves an inspection of the work area and consultation with the individuals performing the task to determine the likely hazards associated with the planned work, and whether or not these hazards can be readily controlled. If this is the case, the assessment should be summarized on a Hazard Assessment Sheet. The Hazard Assessment Sheet must be filed in your laboratory notebook, and the completion of the assessment should be noted in the laboratory [Register of Hazardous Substances](#), with a reference to the staff/student name and relevant page of the laboratory notebook.

REPEAT RISK ASSESSMENTS

Risk assessments need only be made once. If you are carrying out an experiment using chemicals for which you have already made a risk assessment, you may refer back to the original assessment when completing your risk assessment form. In many cases, essentially the same experiment will be repeated and again, the entire risk assessment can be referred back to an original assessment. However, you must keep track of the original assessments so that you can immediately refer to them if necessary. One suggestion as to how this might be done is to keep a list of all risk assessments in the back of your notebook, together with a page identifier that will enable you to look them up immediately if necessary.

COUNTERSIGNING THE LABORATORY NOTEBOOK

Your supervisor is responsible for ensuring that you understand and abide by all of the safety requirements of the University and more specifically the Faculty of Pharmacy. When you are beginning your research your supervisor may require you to bring your laboratory notebook to her/him so that your risk assessment pages can be countersigned.

All procedures carried out in the Faculty of Pharmacy must undergo a risk assessment. This assessment will normally be based on MSDSs, information contained in the various reference materials available in the University, and consultation with your supervisor or more experienced members of the Faculty.

The class of the procedure (0, 1, 2, 3 or 4) should first be determined. If a procedure is identified as Class 1 or 2 a note should be entered into your laboratory notebook to this effect along with any special precautions that are required, including non-routine methods of waste disposal. If the procedure is left unattended you must label it with your name (and contact phone number if the procedure is left unattended outside of normal working hours), the date, experiment reference number (*e.g.* code used in your lab notebook) and an emergency shutdown procedure if appropriate (see back of this booklet). [The completion of the assessment form is simple and quick and should be encouraged for all tasks.]

Procedures which are determined to be Class 3 or 4 require the completion of Hazard Assessment Forms

(available from Faculty of Pharmacy website), which are to be signed by a member of the academic staff. The form must be displayed in a plastic envelope alongside the procedure. If a reaction is to be repeated it is not necessary to reobtain a supervisor's signature, however, the form must be displayed (see back of this booklet). A signed copy of the Hazard Assessment Form must be kept as part of a permanent record of laboratory activities (*e.g.* pasted into the laboratory notebook).

The lab notebooks of all researchers need to be initialled by a member of the academic staff, verifying each procedure has been appropriately classified. This will continue until a level of competence deemed appropriate by the individual's supervisor is reached, when a supervisor's initial is no longer required (provided the procedure does not involve a technique which is unfamiliar). Class 3 and 4 reactions will still require the Hazard Assessment Form to be signed by a supervisor, unless a "licence" has been obtained for **all** of the techniques and reagents involved (see below).

During the regular safety inspections of the various levels in the Pharmacy Faculty, the Safety Committee will be randomly checking for records that proper hazard assessments have been carried out. If these have not been done, supervisors will be instructed to monitor the student's activities and notebook to ensure that further lapses do not occur.

Continued breaches of the regulations will be referred to the Dean for further action. Procedures which are deemed to be Class 4 involving the use of Notifiable or Prohibited Carcinogens require the prior approval of the WorkCover Authority and the permission of the Safety Officer. For further detail please refer to the University's Guidelines for using Carcinogenic Substances <http://sydney.edu.au/whs/guidelines/chemical/carcinogl.shtml>.

LICENSING OF CLASS 3 PROCEDURES

When a supervisor is satisfied that a researcher is sufficiently experienced in carrying out a class 3 technique or in the use of a hazardous substance, and it is used on a regular basis, the researcher may be "licensed" to carry out the Class 3 procedure without a supervisor's signature (provided a licence has been obtained for **all** of the techniques and reagents involved). However, full risk assessment and labelling must be carried out.

9. INCIDENT REPORTS

All incident and near misses should be reported in RiskWare:

<https://riskware.sydney.edu.au/login.aspx?ReturnUrl=%2fdefault.aspx&cks=1> instructions can be found here:
<http://sydney.edu.au/whs/report/index.shtml>.

10. UNATTENDED EQUIPMENT

Equipment left unattended must be appropriately labelled and have all running water hoses made of PVC and wired onto the terminals. Water pressure alters outside working hours causing the flow to increase. Such equipment should be set up in a fume cupboard or on a drained receptacle.

11. CHEMICAL TRANSPORT

Bulk materials of all kinds, particularly corrosive liquids, must be transported in the appropriate containers.

- Winchesters must not be carried by the neck of the bottle. Solvent bottle carriers **MUST** be used for the transport of winchesters between laboratories or between the solvent store and laboratories. The service rooms have solvent bottle carriers.

- Gas cylinders must be secured at all times. Use a cylinder trolley when moving cylinders. At least 2 people should be involved in the transport of cylinders up and down stairs.

12. CARCINOGENIC AND HIGHLY TOXIC CHEMICALS

Known and suspected carcinogenic substances can be kept and used safely if appropriate precautions are taken. Some carcinogenic substances are regulated by the WorkCover Authority of NSW, and in this case WorkCover must be notified prior to obtaining or using the substance. The WHS Act includes a number of clauses specifically relating to carcinogenic substances, as well as hazardous substances in general.

You must refer to the University's Policy and Guidelines for the use of carcinogenic substances (<http://sydney.edu.au/whs/guidelines/chemical/carcingl.shtml>) prior to commencing any work with carcinogens or other highly toxic substances and notify the safety officer.

NOTIFIABLE CARCINOGENIC SUBSTANCES

- Acrylonitrile [107-13-1]
- Benzene [71-43-2] - when used as a feedstock containing more than 50% of benzene by volume
- Cyclophosphamide [50-18-0] (cytotoxic drug) - when used in preparations for therapeutic use in hospitals and oncological treatment facilities, and in manufacturing operations
- 3,3'-Dichlorobenzidine [91-94-1] and its salts (including 3,3'-Dichlorobenzidine dihydrochloride [612-3-9])
- Diethyl sulfate [64-67-5]
- Dimethyl sulfate [77-78-1]
- Ethylene dibromide [106-93-4] - when used as a fumigant
- 4,4'-Methylene bis(2-chloroaniline) [101-14-4] - MOCA
- 2-Propiolactone [57-57-8]
- o-Toluidine [95-53-4] and o-Toluidine hydrochloride [636-21-5]
- Vinyl chloride monomer [75-01-4]

PROHIBITED CARCINOGENIC SUBSTANCES

- 2-Acetylaminofluorene [53-96-3]
- Aflatoxins - except in foods where specifically permitted under the Food Act 1989
- 4-Aminodiphenyl [92-67-1]
- Amosite [12172-73-5] (brown asbestos) - except for removal, disposal, maintenance, encapsulation and enclosure purposes and situations where amosite occurs naturally and is not used for any new application
- Benzidine [92-87-5] and its salts (including benzidine dihydrochloride [531-85-1])
- bis(Chloromethyl) ether [542-88-1]
- Chloromethyl methyl ether [107-30-2] (technical grade which contains bis(chloromethyl) ether)
- Chrysotile [12001-29-5] (white asbestos) - except when:
 - (a) used for the purpose of research or analysis, or
 - (b) being removed or disposed of, or being handled for storage or stored awaiting disposal, or
 - (c) encountered during non-asbestos mining, or
 - (d) comprising or included in an item being used for the purpose of a historical or educational display.
- Crocidolite [12001-28-4] (blue asbestos) - except for removal, disposal, maintenance, encapsulation and enclosure purposes and situations where crocidolite occurs naturally and is not used for any new application
- 4-Dimethylaminoazobenzene [60-11-7]
- 2-Naphthylamine [91-59-8] and its salts
- 4-Nitrodiphenyl [92-93-3]

13. WASTE DISPOSAL.

Principle investigators and those in charge of workgroups that generate hazardous wastes are responsible for implementing waste avoidance and minimisation strategies and ensuring compliance with the University's Guidelines for the Disposal of Hazardous Waste:

<http://sydney.edu.au/whs/guidelines/hazardouswaste/index.shtml>

All staff and students in the laboratory should be familiar with the procedures for the disposal of hazardous waste and follow them. This requires some specific training and supervision of staff and students. It is recommended that a member of the laboratory staff be made responsible for coordinating the waste disposal activities of the laboratory, including clean-up of spills. However, those who generate the wastes have a responsibility to handle and dispose of them properly, minimising risks to anyone who might have contact with them. In many laboratories only the generator of the waste may be fully aware of the risks associated with it.

The University has a specialist contractor who collects, treats and disposes of hazardous wastes. Hazardous waste must not be placed in the general rubbish. Disposal of all waste materials must be carried out in an appropriate manner.

A) DISCHARGE TO SEWER

The University's Commercial Trade Waste Agreement with Sydney Water governs what materials can and cannot be discharged to sewer. The disposal of discrete chemical waste "down the sink" is prohibited. Any group or staff intending to dispose of routine waste to sewer must first refer to the acceptance criteria detailed below.

Acceptance criteria for discharge to sewer

- No physical hazards, i.e. no risk of fire or explosion
- Not hazardous to health, i.e. not toxic, corrosive, or containing viable microorganisms
- Not environmentally hazardous, i.e. not eco-toxic
- Miscible in water
- pH 7-10
- Limited suspended solids
- Low odour
- Concentration less than or equal to [Sydney Water's listed acceptance standards](#).

B) CHEMICAL WASTE

Chemical waste includes solvents, acids, alkalis, toxic materials, photographic chemicals, paints, contaminated glassware and consumables, and laboratory chemicals that are no longer required or have deteriorated with age. Waste products derived from hazardous substance often have similar hazard characteristics to the hazardous substance from which they were derived, so appropriate consideration must be given to the packaging, labelling, handling and storage of waste products, just as for other hazardous substances.

Segregation

Incompatible chemical wastes must be segregated as far as possible to reduce the risk of a dangerous reaction. It is also desirable to segregate compatible materials (where practical) to improve the potential for reuse or recycling. For further information about chemical compatibilities, consult the product label, material safety

data sheet (MSDS) and laboratory texts. Compatible solvents may generally be collected in the same container. However, halogenated and non-halogenated solvents must be separated.

Packaging and Labelling

Approved dangerous goods drums are supplied for the collection of liquid hazardous wastes and can be found at the solvent store. Labels should be affixed to each container to indicate the type of hazardous waste, the generators name and contact details. Liquid and solid hazardous waste will also be accepted for collection in the supplier's original packaging.

Chemically contaminated consumables (eg. bench covers, heavily contaminated PPE, agarose and acrylamide gels) must be collected in strong leak proof bags and labelled as above. Chemically contaminated plastic pipette tips must be disposed of in rigid containers (eg. a sturdy container with a plastic liner or a dangerous goods drum) and labelled as above.

Waste that is inadequately packaged or labelled may be rejected by the hazardous waste contractor and not collected for disposal.

Empty Chemical Packaging

Empty chemical packaging may only be discarded into the general rubbish if:

- There are no hazardous residues (attained via triple rinsing or evaporation);
- Any labels have been removed or defaced; and
- The lids have been removed.

The packaging from highly toxic chemicals should be disposed of as hazardous waste.

Storage

The requirements for the storage of chemical waste are similar to the requirements for the storage of hazardous substances and dangerous goods. Chemical waste is usually temporarily stored within the laboratory or in the Pharmacy Hazardous Waste Depot. As a minimum requirement the storage area should provide adequate spill containment, allow for the separation of incompatible waste streams and be secured from the public.

Chemicals that may become unstable

To avoid hazards associated with chemicals that can become unstable or explosive during storage (eg. solvents that can decompose to form peroxides, dried solutions of picric acid) all chemicals in long-term storage should be regularly monitored and if not required, recycled or disposed of as soon as possible.

Any chemicals identified as potentially unstable should be left in-situ and reported to the Risk Management Office immediately so that professional advice can be sought regarding safe disposal.

Security – areas used for the storage of hazardous waste must be secured whenever the area is unsupervised.

NOTES

- Do not mix chlorinated and non-chlorinated organic solvents *e.g.* acetone and chloroform, in the residue containers. Mixtures of these solvents can explode.
- Sodium residues should be **COMPLETELY** dissolved in ethanol and then washed down the sink. They must not be left in winchesters.
- Broken glass, Pasteur pipettes, *etc.*, should be disposed of in appropriate sharps containers. **CLEAN**, unbroken glass bottles may be placed in the general rubbish.

Collection Procedure

- i) Ensure that the waste is in a suitable container. Waste solvents should be in a plastic drum available on request from the Building Attendant.
- ii) Complete the Request for Disposal of Hazardous Waste form available from http://www.sydney.edu.au/whs/docs/forms/Routine_chem_waste_manifest.xlsx and email it to the Technical Officer prior to placing the waste in the solvent store.
- iii) The Technical Officer will submit a disposal request via [Campus Assist Online](#), using the 'Problem Type' **chemical waste disposal**, with the detailed waste manifest attached

Further information on the disposal of chemical wastes may be found in the reference materials. If there is any doubt over correct disposal procedures, the Faculty Safety Officer should be consulted.

C) RADIOACTIVE WASTE

Only low activity radioactive material can be disposed of through the University's Hazardous Waste disposal service. To meet this "low level" requirement the Specific Activity of material must be below 100 Bq/gm. Requests for Radioactive Waste Disposal can be made through Campus Assist. The information provided on the WHS website http://sydney.edu.au/whs/guidelines/hazardouswaste/hazardous_waste_collection_schedule.shtml gives details of the collection schedule and links to the manifest template. An additional [<100Bq/gm Clearance form](#) must be completed and accompany the request.

Radioactive waste that does not meet the <100Bq/gm requirement must be stored until it decays to that level. Isotopes such as P-32, S-35 & I-125 may require storage for up to a year until it decays to an acceptable level. Longer half life isotopes such as H-3 & C-14 will not effectively decay and require long term storage. In either situation it is the research group's responsibility to provide for the secure storage of this waste.

For new proposed research projects the amount of radioactive waste generated should be identified in a [Radiation Project Clearance](#). If there is no disposal path for the radioactive waste generated, the project should be re-assessed with the aim of minimising the amount of waste generated.

For long lived isotopes such as ¹⁴C please consult the Radiation Safety Officer or the Safety Officer before use to ensure waste output in < 100Bq/g, and for information about correct storage procedures.

D) DISPOSAL OF CLINICAL AND RELATED WASTE

Clinical waste is defined as waste that has the potential to cause sharps injury, infection or public offence, and includes sharps, human tissue waste, laboratory waste, animal waste resulting from biological, medical research or treatment that has the potential to cause disease.

Clinical waste usually includes the following sub-categories:

- [Laboratory and associated waste](#) directly involved in specimen processing;
- [Human tissues](#) including materials or solutions that contain free-flowing or expressible blood; and
- [Animal tissue or carcasses](#) those are contaminated or suspected to be contaminated by pathogenic organisms.

Laboratory and associated waste

This category includes all specimens used for laboratory testing; cultures or suspensions of micro-organisms in tissue culture; used Petri dishes; culture bottles; disposable equipment, used gloves etc.

All unwanted wastes containing or potentially containing live microorganisms must be:

- sterilised by pressure steam sterilisation or;
- treated by a chemical disinfectant.

http://sydney.edu.au/whs/guidelines/biosafety/decontamination_guidelines.shtml

Wastes contaminated or potentially contaminated with microorganisms of risk groups 1 and 2 (as defined in the Australian Standard 2243.3:2002 - Safety in laboratories, Part 3: Microbiological aspects and containment facilities) and genetically modified organisms (GMOs), that have been thoroughly decontaminated via pressure steam sterilisation may be disposed of as general waste provided that the autoclave bag is placed inside an unlabelled strong black plastic bag. Liquid cultures that have been decontaminated via pressure steam sterilisation may be disposed of to the sewer (sink).

In order to ensure that waste is thoroughly decontaminated via pressure steam sterilisation, monitoring of the autoclave sterilisation cycles must be carried out in accordance with the autoclave guidelines. If these procedures are not in place, sterilised solid waste must be placed into yellow bags and placed into a Clinical Waste Bin for collection. All departments generating clinical or biological waste are required to commence monitoring autoclave sterilisation cycles as soon as reasonably possible.

Wastes contaminated or potentially contaminated with microorganisms of risk groups 1 and 2 (as defined in the Australian Standard 2243.3:2002 - Safety in laboratories, Part 3: Microbiological aspects and containment facilities) and genetically modified organisms (GMOs) that have been chemically decontaminated must be disposed of as chemical waste.

Human tissues

Human tissues include tissue, organs, limbs, free-flowing or expressible blood, and other body fluids that are removed during surgery and autopsy. The management and disposal of these types of wastes needs to be conducted with public perception and aesthetic considerations in mind. Human tissues, blood or body parts must never be placed in the ordinary garbage stream, even if decontaminated.

Any waste classified as human tissue waste should be autoclaved then placed into yellow bags. Yellow bags containing unrecognisable tissue samples must be placed into a Yellow Clinical Waste Bin for collection. Yellow bags containing recognisable body parts must be placed into a Burgundy Anatomical Clinical Waste Bin for collection.

Animal tissue or carcasses

This category of waste comprises tissue, carcasses and other waste arising from animals used in laboratory investigation, or for medical or veterinary research. Animal tissues, blood or body parts must never be placed in the ordinary garbage stream, even if decontaminated.

At the Camperdown/Darlington & Camden Campuses, clean animal waste is disposed of via on-site incineration. Please contact the Faculty of Veterinary Science to arrange disposal. Animal tissue contaminated with microorganisms must be autoclaved, placed into yellow bags and placed in to a Yellow Clinical Waste Bin for collection. Animal carcasses contaminated with microorganisms must be autoclaved (where practical), placed into yellow bags and placed into a Burgundy Anatomical Clinical Waste Bin for collection.

Storage, transport and spills

Plastic bags for the collection of clinical and biological wastes other than sharps should:

- Have sufficient strength to safely contain the waste class they are designated to hold;
- Be suitable for the purpose, i.e. if to be heat sterilised they must be able to withstand high temperatures and allow steam to penetrate;

- Not be filled to more than two-thirds of their capacity;
- Allow for secure final closure when the bag is filled to a maximum of two-thirds of its capacity or 6kg, whichever is lesser; and
- Not be secured with staples or any other closure devices with sharp points or edges.

The storage of clinical and biological wastes prior to disposal should be minimised. Wastes should be treated as soon as possible after generation. When storage is required it should minimise exposure to the waste and prevent increases in the numbers of potentially harmful organisms present. For this reason refrigeration may be required. The area should also be kept secure at all times, be vermin-free, and be regularly cleaned and disinfected.

Animal cadaver waste can be stored in a designated freezer, however users must ensure that these wastes are regularly removed for disposal. All remains should be placed in colour-coded bags with labels indicating where the waste originated, what the bag contains, and who is responsible for the waste. To organise disposal of animal cadaver waste, contact the Building Attendant.

Wastes sometimes need to be transported around the University, either from the facility to autoclave area or from the autoclave to the clinical waste bin. Transport routes should be planned to minimise possible exposure to the wastes by consideration of activity levels and population densities at various times of day and places on the routes. Transport of microorganisms must be wholly contained within a primary sealed container (eg. an autoclave bag) and the primary sealed container must be packed in a secondary sealed unbreakable container (eg. Tupperware container or garbage bin with a sealable lid). The secondary container must be easily decontaminated.

A suitable spill kit and spills procedures must be readily available at any area where waste is stored.

Clinical Waste Bins must be kept locked whenever they are not being accessed and where possible stored internally. Departments that require a clinical waste bin for the regular disposal of clinical and related wastes should contact the Safety Officer for further information.

INSTRUMENT ROOMS

- In a number of instrument rooms specific safety regulations are in place. All persons must be familiar with these specific requirements.
- Instruments may only be operated by authorised persons. Unless specifically instructed on the use of an instrument all undergraduate and post-graduate students must assume that they are not authorised to operate it.
- Do not interfere with or attempt to repair the mechanism of any instrument. Report suspected faults to the appropriate member of academic staff or to Campus Property and Services.
- The handling of solvents and especially corrosive substances such as acids, must be kept to a minimum in instrument rooms.
- Exercise special care when using hydrogenation equipment. High pressure equipment may only be assembled and dismantled by suitably trained personnel.

REFERENCES

The following books are held in the School of Chemistry Library. Call numbers are given in italics:

1. *"Hazards in the Chemical Laboratory"*, 5th Edn, (Royal Society of Chemistry, London, 1992, S.G. Luxon, Ed.). 542.10289
2. L. Betherwick, *"Betherwick's Handbook of Reactive Chemical Hazards"*, 4th Edn, (Butterworths, London 1990). 541.393
3. N.I. Sax, *"Dangerous Properties of Industrial Materials"* (New York.) 614.83
4. *"Handbook of Laboratory Safety"*, 3rd Edn, (CRC Press, 1990). 542.1
5. *"The Sigma-Aldrich Library of Chemical Safety Data"*, 2nd Edn, (Sigma-Aldrich Milwaukee, 1988, R.E. Lenga, Ed) 604.7
6. *"Toxic and Hazardous Industrial Chemicals Safety Manual"* (Inter. Tech. Inf. Instit.). 660.282
7. *"Chemical Safety Data Sheets"*, (Royal Society of Chemistry, London 1991). 640.732
8. COMMONWEALTH OF AUSTRALIA *Gene Technology Act 2000*
9. COMMONWEALTH OF AUSTRALIA *Gene Technology Regulations 2001*

Other sources of safety data are:

1. The University policy on Occupational Health and Safety is located at:
<http://sydney.edu.au/whs/policies/index.shtml>
2. McLean K & Faragher A - Safety Practices in PC2 Laboratories, Genetic Manipulation Advisory Committee
3. Australian/New Zealand Standard 2243.3 2010 - Safety in Laboratories – Part 3: Microbiological safety and containment
4. The University of Sydney Emergency Policy and Guide for Fire and Other Emergencies
<http://sydney.edu.au/whs/emergency/index.shtml>
5. The University of Sydney Policy for the Acquisition, Use and Disposal of Carcinogenic Substances & Guideline for the using Carcinogenic Substances
<http://sydney.edu.au/whs/guidelines/chemical/carcingl.shtml>
6. The University of Sydney Policy and Guideline for the Disposal of Hazardous Waste
<http://sydney.edu.au/whs/guidelines/hazardouswaste/index.shtml>.
7. AS/NZS 3816 - 1998: Australian/New Zealand Standard Management of clinical and related wastes
8. [ChemAlert database](#)
9. BMBL 1999. Section V11-D. Agent Summary Statements – Prions. Biosafety in Microbiological and Biochemical Laboratories, 4th ed. Centres for Disease Control and Prevention, National Institute of Health, U.S. Department of Health and Human
10. CCH Laboratory Safety Manual
11. Safe Work Australia - Hazardous Substances Information System (HSIS)
<http://hsis.safeworkaustralia.gov.au/>
12. NH&MRC, 1999 - National Guidelines for the Management of Clinical and related Wastes
13. WHO. 2000. WHO infection control guidelines for transmissible spongiform encephalopathies. Report of a WHO consultation, Geneva, Switzerland, 23-26 March 1999.

APPENDIX I – RISK PHRASES

used in the classification, packaging, labelling and provision of information on dangerous substances:

R1	Explosive when dry
R2	Risk of explosion by shock, friction, fire or other source of ignition
R3	Extreme risk of explosion by shock, friction, fire or other source of ignition
R4	Forms very sensitive explosive metallic compounds
R5	Heating may cause an explosion
R6	Explosive with or without contact with air
R7	May cause fire
R8	Contact with combustible material may cause fire
R9	Explosive when mixed with combustible material
R10	Flammable
R11	Highly flammable
R12	Extremely flammable
R13	Extremely flammable liquefied gas
R14	Reacts violently with water
R15	Contact with water liberates highly flammable gases
R16	Explosive when mixed with oxidising substances
R17	Spontaneously flammable in air
R18	In use, may form flammable/explosive vapour-air mixture
R19	May form explosive peroxides
R20	Harmful by inhalation
R21	Harmful in contact with skin
R22	Harmful if swallowed
R23	Toxic by inhalation
R24	Toxic in contact with skin
R25	Toxic if swallowed
R26	Very toxic by inhalation
R27	Very toxic in contact with skin
R28	Very toxic if swallowed
R29	Contact with water liberates toxic gas
R30	Can become highly flammable in use
R31	Contact with acids liberates toxic gas
R32	Contact with acids liberates very toxic gas
R33	Danger of cumulative effects
R34	Causes burns
R35	Causes severe burns
R36	Irritating to eyes
R37	Irritating to respiratory system
R38	Irritating to skin
R39	Danger of very serious irreversible effects
R40	Possible risk of irreversible effects
R41	Risk of serious damage to eyes
R42	May cause sensitisation by inhalation
R43	May cause sensitisation by skin contact
R44	Risk of explosion if heated under confinement
R45	May cause cancer
R46	May cause heritable genetic damage
R47	May cause birth defects
R48	Danger of serious damage to health by prolonged exposure
R49	May cause cancer by inhalation
R50	Very toxic to aquatic organisms
R51	Toxic to aquatic organisms
R52	Harmful to aquatic organisms
R53	May cause long-term adverse effects in the aquatic environment
R54	Toxic to flora
R55	Toxic to fauna
R56	Toxic to soil organisms
R57	Toxic to bees
R58	May cause long-term adverse effects in the environment
R59	Dangerous to the ozone layer
R60	May impair fertility
R61	May cause harm to the unborn child
R62	Possible risk of impaired fertility
R63	Possible risk of harm to the unborn child
R64	May cause harm to breastfed babies

Combination of risks:

R14/15	Reacts violently with water liberating highly flammable gases
R15/29	Contact with water liberates toxic, highly flammable gas
R20/21	Harmful by inhalation and in contact with the skin
R20/21/22	Harmful by inhalation, in contact with the skin and if swallowed
R20/22	Harmful by inhalation and if swallowed
R21/22	Harmful in contact with the skin and if swallowed
R23/24	Toxic by inhalation and in contact with the skin
R23/24/25	Toxic by inhalation, in contact with the skin and if swallowed
R23/25	Toxic by inhalation and if swallowed
R24/25	Toxic in contact with the skin and if swallowed
R26/27	Very toxic by inhalation and in contact with the skin
R26/27/28	Very toxic by inhalation, in contact with the skin and if swallowed
R26/28	Very toxic by inhalation and if swallowed
R27/28	Very toxic in contact with the skin and if swallowed
R36/37	Irritating to eyes and respiratory system
R36/37/38	Irritating to eyes, respiratory system and skin
R36/38	Irritating to eyes and skin
R37/38	Irritating to respiratory system and skin
R42/43	May cause sensitisation by inhalation and skin contact
R48/20	Harmful danger of serious damage to health by prolonged exposure through inhalation
R48/20/21	Harmful danger of serious damage to health by prolonged exposure through inhalation and in contact with the skin
R48/20/21/22	Harmful danger of serious damage to health by prolonged exposure through inhalation, in contact with the skin and if swallowed
R48/20/22	Harmful danger of serious damage to health by prolonged exposure through inhalation and if swallowed
R48/21	Harmful danger of serious damage to health by prolonged exposure in contact with skin
R48/21/22	Harmful danger of serious damage to health by prolonged exposure in contact with skin and if swallowed
R48/22	Harmful danger of serious damage to health by prolonged exposure if swallowed
R48/23	Toxic danger of serious damage to health by prolonged exposure through inhalation
R48/23/24	Toxic danger of serious damage to health by prolonged exposure through inhalation and in contact with the skin
R48/23/24/25	Toxic danger of serious damage to health by prolonged exposure through inhalation, in contact with the skin and if swallowed
R48/23/25	Toxic danger of serious damage to health by prolonged exposure through inhalation and if swallowed
R48/24	Toxic danger of serious damage to health by prolonged exposure in contact with skin
R48/24/25	Toxic danger of serious damage to health by prolonged exposure in contact with skin and if swallowed
R48/25	Toxic danger of serious damage to health by prolonged exposure if swallowed
R50/53	Very toxic to aquatic organisms, may cause long term adverse effects in the aquatic environment
R51/53	Toxic to aquatic organisms, may cause long term adverse effects in the aquatic environment
R52/53	Harmful to aquatic organisms, may cause long term adverse effects in the aquatic environment

APPENDIX II – SAFETY PRECAUTION PHRASES

used in the classification, packaging, labelling and provision of information on dangerous substances:

S1	Keep locked up
S2	Keep out of reach of children
S3	Keep in a cool place
S4	Keep away from living quarters
S5	Keep contents under.....(appropriate liquid to be specified by the manufacturer)
S6	Keep under.....(inert gas to be specified by the manufacturer)
S7	Keep container tightly closed
S8	Keep container dry
S9	Keep container in a well-ventilated place
S12	Do not keep the container sealed
S13	Keep away from food, drink and animal feedstuffs
S14	Keep away from..... (incompatible material to be indicated by the manufacturer)
S15	Keep away from heat
S16	Keep away from sources of ignition - No Smoking!
S17	Keep away from combustible material
S18	Handle and open container with care
S20	When using do not eat or drink
S21	When using do not smoke
S22	Do not breathe dust
S23	Do not breathe gas/fumes/vapour/spray (appropriate wording to be specified by the manufacturer)
S24	Avoid contact with the skin
S25	Avoid contact with eyes
S26	In case of contact with eyes, rinse immediately with plenty of water and seek medical advice
S27	Take off immediately all contaminated clothing
S28	After contact with skin, wash immediately with plenty of.....(to be specified by the manufacturer)
S29	Do not empty into drains
S30	Never add water to this product
S33	Take precautionary measures against static discharges
S34	Avoid shock and friction
S35	This material and its container must be disposed of in a safe way
S36	Wear suitable protective clothing
S37	Wear suitable gloves
S38	In case of insufficient ventilation, wear suitable respiratory equipment
S39	Wear eye/face protection
S40	To clean the floor and all objects contaminated by this material use (to be specified by the manufacturer)
S41	In case of fire and/or explosion do not breath fumes
S42	During fumigation /spraying wear suitable respiratory equipment (appropriate wording to be specified by the manufacturer)
S43	In case of fire, use....(indicate in this space the precise type of fire fighting equipment. If water increases the risk, add "never use water")
S44	If you feel unwell, seek medical advice (show the label where possible)
S45	In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible)
S46	If swallowed, seek medical advice immediately and show the container or label
S47	Keep at temperature not exceeding....°C (to be specified by the manufacturer)
S48	Keep wetted with....(appropriate material to be specified by the manufacturer)
S49	Keep only in the original container
S50	Do not mix with... (to be specified by the manufacturer)
S51	Use only in well ventilated areas
S52	Not recommended for interior use on large surface areas treatment plants
S55	Treat using the best available techniques before discharge into drains or the aquatic environment
S56	Do not discharge into drains or the environment, dispose to an authorised waste collection point
S57	Use appropriate containment to avoid environmental contamination
S58	To be disposed of as hazardous waste
S59	Refer to manufacturer/supplier for information on recovery/recycling
S60	This material and/or its container must be disposed of as hazardous waste
S61	Avoid release to the environment. Refer to special instructions/ material safety data sheet
S62	If swallowed, do not induce vomiting seek medical advice immediately and show the container or label

Combined safety phrases

S1/2	Keep locked up and out of reach of children
S3/9	Keep in a cool, well ventilated place
S3/7/9	Keep container tightly closed in a cool, well ventilated place
S3/14	Keep in a cool place away from..... (incompatible materials to be indicated by the manufacturer)
S3/9/1	Keep in a cool, well ventilated place away from. (incompatible materials to be indicated by the manufacturer)
S3/9/49	Keep only in the original container in a cool, well ventilated place
S3/9/14/49	Keep only in the original container in a cool, well ventilated place away from. (incompatible materials to be indicated by the manufacturer)
S3/14	Keep in a cool place away from.....(incompatible materials to be indicated by the manufacturer)
S7/8	Keep container tightly closed and dry
S7/9	Keep container tightly closed and in a well-ventilated place
S7/47	Keep container tightly closed and at a temperature not exceeding.....deg.C (to be specified by the manufacturer)
S20/21	When using do not eat, drink or smoke
S24/25	Avoid contact with skin and eyes
S29/56	Do not empty into drains dispose of this material and its container to hazardous or special waste collection point
S36/37	Wear suitable protective clothing and gloves
S36/37/39	Wear suitable protective clothing, gloves and eye/face protection
S36/39	Wear suitable protective clothing and eye/face protection
S37/39	Wear suitable gloves and eye/face protection
S47/49	Keep only in the original container at a temperature not exceeding.....°C (to be specified by the manufacturer)

APPENDIX III – HAZARDOUS PROPERTY PHRASES

H1	"Explosive" substances and preparations which may explode under the effect of flame or which are more sensitive to shocks or friction than dinitrobenzene.
H2	"Oxidizing" substances and preparations which exhibit highly exothermic reactions when in contact with other substances, particularly flammable substances.
H3-A	"Highly flammable" liquid substances and preparations having a flash point below 21 °C (including extremely flammable liquids), or substances and preparations which may become hot and finally catch fire in contact with air at ambient temperature without any application of energy, or solid substances and preparations which may readily catch fire after brief contact with a source of ignition and which continue to burn or to be consumed after removal of the source of ignition, or gaseous substances and preparations which are flammable in air at normal pressure, or substances and preparations which, in contact with water or damp air, evolve highly flammable gases in dangerous quantities.
H3-B	"Flammable" liquid substances and preparations having a flash point equal to or greater than 21°C and less than or equal to 55°C.
H4	"Irritant" non-corrosive substances and preparations which, through immediate, prolonged or repeated contact with the skin or mucous membrane, can cause inflammation.
H5	"Harmful" substances and preparations which, if they are inhaled or ingested or if they penetrate the skin, may involve limited health risks.
H6	"Toxic" substances and preparations (including very toxic substances and preparations) which, if they are inhaled or ingested or if they penetrate the skin, may involve serious, acute or chronic health risks and even death.
H7	"Carcinogenic" substances and preparations which, if they are inhaled or ingested or if they penetrate the skin, may induce cancer or increase its incidence.
H8	"Corrosive" substances and preparations which may destroy living tissue on contact.
H9	"Infectious" substances containing viable micro-organisms or their toxins which are known or reliably believed to cause disease in man or other living organisms.
H10	"Teratogenic" substances and preparations which, if they are inhaled or ingested or if they penetrate the skin, may induce non-hereditary congenital malformations or increase their incidence.
H11	"Mutagenic" substances and preparations which, if they are inhaled or ingested or if they penetrate the skin, may induce hereditary genetic defects or increase their incidence.
H12	Substances and preparations which release toxic or very toxic gases in contact with water, air or an acid.
H13	Substances and preparations capable by any means, after disposal, of yielding another substance, e.g. a leachate, which possesses any of the characteristics listed above.
H14	"Ecotoxic" substances and preparations which present or may present immediate or delayed risks for one or more sectors of the environment.

APPENDIX V – OHSRM PART B

http://www.sydney.edu.au/pharmacy/whs/OHSRM-Part_B.pdf

ohsrm PART B – Hazardous Substances Risk Assessment Supplement

This form must be attached to the relevant ohsrm PART B, together with any other supporting documentation.

Ref. #	Description of the task involving a hazardous substance(s)	Priority	Date

Chemical/s involved (list)	Classification (from MSDS)	
	Hazardous (NOHSC Criteria)	Dangerous Goods Class (ADG Code)
1.	<input type="checkbox"/> Yes <input type="checkbox"/> No	
2.	<input type="checkbox"/> Yes <input type="checkbox"/> No	
3.	<input type="checkbox"/> Yes <input type="checkbox"/> No	
4.	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Do you have an MSDS for each substance?		<input type="checkbox"/> Yes <input type="checkbox"/> No
Has an entry been made in the Hazardous Substances Register?		<input type="checkbox"/> Yes <input type="checkbox"/> No
Can any of these substances be substituted with a less hazardous substance?		<input type="checkbox"/> Yes <input type="checkbox"/> No

Task Summary
Include a step by step summary of the processes including the quantities and concentration of substances used.

Are any hazardous substances formed as a by-product of this task?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
How will the waste products be collected, treated and disposed?		

Hazardous nature of the Substance(s) – refer to the MSDS(s)			
Health Effects		Other Physical Hazards	
<input type="checkbox"/> Toxic – single exposure	<input type="checkbox"/> Asphyxiate	<input type="checkbox"/> Flammable	
	<input type="checkbox"/> Corrosive	<input type="checkbox"/> Oxidiser	
	<input type="checkbox"/> Irritant	<input type="checkbox"/> Reactive	
<input type="checkbox"/> Hazardous to health - repeated or prolonged exposure	<input type="checkbox"/> Sensitiser	<input type="checkbox"/> Infectious – refer to the Biosafety Checklist	
	<input type="checkbox"/> Carcinogenic	<input type="checkbox"/> Radioactive – refer to Radiation Risk Assessment Form	
	<input type="checkbox"/> Mutagenic	<input type="checkbox"/> Harmful to the environment	
	<input type="checkbox"/> Teratogenic		
	<input type="checkbox"/> Cytotoxic		
Hazard Level of Substance(s) used or generated:		<input type="checkbox"/> High	<input type="checkbox"/> Medium <input type="checkbox"/> Low

Who performs the task?			
Name	Position	Experience & Training	Characteristics that increase risk (eg. allergies, sensitivity)

Control measures - existing or proposed			
<input type="checkbox"/> Smallest possible volumes are used	<input type="checkbox"/> Fume Cupboard	<input type="checkbox"/> Restricted Access	<input type="checkbox"/> Gloves (Type)
<input type="checkbox"/> Lowest possible concentration is used	<input type="checkbox"/> Biosafety Cabinet	<input type="checkbox"/> Safe Work Procedures (documented and used)	<input type="checkbox"/> Safety Glasses
<input type="checkbox"/> Shortest possible duration of exposure	<input type="checkbox"/> Cytotoxic Cabinet	<input type="checkbox"/> Training / Supervision	<input type="checkbox"/> Full Face Shield
<input type="checkbox"/> Separation from ignition sources	<input type="checkbox"/> Local exhaust ventilation	<input type="checkbox"/> Colleague in attendance	<input type="checkbox"/> Lab Coat/Gown
<input type="checkbox"/> Separation from incompatible substances	<input type="checkbox"/> General Ventilation		<input type="checkbox"/> Respirator (Type)

APPENDIX VI – HAZARD ASSESSMENT SHEET

[http://www.sydney.edu.au/pharmacy/whs/WHS-Hazard Assesment.pdf](http://www.sydney.edu.au/pharmacy/whs/WHS-Hazard_Assesment.pdf)

HAZARD ASSESSMENT SHEET

NAME: (print) _____
 Photocopy this form. One copy must be placed in your workbook, one copy left with your Supervisor.

Experiment: _____

Lab note book page number: _____

REAGENTS	HAZARDS						
	Toxic	Corrosive	Flammable	Infectious	Carcinogenic	Radioactive	Other
1. _____	<input type="checkbox"/>						
2. _____	<input type="checkbox"/>						
3. _____	<input type="checkbox"/>						
Solvent _____	<input type="checkbox"/>						
Product 1 _____	<input type="checkbox"/>						
Product 2 _____	<input type="checkbox"/>						
Other _____	<input type="checkbox"/>						

Temperature: (Circle one) Hot °C Cold °C Room Temp

Pressure: (Circle one) < 1atm > 1atm 1 atm

Location: (Circle one) Bench Fume Cupboard Biosafety Cabinet Incubator Other

Details (Lab No., Bench/Fume Cupboard No etc.): _____

Equipment Used: _____

General Procedure and Reaction: _____

General Hazard Level of substance(s) used (Ref to MSDS): High Medium Low
Likelihood of Exposure during process: N/A Not significant Low Medium* High*
Likelihood of fire/explosion during process: N/A Not significant Low Medium* High*
Likelihood of physical strain: Repetitive action* Long-duration task* Sustained uncomfortable posture*

***Additional Control Measures required to minimise risk of exposure or injury:** _____

Emergency Action: _____

Emergency Equipment Available: Spill Response Decontamination Fire

Risk Summary

- The risk posed is insignificant and unlikely to increase during the course of the project.
- The risk is significant, but will be effectively controlled.
- There is uncertainty about the level of risk.
- The risk is significant and cannot be effectively controlled.

Supervisor Approval – based on recognised competence

Your supervisor's signature below will authorise you to carry out this reaction repeatedly but minor changes in reagents must be discussed with and approved by your supervisor.

Supervisors Name: _____ Phone No: _____

Supervisors Signature _____ Date: _____

APPENDIX VII – HAZARD CHECKLIST

If the procedure is left unattended you must label it with your name (and contact phone number if the procedure is left unattended outside of normal working hours), the date, experiment reference number (*e.g.* code used in your lab notebook) and an emergency shutdown procedure if appropriate.

WARNING

CLASS __ PROCEDURE

Name: _____ Emergency Contact # _____

Emergency Shutdown Procedure

Principal Hazard

HAZARD CHECK LIST

Acute Health

- Toxic
- Irritant

- Pungent/Stench
- Infectious

Chronic Health

- Carcinogenic
- Mutagenic

- Radioactive
- Teratogenic

Physical Hazards

- Corrosive
- Explosive
- Oxidising
- Pyrophobic
- Flammable

- Electrical/spark
- High pressure
- Reacts violently with water
- Other (describe)

Procedures / Reaction

Location (Lab No., Bench No., Fumehood No.)

Page in Notebook

NAME:

APPROVED BY:

DATE: