MACQUARIE University

GENERAL LABORATORY SAFETY GUIDELINES

This guideline is not intended to be a complete listing of laboratory hazards or safe practices. Because of the diverse nature of work being undertaken in laboratories at Macquarie University, additional procedures or requirements may need to be undertaken to ensure yours and others safety. For example, risk assessments of planned research are required to be undertaken before commencing any research activities.

Staff and/or students must adhere to relevant Legislation, Codes of Practise and Standards, as well as University policies and procedures. For information on these and other safety related matters please contact the Health & Safety Unit.

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- Hazardous substances and toxicity

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- Forms and Processes when working with chemicals
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- Chemical Compliance Declaration Form

References

- Safe Work Australia
- WorkCover NSW
- Standards Australia 2243 part 1-10
- CCH Laboratory Safety Manual
- CCH Managing Hazardous Substances

Introduction

Macquarie University is committed to ensuring the health and wellbeing of its employees & students by -

- eliminating and reducing hazards that could result in injury or ill health;
- implementing initiatives that improve the welfare of its employees and students; and
- by increasing awareness of workplace safety.

The University has implemented a safety management system that reflects the unique environment we work and study in, but remains robust to ensure our safety. This booklet and your induction forms part of this system.

The most important person in the laboratory is you. You have an obligation to take care of yourself and of others. Everyone who works in laboratory is responsible for ensuring the work is carried out in a safe manner.

In an EMERGENCY (fire, serious injury or major chemical spill) call **9999** (Security) immediately.

REPORT ACCIDENTS INJURIES AND SAFETY PROBLEMS. If you see a hazard or safety problem let others know.

To help eliminate and reduce incidents and hazards that could result in injury or ill health you should report incidents and hazards online http://staff.mq.edu.au/human_resources/health_and_safety/

If you feel you do not have the skills to assess a situation, there are many people at Macquarie University who are experienced in hazard evaluation and who can help resolve local safety issues - these include your supervisor, laboratory manager, and your health and safety representative.

For safety issues that could affect the entire department or building you need to inform the Head of Department, the Executive Dean and Manager, Health and Safety.

Laboratory Procedures and Practices

Laboratory safety begins with a safe attitude. This guideline provides a starting point for planning and maintaining safety in the laboratory.

If you supervise others who use chemicals, you are responsible for their training and safety. Check to see if appropriate safety equipment and supplies are present and in good working order, review laboratory work practices, maintain current inventory of chemicals and Safety Data Sheets. Discussions on safety issues should also be included in the regular lab group meetings.

Regular inspections help keep the workplace safe. Supervisors should regularly look at their laboratory as if they were looking at it for the first time. They should check to see if it looks safe, it is neat and orderly, and if staff and students are taking the appropriate safety precautions.

Good housekeeping can lower the number of accidents and reduce the risk and consequences of a fire. It can also increase your working space. Keep chemical containers off the floor to avoid them being kicked, broken or becoming a trip hazard. Keep common-use items, such as balances, fume hoods, centrifuge, incubators, neat and clean for the next user.

Personal hygiene will help minimize exposure to hazardous chemicals. This includes practices so as to avoid accidental or inadvertent exposure to chemicals. You should aim to have no skin contact with laboratory chemicals. Use gloves and wear a lab coat. Gloves should be removed and hands should be washed before you leave the laboratory. Do not touch door handles, telephones, keyboards and desks with gloved hands.

LABORATORY RULES

- Smoking, eating or drinking are not permitted in the laboratory.
- No mouth pipetting of any substance.
- Safety glasses should be worn when doing laboratory work, which may involve the risk of eye injury. Glasses should also be worn in areas designated mandatory eyeglass areas.

- Laboratory coats must be worn when working in a laboratory.
- Appropriate clothing must be worn when working in a laboratory. A shirt that covers the stomach and lower back as well as the upper arms and long pants. The following **are not** permitted to be worn in a laboratory - Tank tops or cropped shirts, Mesh shirts, shorts or short skirts.
- Appropriate covered footwear must be worn when working in laboratories. Thongs, flip flops or sandals **are not** permitted.
- Laboratory test procedure is to include information on chemicals, which may be hazardous and highlight any special precautions necessary.
- Unwanted chemicals are to be disposed of according to established laboratory practice. If uncertain of appropriate disposal method consult.
- Do not use Mercury thermometers except for specialist reasons. If you find one please hand it in for disposal.
- Dry ice, cryogenics, solvents or flammables are not to be taken into or used in controlled temperature rooms.
- Nothing but solid laboratory apparatus may be stored under fume cupboards.
- Children **are not** permitted in laboratories.
- No flammables should be stored in refrigerators (unless refrigerators are flameproof).
- Keep workbenches uncluttered and clean - return all unwanted materials to storage.
- Do not obstruct walkways, fire escapes, fire extinguishers or safety showers.
- Keep fire and smoke doors closed at all times
- Clean up spills immediately. If hazardous, evacuate the area and notify your supervisor.
- Ensure all electrical apparatus is switched off at the plug if not needed.
- Ensure all gas burners are turned off when not needed.
- Conduct a regular maintenance program of equipment used.

- Make sure you use correct techniques when lifting or moving equipment or heavy loads i.e. Keep your back straight and lift using your legs. If in doubt seek assistance.
- Care should be taken when handling and transporting chemicals. For containers of 2 litres or more use a carry basket. If you transport chemicals between buildings use a trolley with a safety rail. As soon as possible decant the chemical into smaller container to reduce volume handled. Containers larger than 10 litres must NOT be stored in the laboratory overnight.

AFTER HOURS PROCEDURES

The University defines its core business hours as;

7:00am – 10:00pm (weekdays)
8:00am – 6:00pm (weekends).

Exceptions: In all cases, access to services or facilities will not be permitted after 2:00am on weekdays, or midnight on weekends, public holidays and University concessional days.

Exceptions will only be permitted for staff and higher degree research (HDR) students who have prior **written approval from the Executive Dean / Head of Office**.

This permission will need to indicate that approval has been granted to a specific staff member or HDR student to access an identified service or facility between 2:00am – 7.00am weekdays, and midnight and 8.00am on weekends, public holidays and University concessional days.

All persons entering or remaining in the building during the hours 10.00 pm to 7.00 am Monday to Friday or at any time on Saturday, Sunday or Public Holidays should contact security on Ext **7112**.

Experimental work which may involve significant risk should not be performed during after hour's period unless;

- The Head of Department has been informed

- University Security have been informed (ext **7112**) with details date, time, and location of work to be done and contact name and phone numbers.

PERSONAL SECURITY

If you are concerned about your security or any other issues ring ext. **7112** (they offer an escort to your car service.)

AUTOCLAVES

For information on the correct use of these pieces of equipment see a trained laboratory manager, not just anyone who happens to be around!!

Some guidelines:

- Ensure the boiler temperature and pressures are correct before attempting to start the autoclave's cycle.
- Ensure the door is shut firmly but not tight enough to squash the gasket out of shape.
- Ensure that the load is not too large and that steam has free access to all parts of the load. If steam cannot penetrate the load then it will not be sterilised.
- At the end of the cycle ensure that the chamber pressure is zero before opening the door. If there is still some pressure there is a danger of being burnt by the released steam.
- Use gloves that are both waterproof and heatproof to handle the load after the cycle to prevent burns from the hot load. These are provided in the autoclave rooms.

BIOLOGICAL HAZARDS

All work with biological hazards, potential pathogens, human tissues/blood or recombinant DNA, is to be approved by the Biosafety Committee prior to work commencing.

BUNSEN BURNER BASIC SAFETY RULES

1. Bunsen burners should only be used when absolutely necessary and there is no alternative such as a hot plate.
2. Do not leave a lit bunsen unattended.
3. Ensure the ignited bunsen is kept away from flammable substances.
4. Check hose and bunsen for cracks, holes, pinch points or any defect and ensure that the hose fits securely on the gas valve and the burner.
5. Regularly check all burners to ensure there are no blockages and there is correct gas/airflow

ELECTRICAL WORK

No electrical work is to be carried out by staff or students. All electrical wiring is to be done by a licensed trade person.

Commercially available extension cords and power blocks may be used but the use of piggyback plugs and double adaptors is prohibited.

Any frayed cords must be repaired by an electrician or replaced. If any electrical apparatus is being used with frayed wiring it will be removed for repairs immediately, even if the work has to stop.

All electrical items must be tested and tagged by qualified testers regularly. Faulty equipment found must not be used.

FIRE EQUIPMENT

Ensure you know where the fire extinguishers, hoses and fire blankets are in your area and keep them clear of obstructions.

Report any used extinguisher to the Building Services Manager or Lab Manager so a replacement can be arranged.

Water hoses are for use by people skilled in their use i.e. Fire Department. Do not attempt to use them in case of fire.

If you have not been trained in the use of fire extinguishers do not attempt to put a fire out. Instead raise the alarm promptly.

FIRST AID

If a person is injured: Do not move the person unless there is a danger to life. Switch off any electricity or mechanical equipment (where it is safe to do so).

Call for a First Aid Officer. If a First Aid Officer is not available and the injury appears serious DIAL **9999** on internal phones **or 9850 9999** on your mobile, you will need to provide your name, relevant details about the issue and your location.

Security will call an ambulance and attempt to locate the Occupational First Aid Officer to assist you until an ambulance arrives.

First Aid kits are located around the buildings and in laboratories.

In all cases seek medical attention. The closest Medical Centre is located in Building F10A Level 3 ph 9812 3944 or 9812 3906

NOTE: It is University policy that all incidents and accidents are reported immediately. This can be done online at - http://students.mq.edu.au/home/

GAS CYLINDERS

All compressed and liquefied gases should be regarded as hazardous. Factors contributing to the hazards include; compressed state, low temperature, reactivity, flammability, toxicity, oxygen depletion and density effect.

Points to be observed with gas cylinders:

1. Read labels and Safety Data Sheets (SDS) before use.
2. Store upright and use in a well ventilated, secure area away from pedestrian or vehicle thoroughfare
3. Ensure the cylinder is securely fastened in an upright position. The straps used should be strong enough to hold the cylinder and positioned high enough to provide stability
4. Wear safety shoes and gloves when handling cylinders
5. Always move cylinders securely with an appropriate trolley
6. Keep in a cool, well ventilated area, away from heat sources, sources of ignition and combustible materials, especially flammable gases.
7. Keep full and empty cylinders separate
8. Keep oil and grease away from cylinder and valves
9. Never use force when opening and closing valves
10. Ensure the correct type of regulator is used for the gas in the cylinder and the regulator is regularly serviced.
11. Ensure all plumbing is adequate to withstand the intended pressures. This includes clamping all joints and testing joints with water for leaks. If the setup is to be permanent it is preferred the plumbing be constructed from a suitable metal.
12. Don't repaint or disguise markings and damage, if damaged return cylinder immediately to the supplier.
13. Store all cylinders not actually in use in the correct compressed gas store located outside the building.
14. Return empty or redundant cylinders promptly, as a charge is made on the cylinder for the time rented.

MANUAL HANDLING

The definition of manual handling means "Any activity requiring the use of force exerted by a person to lift, lower, push, pull, carry or otherwise move, hold or restrain any animate or inanimate object" (National code of Practice Manual Tasks 23/12/2011).

This definition could apply to just about all of the daily tasks that you perform in both the workplace or at home.

Back injuries are the most common manual handling injury in the workplace in Australia. Those people affected, experience pain and lifestyle restrictions from injuries that may have been prevented. Manual handling injuries can occur suddenly or gradually over time.

A training module in manual handling can be found at

http://staff.mq.edu.au/human_resources/health_and_safety/training_induction/

MICROWAVE OVENS

Microwave ovens can explode if not used properly

Before using a microwave oven you must:

1. Receive instruction in the safe use of the microwave oven from your supervisor.
2. Read, understand and follow the appropriate Safe Work Procedure.
3. Sign and date Safe Use of Microwave Oven form.

REMOVE LIDS FROM ALL CONTAINERS. **NEVER** heat objects that are sealed as they may explode, damaging the oven and blowing off the door.

Ovens used for laboratory applications must not be used for food preparation.

Do not operate the oven if it is damaged or does not operate properly. It is imperative that the oven door seals properly and that there is no damage to the door seal, hinges, latches, or oven surfaces

RADIATION

No radiation work is to be done by anyone without the express approval of Radiation Safety Officer. He will give guidance in correct and safe procedures and provide a radiation badge for use, where necessary.

Use of radioactive material must be done in laboratories designated as radioactive laboratories. Staff with requirements using isotopes outside of these areas must consult with Radiation Safety Officer before proceeding.

A detailed radiation safety procedure manual "Safety Procedures for Users of Radioactive Materials" is available from Radiation Safety Officer.

Staff or students must not proceed with experiments using radioisotopes until they have received appropriate safety instruction from Radiation Safety Officer.

RUNNING UNATTENDED EQUIPMENT

Where it is necessary to run apparatus after hours, the potential hazards should be recognised and monitored. The apparatus may comprise such equipment which may present substantial likelihood of electrical, fire, chemical, flood, explosion or other similar hazards.

See appendix Unattended Reaction Form

LABORATORY WASTE

Laboratory staff/ students are responsible for removing contaminated laboratory waste from laboratories. (Do not leave for cleaners).

For more information see the - Specific Laboratory Waste Management Schedule

http://staff.mq.edu.au/human_resources/health_and_safety/policies-procedures-guidelines_forms/

SHARPS / BROKEN GLASS

There are 2 classes of `Sharps'. Non-contaminated broken glass and `Sharps', such as hypodermic needles, razor blades etc.

Broken glass should be collected in broken glass bins available from E8A Store (special cardboard boxes.) When these are full the lid is sealed shut and the whole box is taken to the skip which is F9B (METS workshop) or E5 compound.

The cleaners are not responsible for emptying these containers. **Do not place broken glass in the normal bins!!**

`SHARPS' are considered contaminated and must be placed in the hard yellow `SHARPS' containers or Clicksmart blade removal system located in all laboratories. These are available from the E8A Store. Contaminated sharps include hypodermic needles, syringes, needles, razor blades, scalpels etc. Do not dismantle syringes or recap needles before disposal, it is unsafe!! Simply place them in the Sharps container intact.

For more information see the - Specific Laboratory Waste Management Schedule

http://staff.mq.edu.au/human_resources/health_and_safety/policies-procedures-guidelines_forms/

CHEMICAL WASTE

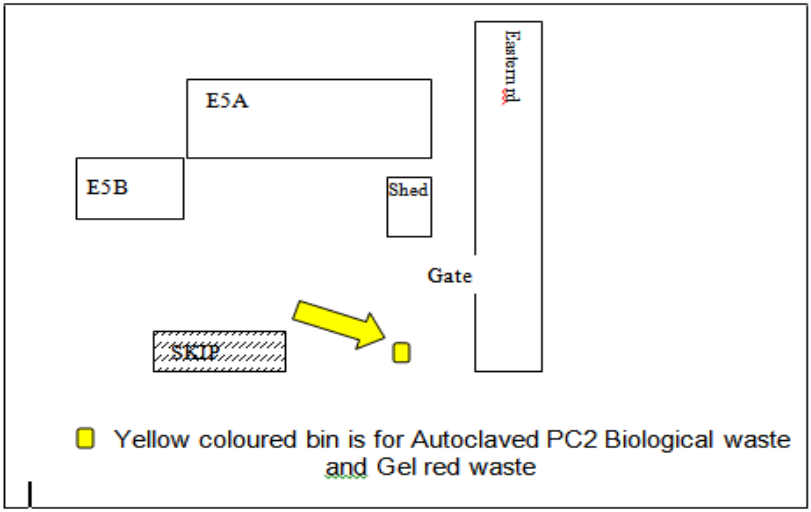
The disposal of chemical waste into the sewerage system is generally unacceptable. Collect waste in approved dangerous goods waste containers. Containers for waste must not exceed 10L volumes. Incompatible chemicals should not be stored together. All waste must be correctly labelled.

See Jenny Minard Ext - 8169 jenny.minard@.mq.edu.au for details

For more information see the - Specific Laboratory Waste Management Schedule

http://staff.mq.edu.au/human_resources/health_and_safety/policies-procedures-guidelines_forms/

Waste collection points for Science



Sharps containers should be placed in the contaminated waste bin - (Shed in carport E8A)

Cardboard bin (located between F7B and E8C)

- Clean cardboard only
- Flattened cardboard boxes

Skip bin (located behind F9B and E5 compounds)

- Clean Glass bottles
  Glass bins (get replacement from E8A Stores
  Plastic tip boxes
  Other general waste

Chemical waste (located in F7A waste area)

TETANUS

All laboratories and associated facilities are regarded as high-risk areas for tetanus. All students must be vaccinated against the possibility of becoming infected. Injections of tetanus toxoid vaccine are available from the Student Health Service free of charge on production of your Medicare card.

Students who are not willing to be vaccinated will need to liaise with the Health & Safety Unit.

COMPUTER USE

People using computer terminals should observe the appropriate guidelines to prevent repetitive strain injury, back problems and eye strain. Briefly these guidelines include:

- Use an adjustable swivel chair with a lumbar support, adjusted so the feet can be set comfortably on the floor with the upper leg almost level.
- Set both the screen slightly below eye level and the keyboard slightly below elbow level.

See training for Office Safety and Office Ergonomics at

http://staff.mq.edu.au/human_resources/health_and_safety/training_induction/

EMERGENCY RESPONSE GUIDE

In case of EMERGENCY call 9999 – you will be asked for your Room and Building Number.

All lab workers should know the procedures for their laboratory for responding to emergencies. They should periodically review the emergency response plans for their lab and always be aware of the locations of:

1. Emergency telephone numbers.
2. Eyewash stations and emergency showers.
3. Spill kits.
4. Emergency exits and evacuation routes.

If an alarm sounds, listen to floor wardens and firemen. Take your valuables and keys with you and lock the door behind you. Go to the designated assembly area for your building.

MEDICAL CENTRE (Medical Practitioners) are located in Building F10A Level 3 Suit 305, Macquarie University Clinic (Next to the Macquarie Hospital). Phone # 9812 3944 or 9812 3906

Medical First Aid Emergency

In medical emergencies, lab workers should follow these general guidelines:

1. Remain calm.
2. Initiate lifesaving measures if required.
3. Call for emergency response DIAL Ext **9999**
4. Do not move injured person unless there is danger of further harm.
5. Keep injured person warm.
6. Report incident into the University online reporting system.

Laboratory Fire Response Guide

Notes and Precautions

- Small fires may be extinguished without evacuation. However, an immediate readiness to evacuate is essential in the event the fire cannot be controlled.
- Fire extinguishers should be used only by trained personnel.
- Never enter a room that is filled with smoke.
- Never enter a room containing a fire without a backup person.
- Never enter a room if the top half of the door is warm to touch.

Small Fire

1. Alert people in laboratory and activate alarm.
2. Smother fire or use correct fire extinguisher.
3. Aim extinguisher at base of fire.
4. Always maintain accessible exit.
5. Avoid smoke or fumes.

Major Fire

1. Alert ALL people in the area to evacuate.
2. Activate nearest break-glass fire alarm and call the University Emergency number on EXT **9999**.
3. Close doors to confine fire.
4. Evacuate to safe area or exit building through stairwell; **do not use elevator**.
5. Have person knowledgeable of incident and laboratory assist emergency personnel.

Chemical Spill Response Guide

Notes and Precautions

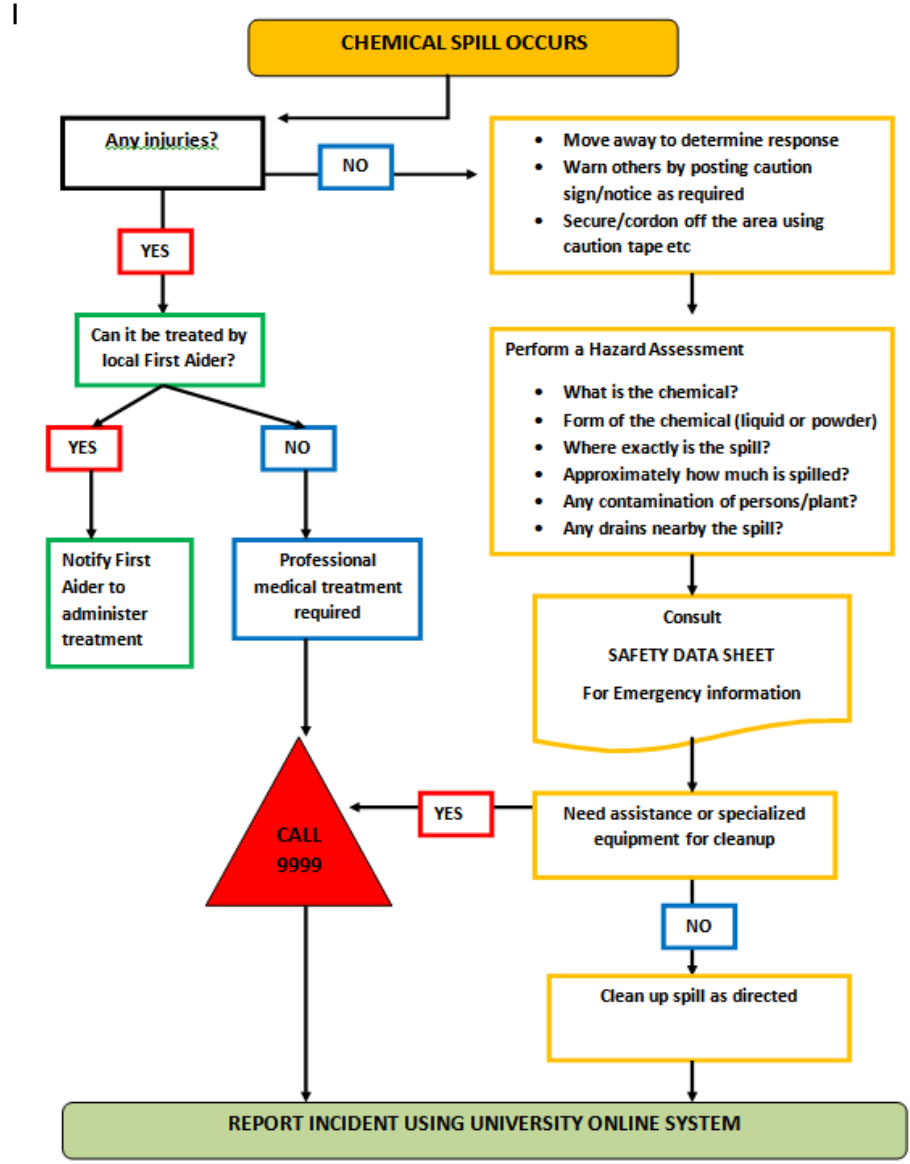
The range and quantity of hazardous substances used in laboratories require preplanning to respond safely to chemical spills. The cleanup of a chemical spill should only be done by knowledgeable and experienced personnel.

Small incidents are those which can be contained and rendered safe without causing any negative health, property or environmental impacts. If there is doubt as to the success of an operation to render a “small incident” safe, then it shall be deemed to be a notifiable incident and will require the attention of emergency services.

Suitable spills kits with instructions, absorbents, reactants, and protective equipment should be available to clean up minor spills. For further information see the flow chart on page 21.

Consult Safety Data Sheets for more information on handling chemical spills.

Chemical Spills Management Flow Chart



Consult Safety Data Sheets for more information on handling chemical spills.

Minor Chemical Spill

1. Alert people in immediate area of spill.
2. Wear protective equipment, including safety goggles, gloves, and long-sleeve lab coat.
3. If there is chemical exposure to others, respond as quickly as possible in administering First Aid.
4. Avoid breathing vapours from spill (wear appropriate breathing apparatus or protection).
5. Confine spill to small area.
6. Use appropriate kit to neutralize and absorb inorganic acids and bases. Collect residue, place in container, and dispose as chemical waste.
7. Clean spill area with water.
8. Review area when decontamination is complete. Check surrounding areas.
9. Report incident into the University online reporting system.

Major Chemical Spill

Protect yourself and, if safe to do –

1. Attend to injured or contaminated persons and remove them from exposure.
2. Alert people in the laboratory to evacuate (use Break glass alarm if needed)
3. If spilled material is flammable, turn off ignition and heat sources.
4. Call **Security** on **9999**
5. Cordon of the immediate area and close doors to affected area.
6. Have person knowledgeable of incident and laboratory assist emergency personnel.
7. Report incident into the University online reporting system.

Radiation Spill Response Guide

Notes and Precautions

Spreading of radiation beyond the spill area can easily occur by the movement of personnel involved in the spill or cleanup effort. Prevent spread by confining movement of personnel until they have been monitored and found free of contamination.

A minor radiation spill is one that the laboratory staff is capable of handling safely without the assistance of safety and emergency personnel. All other radiation spills are considered major.

Minor Radiation Spill

1. Alert people in immediate area of spill.
2. **Notify Radiation Safety Officer.**
3. Put on the following personal protective equipment - safety goggles, disposable gloves, shoe covers, and long-sleeve lab coat.
4. Place absorbent paper towels over liquid spill. Place towels dampened with water over spills of solid materials.
5. Using forceps, place towels in plastic bag and place in radiation waste container.
6. Monitor area, hands, and shoes for contamination with an appropriate survey meter or method. Repeat cleanup until contamination is no longer detected.
7. Report incident into the University online reporting system.

Major Radiation Spill

Protect yourself and, if safe to do –

1. Attend to injured or contaminated persons and remove them from exposure.
2. Alert people in the laboratory to evacuate.

3. Have potentially contaminated personnel stay in one area until they have been monitored and shown to be free of contamination.
4. Call **security** on **9999**
5. **Notify Radiation Safety Officer.**
6. Close doors and prevent entrance into affected area.
7. Have person knowledgeable of incident and laboratory assist emergency personnel.
8. Report incident into the University online reporting system.

Biological Spill Response Guide

In the event of a biological spill, hazardous aerosols or other risks to human health and safety can be produced. The level of compliance with these steps will depend upon the material and identified risk. It is intended to be a guide only.

Before work begins, the Chief Investigator (the researcher leading the project) will ensure workers have the necessary level of training and information to deal with a spill. The Chief Investigator will identify as part of the risk assessment process the level of equipment required to contain and clean a biological spill. This will include a suitable and sufficiently stocked biological spill kit. If the kit is not suitable steps must be taken to ensure one is present before work starts.

Appropriate Personal Protective Equipment (PPE) must be worn when cleaning spills as identified in the risk assessment and with reference to any available technical or safety data. Care should be taken not to generate aerosols and if there is a risk of hazardous aerosols respiratory protective equipment (RPE) may be required. Spill kits should include absorbent material appropriate to contain the spill and reduce aerosols.

All biological spills must be attended to immediately. The approach you take will depend on the risk group of the biological material, the volume and location of the spill.

Small spill of Risk group 1 or 2 material outside of Biological Safety cabinet (< 100mls)

1. Put on appropriate PPE.
2. Contain the spill do not spread it, wipe material towards the center.
3. Remove any sharp objects with forceps.
4. Cover the biological spill with absorbent material such as paper towels.
5. Dispose of contaminated paper towels in the biological waste bin.
6. Cover area with suitable disinfectant and leave for the appropriate contact time.
7. Autoclave or disinfect any equipment used in the clean- up.
8. Do not autoclave anything that has been in contact with chlorine as this will produce chlorine gas when heated.
9. Remove and decontaminate any PPE (including lab coats) according to laboratory protocols

Large spill of Risk group 1 material outside of a Biological safety cabinet (> 100mls)

1. Get help if required.
2. Clean up procedure is the same as for small risk group 1 spills only on a larger scale.
3. Notify the lab manager or supervisor that there has been a spill

Large spill of Risk group 2 material outside of a Biological safety cabinet (> 100mls)

1. Get Help.
2. Contact the PC2 lab manager immediately.
3. Keep people out of the area

4. If the spill is potentially infectious the area must be vacated for 30 minutes to allow aerosols to settle before the clean- up procedure can commence.
5. Follow the instructions inside the Biohazard Spill kit.
6. Remove and decontaminate any PPE (including lab coats) according to laboratory protocols.
7. Report the incident to the lab manager and the University Health & Safety unit.

Spill in a Biological Safety Cabinet

1. Ensure that the cabinet is on and continues to operate during the clean-up procedure
2. Put on PPE
3. Remove any sharp objects with forceps
4. Cover the spill with absorbent material and dispose of in the biological waste bin
5. All surfaces must be decontaminated. Cover the affected area with suitable disinfectant and leave for the appropriate contact time.
6. Ensure that the surfaces below the work area are also treated.
7. Remove and decontaminate any PPE (including lab coats) according to laboratory protocols.
8. Report incident.

Risk group 1: Lab manager or supervisor

Risk group 2: Lab manager and the University Health & Safety unit

Spill in a centrifuge

A biological spill in a centrifuge has the potential for creating aerosols. As soon as the operator becomes aware of a spill immediate action is required.

1. Turn off centrifuge.
2. If hazardous or infectious aerosols have been generated then close the centrifuge.
3. Notify others working in the area of the potential hazard.
4. Allow 30 minutes settling time before clean up procedures commence.
5. Put on PPE.
6. Remove debris.
7. Place contaminated equipment in leak proof bag and if possible transfer to Biological Safety cabinet for disinfection
8. Disinfect inside of centrifuge
9. Remove and decontaminate any PPE (including lab coats) according to laboratory protocols.
10. Report spill.

Risk group 1: Lab manager or supervisor

Risk group 2: Lab manager and the University Health & Safety unit

Personal Injury Response Guide

Some brief notes are included here in case of emergency. These notes are **not** intended to replace the need for a qualified First Aid Officer but are pointers to the initial treatment of the injuries. Ensure you know the whereabouts of the safety showers in your area.

Burns

Acid/alkali burns - wash affected part thoroughly in running tap water or under safety shower.

Heat burns - wash under cool tap water for at least 10-20 minutes.

Phenol burns - For burns larger than 3 or 4 cm in diameter. Flood the affected area immediately with a 50% solution of Polyethylene

Glycol and leave for a few minutes. Rinse with cold tap water. If pain persists, repeat the procedure.

Emergencies Involving Clothing on Fire

1. Roll person around on floor to smother flame, or drench with water if safety shower is immediately available.
2. Obtain medical attention, if necessary.
3. Report incident to lab supervisor.
4. Report incident into the University online reporting system

Radiological Spill on Body

1. Remove contaminated clothing.
2. Rinse exposed area thoroughly with water.
3. Obtain medical attention, if necessary.
4. Report incident to lab supervisor and Radiation Safety Officer.
5. Report incident into the University online reporting system.

Chemical Spill on Body

1. Flood exposed area with running water from faucet or safety shower for at least 5 minutes.
2. Remove contaminated clothing at once.
3. Make sure chemical has not accumulated in shoes.
4. Obtain medical attention, if necessary.
5. Report incident to lab supervisor.
6. Report incident into the University online reporting system.

Biological Spill on Body

1. Remove contaminated clothing.
2. Vigorously wash exposed area with soap and water for 1 minute.
3. Obtain medical attention, if necessary.
4. Report incident to lab supervisor.

5. Report incident into the University online reporting system.

Hazardous Material Splashed in Eye

1. Immediately rinse eyeball and inner surface of eyelid with water continuously for 15 minutes.
2. Forcibly hold eye open to ensure effective wash behind eyelids.
3. **Obtain medical attention.**
4. Report incident to lab supervisor.
5. Report incident into the University online reporting system.

Minor Cuts and Puncture Wounds

1. Vigorously wash injury with soap and water for several minutes.
2. **Obtain medical attention.**
3. Report incident to lab supervisor.
4. Report incident into the University online reporting system.

GENERAL PRECAUTIONS WITH CRYOGENIC MATERIALS

Brief contact with cryogenic materials can cause burns similar to thermal burns from high temperature contact. Prolonged contact with these temperatures will cause embrittlement of the affected parts because of the high water content of the body.

The eyes are especially vulnerable, so eye protection is mandatory.

While a number of gases in the cryogenic range are not toxic, they are capable for causing asphyxiation by displacing oxygen. Even oxygen may have harmful physiological effects on prolonged breathing of the pure gas.

For specific precautions the MSDS for the cryogenic material should be consulted.

The following are general precautions for handling cryogenic material:

Personnel must be thoroughly instructed and trained in the nature of the hazards and precautions against them, including;

- Emergency procedures,
- Operating equipment,
- Safety devices
- The properties of the materials used and
- Personal protective equipment

If contact with a cryogenic fluid is possible, eye protection (or full-face protection is preferred), an impervious apron or coat, trousers without cuffs and high top shoes or boots must be worn.

Jewellery (e.g. watches and metal bracelets) is not permitted, i.e. anything capable of trapping a cryogenic fluid close to the skin,

If gloves are necessary to handle containers or cold metal, they should be impervious and large enough to be thrown off the hand in case of a spill;

Care is required in the transport and storage of cryogenic substances. Slow evaporation is bound to take place leading to contamination of the atmosphere, unless there is good ventilation. Cryogenic substances should not be carried with passengers in a passenger lift;

Liquid oxygen and nitrogen containers should not normally be emptied - occasionally they should be allowed to warm to room temperature and purged with dry nitrogen. This avoids danger from accumulated hydrocarbon gases extracted from the atmosphere and the nuisance of water freezing out in the container.

Instructions for handling liquid nitrogen, helium, argon and methane should be sought from the supplier and the experimental work should proceed based on their advice with the full knowledge and agreement of the Division Safety Officer.

First Aid

Lungs - following exposure to cold gas resulting in respiratory distress medical attention should be obtained immediately by phoning Ext **9999**.

Skin - medical assistance should be requested and any clothing that may constrict the blood circulation to the burn should be removed. The part of the body exposed should be thawed slowly in lukewarm water between 42 and 45 degrees C. **Dry heat should not be used**.

- Burns should be covered with a large sterile dressing.
- If frozen area is extensive or deeply frozen, the casualty should be taken to hospital; sticking clothing should not be removed until completely thawed.
- The casualty should not be given alcohol or allowed to smoke.

HAZARDOUS CHEMICALS

Hazardous chemicals may not always be obvious in the workplace. Many substances are not in forms that people readily identify (e.g. dusts, mists, gases). For this reason employers and employees must be aware of substances brought into the workplace, and also those that are indirectly manufactured on site such as welding fumes, off-gases, by-products of manufacturing processes, oil mists, chemical wastes and so on.

Common substances used by people in both domestic and work environments may be hazardous (e.g. turpentine, white spirit, caustic soda, pesticides, and some disinfectants). Often people do not perceive products as hazardous if they can buy them for home use. Awareness is needed that these products are potentially hazardous despite the fact they are readily available to consumers.

The term “Hazardous Chemical” is used by the legislation to denote the diversity of chemical forms that may cause injury (i.e. liquids, solids, gases).

Health Effects of Chemical Use

In some instances people may regularly use a product, or perceive a substance as having no health threat because they have not had problems with the product in the past. This behaviour can be dangerous, and contribute to the development of long-term health effects.

For an effect on health to occur, the hazardous substance must enter or contact with the body.

There are three common routes of entry to the body. These are:

- Inhalation e.g.: gases, fumes, mists, dusts
- Ingestion e.g.: powders, mists, liquids, solids
- Skin Contact e.g.: liquids, solids.

There is substantial difference in the way individuals react to chemical exposure. Some people are more sensitive to the effects of chemicals than others.

Chemicals may cause effects at the site of contact, which is called a local effect (e.g. acid burns on skin).

Chemicals may also be transported throughout the body to produce effects at organs away from the original site of contact. This is called a systemic effect (e.g. solvents may be inhaled or ingested and produce brain damage).

Systemic effects often produce serious long term health effects such as diseases and organ degeneration (e.g. liver, nerve, kidney damage).

Common chemical injuries include

- Dermatitis
- Eye, skin and lung burns
- Headaches
- Brain and nerve damage
- Cancer
- Asthma and Allergies.

Laws

The NSW Work Health and Safety Act and Regulations regulate the use of hazardous chemicals in NSW.

These laws encourage the use of Safety Data Sheets (S.D.S) to ensure that people have information about the chemicals they are working with.

The two most important information tools when working with chemicals are chemical labels and SDS. These items are developed by the supplier of the product, and are delivered to the workplace with the product.

Risk assessment is the process of identifying workplace hazards, determining the seriousness of any risks posed, and putting suitable control measures in place.

RESPONSIBILITY under the new legislation lies with Manufactures and Suppliers, Persons Conducting a Business or Undertaking (PCBU), Officers and Workers

Manufactures and Suppliers have a legal responsibility to ensure that their products are classified, and must provide adequate and accurate information prior to distribution to end users. This information is included in the label and in S.D.S.'s.

A person conducting a business or undertaking has the primary duty under the WHS Act to ensure, so far as is reasonably practicable, that workers and other persons are not exposed to health and safety risks arising from the business or undertaking. This duty includes the safe use, handling and storage of substances.

There are more specific requirements relating to hazardous chemicals under the WHS Regulations, including that a person conducting a business or undertaking must:

- manage risks to health and safety associated with using, handling, generating and storing of hazardous chemicals at a workplace and review and if necessary revise control measures
- obtain the current Safety Data Sheet (SDS) from the manufacturer, importer or supplier of the chemical when or before it is first supplied for use at the workplace, or as soon as practicable after the hazardous chemical is first supplied to the workplace but before the hazardous chemical is used at the workplace
- ensure the SDS is readily accessible to a worker who is involved in using, handling or storing the hazardous chemical at the workplace and an emergency service worker, or anyone else, who is likely to be exposed to the hazardous chemical at the workplace
- ensure that a hazardous chemical is correctly labelled in accordance with the GHS and it complies with Part 3 of Schedule 9 of the WHS Regulations
- identify any risk of a physical or chemical reaction in relation to a hazardous chemical used, handled, generated or stored at a workplace
- ensure that, when storing flammable or combustible materials at the workplace, they are kept at the lowest practicable quantity

- if there is a possibility of fire or explosion in a hazardous area being caused by an ignition source, ensure that the ignition source is not introduced into the area (from outside or within the space)
- ensure that the workplace is provided with fire protection, fire fighting equipment and emergency equipment that is designed and built for the types of hazardous chemicals used, handled and stored at the workplace, and the conditions under which they are used, handled, generated or stored
- prepare an emergency plan if the quantity of a class of hazardous chemical used, handled, stored or generated at a workplace exceeds the manifest quantity for that hazardous chemical, including providing a copy of the emergency plan to primary emergency services organisation
- ensure that no-one at the workplace is exposed to a substance or mixture in an airborne concentration that exceeds the exposure standard for the substance or mixture
- ensure, so far as is reasonably practicable, that if there is a risk from a spill or leak of a hazardous chemical, a spill containment system is provided and is provided in each part of the workplace where the hazardous chemical is used, handled, generated or stored
- provide any supervision to a worker that is necessary to protect the worker from risks arising from the work at the workplace if the worker uses handles, generates or stores a hazardous chemical or operates tests, maintains, repairs, or decommissions a storage or handling system for a hazardous chemical.

Officers, such as company directors, have a duty to exercise due diligence to ensure that the business or undertaking complies with the WHS Act and Regulations. This includes taking reasonable steps to ensure that the business or undertaking has and uses appropriate resources and processes to eliminate or minimise risks that arise from hazardous chemicals at the workplace.

Workers have a duty to take reasonable care for their own health and safety and not adversely affect the health and safety of other persons. Workers must comply with any reasonable instruction and cooperate with any reasonable policy or procedure relating to the use, handling

and storage of hazardous chemicals at the workplace. Students are considered as workers under the Work Health & Safety Act.

In order to meet this responsibility, it is imperative that all students using chemicals and hazardous materials receive adequate training on hazardous chemical related matters.

The WHS Regulation specifies that the manufacturer or importer must classify whether a substance is hazardous or not.

The SDS must be supplied with the hazardous substance on or before the first supply of the product to a workplace.

The label must be fixed to the container of the hazardous substance before supply to a workplace.

Signal words are used to indicate the relative level of severity of a hazard. The GHS uses 'Danger' and 'Warning' as signal words. 'Danger' is used for the more severe or a significant hazard, while 'Warning' is used for the less severe hazards.

Other information is also provided to enable safe product use.

Hazardous Substances and Dangerous Goods

Previously in Australia there have been two major chemical hazard classifications that are legislated separately by governments. They were Hazardous Substances and Dangerous Goods.

Key changes in the Work health and safety regulations are the introduction of classification according to GHS (Globally Harmonised System of classification and Labelling of Chemicals). A five year transitional period will apply to this change. During the transitional period from January 2012 until December 31st 2016 duty holders may classify and label chemicals in accordance with either GHS or existing arrangements.

By legal definition, a Hazardous Chemical means any substance, mixture or article that satisfies the criteria of one or more Globally Harmonised System of Classification and Labelling of Chemicals

(GHS) hazard classes. There are some exclusions (refer *to Labelling of workplace Hazardous chemicals Code of Practice*).

Hazard pictogram means a graphical composition, including a symbol plus other graphical elements, that is assigned in the GHS to a hazard class or hazard category. Hazard pictograms enable easy identification of hazardous substances.

There are nine hazard pictograms that are representative of the physical, health and/or environmental hazards are shown on page 38.

Dangerous Goods are classified by the United Nations, who have established an international system for the naming, packaging and transport of dangerous goods.

Comparison of Hazard Pictograms from the Classification Criteria and ADG Code Class Labels

Hazard Pictograms	GHS Hazard	Dangerous Goods class labels (pictograms)	Dangerous goods classes
	Explosives Self-reactives Organic peroxides		Explosive
	Flammables Self-reactives Pyrophorics Self-heating Emits flammable gas on contact with water		• Flammability (Liquid, Solid or Gas) • Pyrophoric, • Emits Flammable Gas
	Oxidisers Organic peroxides		• Oxidiser • Organic Peroxide • Oxidising gas
	Gases under pressure		Non-toxic non-flammable gas
	Acute toxicity		• Acute toxicity • Acute Toxic gas
	Acute toxicity Skin irritation Eye irritation Skin sensitisers	No equivalent	
	Carcinogens Respiratory sensitisers Reproductive toxicity Target organ toxicity Germ cell mutagens	No equivalent	
	Eye corrosion Skin corrosion Corrosive to metal		Corrosive to Metals
	Aquatic toxicity		Environmental hazard
No equivalent hazard pictogram			Misc. Dangerous Goods
Not covered within the scope of workplace hazardous chemicals requirements			Infectious
Not covered within the scope of workplace hazardous chemicals requirements			Radioactive

Note: The hazardous chemicals part of the WHS Regulations does not apply to some hazard classes and categories in the GHS and the ADG Code. For example, environmental hazards, class 6.2, class 7 and class 9 dangerous goods are excluded.

Labelling of Workplace Hazardous Chemicals

The WHS Regulations require that a person conducting a business or undertaking (PCBU) who manufactures hazardous chemicals at the workplace or decants or transfers a hazardous chemical from its original container, must ensure that the container is correctly labelled.

The person conducting a business or undertaking (PCBU) at the workplace must also ensure that a container labelled for a hazardous chemical is used only for the use, handling or storage of that hazardous chemical.

These requirements do not apply if the hazardous chemical is used immediately after it is put into the container and the container is thoroughly cleaned immediately after use to the condition it would be in if it had never contained the material.

If you find that a container of a hazardous chemical is not correctly labelled in accordance with the WHS Regulations, you should attach the product identifier to the container. You should not use a hazardous chemical which is not correctly labelled. Store it in isolation until it is appropriately labelled.
If the product identifier of an unlabeled chemical is not known, this should be clearly marked on the container, for example by attaching a label to the container with the statement: **Caution - Do Not Use - Unknown Substance**.

You should take steps to either identify and correctly label the unknown chemical or dispose of the contents in accordance with relevant environmental regulations and, where necessary, in consultation with the relevant waste management authority.

Special Labeling situations

Under the WHS Regulations, reduced labelling is permitted for hazardous chemicals that are:

- Supplied in small containers
- Research chemicals or samples for analysis
- Decanted or transferred
- Not supplied to another workplace, and where the hazards are known to the workers using the chemical
- hazardous wastes or
- classified into the explosive hazard class and are not explosive articles

Small containers

The WHS Regulations require that where a chemical substance is packaged in a container that is too small to attach a label with information that is required of hazardous chemical labels in general, then the label must include the product identifier, the name, Australian address and business telephone number of either the manufacturer or importer.

In addition to the mandatory items, labels must include as much labelling information required for hazardous chemical labels in general that is reasonable practicable to include.

Research chemicals or samples for analysis

A research chemical is a substance or mixture, that has been manufactured in a laboratory for the purposes of genuine research and which is not for use or supply to others for a purpose other than genuine analysis or research.

The WHS Regulations require that where a hazardous chemical is used for research purposes only, or is a sample for analysis, and then the label must, at a minimum –

- be written in English,
- include the product identifier (Chemical Name) and

- a hazard pictogram or hazard statement that is consistent with the correct classification of the chemical.

Where labelling the actual laboratory container is impractical due to its size or the conditions under which it is used, other methods of providing the information can be used, for example a secure swing tag, a sign attached to supporting apparatus or labelling an outer container.

For example, for a rack of test tubes, rather than label each individual test tube containing the same hazardous chemical, you may attach a label to the rack using a swing tag.

Decanted or transferred hazardous chemicals

The WHS Regulations require, where a hazardous chemical has been decanted or transferred from the container in which it was packed and it will not be used immediately or it is supplied to someone else, then the label must, at a minimum, be written in English and include the product identifier, and a hazard pictogram or hazard statement consistent with the correct classification of the chemical

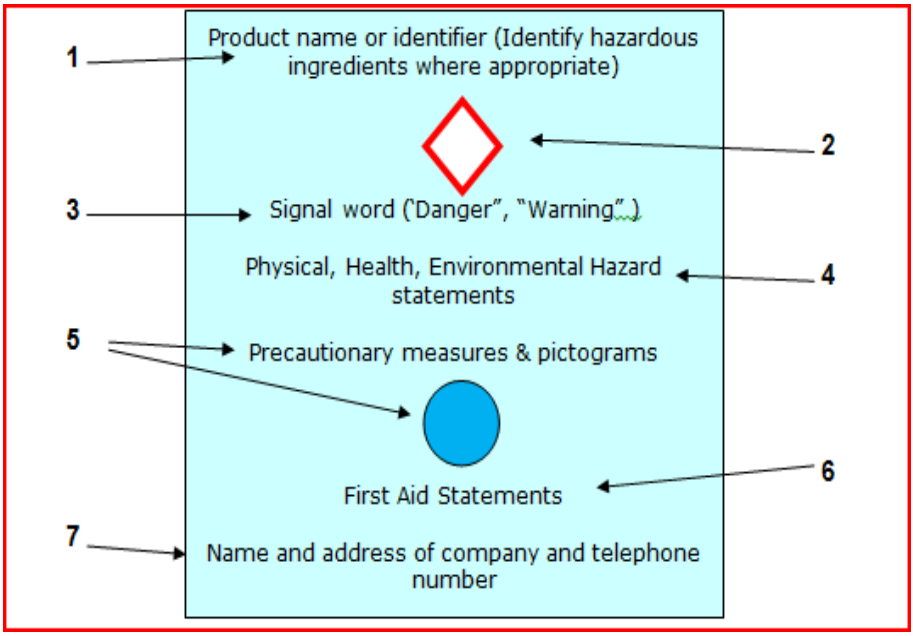
For the purposes of this Code, *decant* means to transfer a hazard chemical from a correctly labelled container to another container within a workplace. Such a container may range from a small flask in a research laboratory to a large vessel that is used to contain reaction components prior to use in a mixing or reaction process.

Guide for Labels.

Decanted Hazardous Chemicals MUST be labelled correct

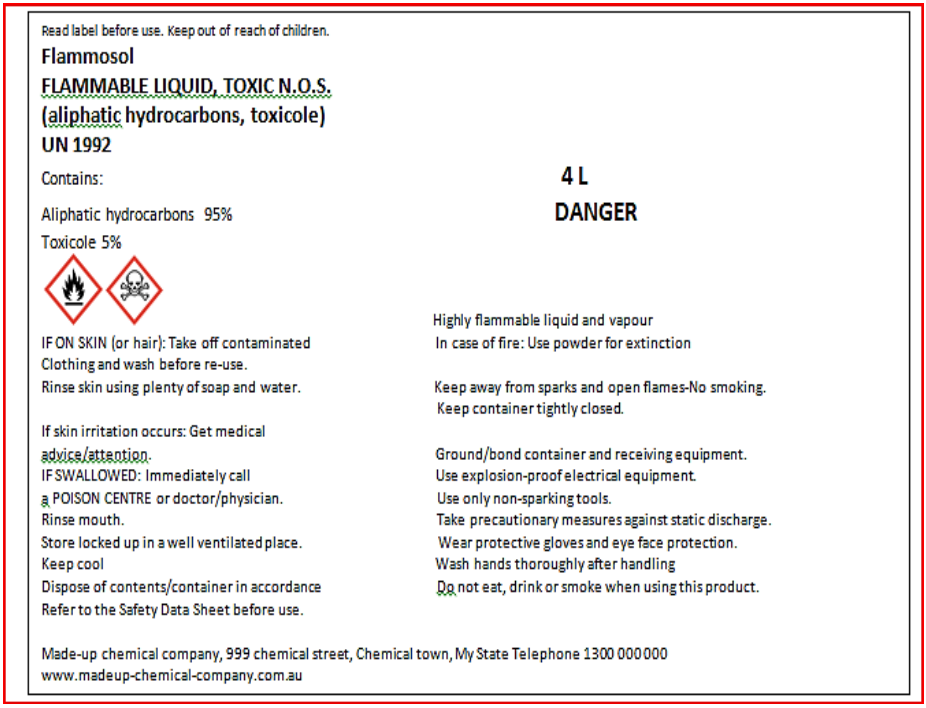
The contents of labels which are firmly fixed must be written in English language and include Product identifier or Chemical Name (may also include chemical formula), Signal words (Danger or Warning) Dangerous goods class /UN No., any Hazard and Precautionary statements (or Risk and Safety Phrases), any Hazard Pictograms any information about first aid and emergency procedures and the name, Australian address and phone number of the manufacturer or importer.

GHS Label Elements



The amount of information included on the label of a small container will vary, and be dependent on the size and shape of the container, and the number of label elements to be included, particularly where the hazardous chemical meets the criteria for multiple hazard classes. As a mandatory minimum, small containers must be labelled with the product identifier, manufacturer or importer information and hazard pictograms or hazard statements. Labels for small containers or packages must include as much labelling information as reasonably practical.

Example: **label containing the full set of workplace labelling information** The general precautionary statements 'Read label before use' and 'Keep out of reach of children' have been included. Inclusion of these statements is not mandatory


Read label before use. Keep out of reach of children.

Flammosol

FLAMMABLE LIQUID, TOXIC N.O.S.

(aliphatic hydrocarbons, toxicole)

UN 1992

Contains:

Aliphatic hydrocarbons 95%

Toxicole 5%

4 L

DANGER

IF ON SKIN (or hair): Take off contaminated Clothing and wash before re-use.
Rinse skin using plenty of soap and water.

If skin irritation occurs: Get medical advice/attention.
IF SWALLOWED: Immediately call a POISON CENTRE or doctor/physician.
Rinse mouth.
Store locked up in a well ventilated place.
Keep cool
Dispose of contents/container in accordance
Refer to the Safety Data Sheet before use.

Highly flammable liquid and vapour
In case of fire: Use powder for extinction

Keep away from sparks and open flames-No smoking.
Keep container tightly closed.

Ground/bond container and receiving equipment.
Use explosion-proof electrical equipment.
Use only non-sparking tools.
Take precautionary measures against static discharge.
Wear protective gloves and eye face protection.
Wash hands thoroughly after handling
Do not eat, drink or smoke when using this product.

Made-up chemical company, 999 chemical street, Chemical town, My State Telephone 1300 000 000
www.madeup-chemical-company.com.au

The following label has sufficient room to include additional labelling information. Following the guidance provided hazard statements, the identity and proportions of the hazardous ingredients, critical first aid instructions and reference to the safety data sheet have been included.

Flammosol

Contains:
Hydrocarbon solvent 95%
Toxicole 5%

Highly flammable liquid and vapour
Toxic if swallowed
Causes skin irritation

IF SWALLOWED; immediately call a POISON CENTRE or doctor/physician.
Rinse mouth.

Additional information is listed in the Safety Data Sheet

Made up chemical Company, 999 Chemical Street, Chemical Town, My State.
Telephone: 1300 000 000

The following example contains the minimum labelling information permitted and a reference to the safety data sheet.

Flammosol

Refer to the Safety Data Sheet before use.

Made-up Chemical Company, 999 Chemical Street,
Chemical Town, My State
Telephone 1300 000 000

Labels for non-hazardous substances and non-dangerous goods

5M SODIUM CHLORIDE

NaCl

NON HAZARDOUS NON DANGEROUS GOOD

Hazardous Waste Products

Hazardous waste products must be identified and correctly classified, as far as reasonably practicable. The product identifier should reflect the nature of the waste as closely as possible and may depend on the extent of knowledge about the components of the waste.

Labels for hazardous wastes should include as much hazard information as reasonably practicable based on what is known about the identity and any suspected hazards.

The WHS Regulations require that if it is reasonably likely that a waste product is a hazardous chemical, then the label on the container of the hazardous waste must -

- be written in English and at a minimum,
- include the product identifier, the name,
- a hazard pictogram and hazard statements that are consistent with the correct classification of the chemical.
- Australian address and business telephone number of either the manufacturer or the importer.
- and should also include, where possible, the identity of any known or likely hazardous constituents or impurities and their proportions (for example, ‘contains chromium VI, 5%’, or ‘may contain trace levels organic peroxides’) relevant precautionary statements, relevant first aid and safety directions, and any, other information that may assist identification of the hazardous waste and its associated hazards.

If you have made every reasonable attempt to identify and classify the chemical waste and have been unsuccessful, you should clearly indicate this on the label.

Example: Hazardous waste label

Hydrochloric acid waste

May be corrosive to metals
Causes serious eye damage

Wear eye/face protection

IF GETS IN EYES: Rinse cautiously with water for several minutes.
Remove contact lenses, if present and easy to do so. Continue rinsing.
Immediately call a POISION CENTRE or doctor/physician.

Macquarie University, Faculty of XXX, North Ryde, 2113
Telephone 9850 7112

SAFETY DATA SHEETS

A safety data sheet (SDS), previously called a Material Safety Data Sheet (MSDS), is a document that provides information on the properties of hazardous chemicals and how they affect health and safety in the workplace. It includes information on the identity, health and physico-chemical hazards, safe handling and storage, emergency procedures, and disposal considerations.

An SDS is an important tool for eliminating or minimising the risks associated with the use of hazardous chemicals in workplaces.

Duties in relation to safety data sheets

The manufacturer and importer of a hazardous chemical must prepare an SDS for the hazardous chemical before first manufacturing or importing the hazardous chemical or if that is not practicable, as soon as practicable after first manufacturing or importing the hazardous chemical. Must review the SDS at least once every 5 years and amend whenever necessary to ensure it contains correct current information.

The manufacturer and importer must also provide a current SDS to a person conducting a business or undertaking, or anyone else, if the person is likely to be affected by the chemical or asks for the SDS.

A person conducting a business or undertaking, (PCBU) **must** obtain the current SDS from the Australian manufacturer, importer or supplier of the chemical when or before it is first supplied for use at the workplace.

If the person **is not able** to obtain the SDS at that time, the person **must** obtain the SDS **as soon as practicable** after the chemical is first supplied for use at the workplace **but** before the chemical is used at the workplace. If the SDS is amended, the person conducting the business or undertaking must obtain the SDS when or before the chemical is first supplied to the workplace after the SDS is amended.

A PCBU must ensure the SDS is readily accessible to a worker who is involved in using, handling or storing a hazardous chemical at the workplace and an emergency service worker, or anyone else, who is likely to be exposed to the chemical at the workplace

Under the WHS Regulations, a safety data sheet for a hazardous chemical must state the following information about the chemical:

Section 1 - Identification: Product identifier and chemical identity;

Section 2 – Hazard(s) identification;

Section 3 - Composition and information on ingredients, in accordance with Schedule 8;

Section 4 - First-aid measures;

Section 5 - Fire-fighting measures;

Section 6 - Accidental release measures;

Section 7 - Handling and storage, including how the chemical may be safely used;

Section 8 - Exposure controls and personal protection;

Section 9 - Physical and chemical properties;

Section 10 - Stability and reactivity;

Section 11 - Toxicological information;

Section 12 - Ecological information;
Section 13 - Disposal considerations;
Section 14 - Transport information;
Section 15 - Regulatory information;
Section 16 - Any other relevant information

A SDS should be used at least until an employee/student is totally familiar with the safety requirements for the product they are using. SDS can then be kept in the hazardous substances register for reference when necessary.

Hazard and Precautionary Statements

Hazard and precautionary statements provide key information to the user about the hazards associated with, and the precautions necessary to take when using the substance.

Hazard statement are a statement assigned to a hazard class or hazard category describing the nature of the hazards of a hazardous chemical including, if appropriate the degree of hazard.

Precautionary statements are a phrase prescribed by the GHS that describes recommended measures to be taken to prevent or minimise the adverse effects of exposure to a hazardous chemical or the improper handling of a hazardous chemical.

HAZARD STATEMENTS

Physical hazards

- **H200**: Unstable explosive
- **H201**: Explosive; mass explosion hazard
- **H202**: Explosive; severe projection hazard
- **H203**: Explosive; fire, blast or projection hazard
- **H204**: Fire or projection hazard
- **H205**: May mass explode in fire
- **H220**: Extremely flammable gas
- **H221**: Flammable gas
- **H222**: Extremely flammable material
- **H223**: Flammable material
- **H224**: Extremely flammable liquid and vapour
- **H225**: Highly flammable liquid and vapour
- **H226**: Flammable liquid and vapour
- **H227**: Combustible liquid
- **H228**: Flammable solid
- **H240**: Heating may cause an explosion
- **H241**: Heating may cause a fire or explosion
- **H242**: Heating may cause a fire
- **H250**: Catches fire spontaneously if exposed to air
- **H251**: Self-heating; may catch fire
- **H252**: Self-heating in large quantities; may catch fire
- **H260**: In contact with water releases flammable gases which may ignite spontaneously
- **H261**: In contact with water releases flammable gas
- **H270**: May cause or intensify fire; oxidizer
- **H271**: May cause fire or explosion; strong oxidizer
- **H272**: May intensify fire; oxidizer
- **H280**: Contains gas under pressure; may explode if heated
- **H281**: Contains refrigerated gas; may cause cryogenic burns or injury
- **H290**: May be corrosive to metals

Health hazards

- **H300**: Fatal if swallowed
- **H301**: Toxic if swallowed
- **H302**: Harmful if swallowed
- **H303**: may be harmful if swallowed
- **H304**: May be fatal if swallowed and enters airways
- **H305**: May be harmful if swallowed and enters airways
- **H310**: Fatal in contact with skin

- **H311**: Toxic in contact with skin
- **H312**: harmful in contact with skin
- **H313**: May be harmful in contact with skin
- **H314**: Causes severe skin burns and eye damage
- **H315**: Causes skin irritation
- **H316**: Causes mild skin irritation
- **H317**: May cause an allergic skin reaction
- **H318**: Causes serious eye damage
- **H319**: Causes serious eye irritation
- **H320**: Causes eye irritation
- **H330**: Fatal if inhaled
- **H332**: Harmful if inhaled
- **H333**: May be harmful if inhaled
- **H334**: May cause allergy or asthma symptoms or breathing difficulties if inhaled
- **H335**: May cause respiratory irritation
- **H336**: May cause drowsiness or dizziness
- **H340**: May cause genetic defects
- **H341**: Suspected of causing genetic defects
- **H350**: May cause cancer
- **H351**: Suspected of causing cancer
- **H360**: May damage fertility or the unborn child
- **H361**: Suspected of damaging fertility or the unborn child
- **H362**: may cause harm to breast-fed children
- **H370**: Causes damage to organs
- **H371**: May cause damage to organs
- **H372**: Causes damage to organs through prolonged or repeated exposure
- **H373**: May cause damage to organs through prolonged or repeated exposure

Environmental hazards

- **H400**: Very toxic to aquatic life
- **H401**: toxic to aquatic life
- **H402**: Harmful to aquatic life
- **H410**: Very toxic to aquatic life with long lasting effects
- **H411**: Toxic to aquatic life with long lasting effects
- **H412**: Harmful to aquatic life with long lasting effects
- **H413**: may cause long lasting harmful effects to aquatic life
- **H420**: Harms public health and the environment by destroying the ozone in the upper atmosphere

PRECAUTIONARY STATEMENTS

General precautionary statements

- **P101**: If medical advice is needed have product container or label at hand
- **P102**: Keep out of reach of children
- **P103**: Read label before use

Prevention Precautionary statements

- **P201**: Obtain special instruction before use
- **P202**: Do not handle until all safety precautions have been read and understood
- **P210**: Keep away from heat/sparks/open flames/hot surfaces-No smoking
- **P211**: Do not spray on an open flame or other ignition source
- **P220**: Keep/Store away from clothing/.../combustible materials
- **P221**: Take any precautions to avoid mixing with combustibles
- **P222**: Do not allow contact with air
- **P223**: Keep away from any possible contact with water, because of violent reaction and possible flash fire
- **P230**: Keep wetted with ...
- **P231**: Handle under inert gas
- **P232**: Protect from moisture
- **P233**: keep container tightly closed
- **P234**: keep only in original container
- **P235**: Keep cool
- **P240**: Ground/bond container and receiving equipment
- **P241**: Use explosion-proof electrical/ventilating/light/...../equipment
- **P242**: use only non-sparking tools
- **P243**: Take precautionary measures against static discharge
- **P244**: Keep reduction valves free from grease and oil
- **P250**: Do not subject to grinding/shock/.../friction
- **P251**: Pressurised container- Do not pierce or burn, even after use
- **P260**: Do not breathe dust/fume/gas/mist/vapour/spray
- **P261**: Avoid breathing dust/fume/gas/mist/vapour/spray

- **P262**: Do not get in eyes, on skin, or on clothing
- **P263**: Avoid contact during pregnancy/while nursing
- **P264**: Wash...thoroughly after handling
- **P270**: Do not eat, drink or smoke when using this product
- **P271**: Use only outdoors or in a well-ventilated area
- **P272**: Contaminated work clothing should not be allowed out of the workplace
- **P273**: Avoid release to the environment
- **P280**: Wear protective gloves/protective clothing/eye protection/face protection
- **P281**: Use personal protective equipment as required
- **P282**: Wear cold insulating gloves/face shield/eye protection
- **P283**: Wear fire/flame resistant/retardant clothing
- **P284**: Wear respiratory protection
- **P285**: In case of inadequate ventilation wear respiratory protection
- **P231+232**: Handle under inert gas. Protect from moisture
- **P235+410**: Keep cool. Protect from sunlight

Response precautionary statements

- **P301**: IF SWALLOWED:
- **P302**: IF ON SKIN:
- **P303**: IF ON SKIN (or hair):
- **P304**: IF INHALED:
- **P305**: IF IN EYES:
- **P306**: IF ON CLOTHING:
- **P307**: IF exposed:
- **P308**: IF exposed or concerned:
- **P309**: IF exposed or you feel unwell:
- **P310**: Immediately call a POISON CENTRE or doctor/physician
- **P311**: call a POISON CENTRE or doctor/physician if you feel unwell
- **P313**: get medical advice/attention
- **P314**: Get medical advice/attention if you feel unwell
- **P315**: Get immediate medical advice/attention
- **P320**: Specific treatment is urgent (see... on this label)

- **P321**: Specific treatment (see... on this label)
- **P322**: Specific measures(see... on this label)
- **P330**: Rinse mouth
- **P331**: do NOT induce vomiting
- **P332**: if skin irritation occurs:
- **P333**: If skin irritation or a rash occurs:
- **P334**: Immerse in cool water/wrap in wet bandages
- **P335**: Brush off loose particles from skin
- **P336**: Thaw frosted parts with lukewarm water. Do not rub affected areas
- **P337**: If eye irritation persists:
- **P338**: Remove contact lenses if present and easy to do, continue rinsing
- **P340**: Remove victim to fresh air and keep at rest in a position comfortable for breathing
- **P341**: If breathing is difficult, remove victim to fresh air and keep at rest in a position comfortable for breathing
- **P342**: If experiencing respiratory symptoms:
- **P350**: Gently wash with soap and water
- **P351**: Rinse cautiously with water for several minutes
- **P352**: Wash with soap and water
- **P353**: Rinse skin with water/shower
- **P360**: Rinse immediately contaminated clothing and skin with plenty of water before removing clothes
- **P361**: Remove/Take off immediately all contaminated clothing
- **P362**: Take off contaminated clothing and wash before reuse
- **P363**: Wash contaminated clothing before reuse
- **P370**: in case of fire:
- **P371**: In case of major fire and large quantities:
- **P372**: Explosion risk in case of fire
- **P373**: DO NOT fight fire when fire reaches explosives
- **P374**: Fight fire with normal precautions from a reasonable distance
- **P375**: Fight fire remotely due to the risk of explosion
- **P376**: Stop leak if safe to do so

- **P377**: Leaking gas fire- do not extinguish unless leak can be stopped safely
- **P378**: Use ... for extinction
- **P380**: Evacuation area
- **P381**:Eliminate all ignition sources if safe to do so
- **P391**: Collect spillage
- **P301+310**: IF SWALLOWED; Immediately call a POISON CENTRE or doctor/physician
- **P301+312**: IF SWALLOWED: Call a POISON CENTRE or doctor/physician if you feel unwell
- **P301+330+331**: IF SWALLOWED: Rinse mouth. Do NOT induce vomiting
- **P302+334**: IF ON SKIN; Immerse in cool water/wrap in wet bandages
- **P302+350**: IF ON SKIN; Gently wash with soap and water
- **P302+352**:IF ON SKIN: Wash with soap and water
- **P303+361+353**: IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower
- **P304+312**: IF INHALED: Call a POISON CENTRE or doctor/physician if you feel unwell
- **P304+340**: IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing
- **P305+351+338**: IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses if present and easy to do – continue rinsing
- **P306+360**: IF ON CLOTHING: Rinse immediately contaminated clothing and skin with plenty of water before removing clothes
- **P307+311**: IF exposed: Call a doctor/physician
- **P308+313**: IF exposed or concerned: Get medical advice/attention
- **P309+311**: IF exposed or you feel unwell: Call a POISON CENTRE or doctor/physician
- **P332+313**: If skin irritation occurs: Get medical advice/attention
- **P333+313**: If skin irritation or a rash occurs: Get medical advice/attention
- **P335+334**: Brush off loose particles from skin. Immerse

in cool water/wrap in wet bandages
- **P337+313**: If eye irritation persists get medical advice/attention
- **P342+311**: Call a POISON CENTRE or doctor/physician
- **P370+376**: in case of fire: Stop leak if safe to do so
- **P370+378**: in case of fire: Use ... for extinction
- **P370+380**: In case of fire: Evacuate area
- **P370+380+375**: in case of fire: Evacuate area. Fight fire remotely due to the risk of explosion
- **P371+380+375**: In case of major fire and large quantities: Evacuate area. Fight fire remotely due to the risk of explosion

Storage precautionary statements

- **P401**: Store...
- **P402**: store in a dry place
- **P403**: Store in a well-ventilated place
- **P404**: Store in a closed container
- **P405**: Store locked up
- **P406**: Store in a corrosive resistant/...container with a resistant inner liner
- **P407**: Maintain air gap between stack/pallets
- **P410**: Protect from sunlight
- **P411**: Store at temperatures not exceeding ...C/...F
- **P412**: Do not expose to temperatures exceeding 50C/122F
- **P420**: Store away from other materials
- **P422**: Store contents under...
- **P402+404**: Store in a dry place. Store in a closed container
- **P403+233**: Store in a well-ventilated place. Keep container tightly closed
- **P403+235**: Store in a well-ventilated place. Keep cool
- **P410+403**: Protect from sunlight. Store in a well-ventilated place
- **P410+412**: Protect from sunlight. Do not expose to temperatures exceeding 50C/122F
- **P411+235**: Store at temperatures not exceeding...C/...F. Keep cool

Disposal precautionary statements

- **P501**: Dispose of contents/container to...

MANAGING HAZARDOUS SUBSTANCES

The basis for developing safe systems of work utilising hazardous substances requires employee and management input. Therefore, it is important that a workplace culture is established that enables and supports employees and managers to work together to resolve any health risks or problems suspected to be due to hazardous substances.

Risk management is a process used to identify, assess and control risks. It is a systematic approach to gain an accurate estimate of risks, to enable prioritised control actions to take place. A risk assessment and risk control is required for all hazardous substances in use at the workplace

Hazard identification is a key step in the risk assessment process. The first action to take place in hazard identification for substances is to compile a register on known hazardous substances in the workplace.

The register must include a list of all hazardous substances at work, the current SDS, and if applicable notations of risk assessment results. The register can take any form such as loose leaf folders, SDS in a binder, or a computer database for example. The key requirement is that the register must be readily accessible to users of the hazardous substances. This means employees must feel free and unhindered in their access to SDS during all working hours.

Risk, or the chance of an event occurring, is a subjective measure. Different people perceive the same risk differently. This means that in a workplace situation one person may consider a task or chemical operation safe, whilst another may perceive a risk. Hence a system is needed to ensure that an accurate projection of a risk is obtained before decisions are made on the best control or management of the situation. This is called a risk assessment.

Risk Assessment. The purpose of assessment is to determine whether a person's health is at risk from exposure to hazardous substances used or produced in the workplace. The employer has the legal responsibility to ensure that a suitable and sufficient assessment is made of the risks

to health arising from work involving the use of hazardous substances. Employers might do the assessment themselves.

As a minimum the risk assessment must include a review of the label and SDS, and any other information available. The latter may include site inspections to check work conditions and methods of use.

During the risk assessment process, consultation with employees must be undertaken.

A risk assessment is best made with a wide range of accurate and up to date information. This includes actually viewing work methods, and consulting with employees about information they may be aware of, and any risks they have perceived (e.g. through health effects or experience).

If in the risk assessment a risk to health was found, it is the responsibility of the employer to **control the risk** to prevent impacts on the health of workers.

This is achieved through the hierarchy of controls. This is a preferential order of control systems that should be applied to a risk. The order of preference goes from 1 (highest) to 6 (lowest).

- **Elimination** - remove the hazard from the workplace (e.g. dispose of unused or old chemicals that are stored on the site).
- **Substitution** - reduce the hazard at the workplace (e.g. use a less hazardous product than the one currently used - such as water based paint instead of solvent or oil based).
- **Isolation** - separate the hazard from the workplace (e.g. the use of screens or walls to prevent the dispersion of welding fumes).
- **Engineering control** - the use of plant to reduce the hazard (e.g. the use of exhaust ventilation to extract fumes or vapours from the workplace).
- **Administration controls** - changing or controlling the behaviour of staff to control the risks (e.g. training, rosters that are time based to reduce employee exposure duration)

- **PPE** - reducing the risk by modifying the employee (e.g. fitting equipment to the body of people to reduce contact such as gloves, goggles, respirators etc.).

At the end of the Risk Assessment process one of four conclusions will be made.

They are:

1. Risks are not significant and are not likely to increase
2. Risks are significant but are effectively controlled.
3. Risks are significant and are not adequately controlled
4. Uncertain about risks, not enough information or uncertain about degree and amount of exposure.

If 1 or 2 are found, a notation is made in the register stating this finding, the date of the assessment, and who carried it out. If 3 is found, risk control must be undertaken and a formal report prepared. If 4 is found further information must be obtained, and professional assistance may be needed.

If the risk assessment shows that there is a risk to health, two measures may be required to assist in the determination of the degree of risk. This includes health surveillance and environmental monitoring (usually atmospheric). (Health surveillance results must be kept confidential and must be held by the Health & Safety Unit)

A Hazardous Chemical Risk Assessment form has to be completed by EACH person for EACH of the hazardous chemical they are using. This needs to be reviewed if new information about the hazardous chemical is known or after 5 years. When completed the forms should be given to Safety officer for review.

These are then filed with SDS in the laboratories where the work is carried out and must be kept for 5 to 30 years

See Hazardous Chemical Risk Assessment Form in the appendix or go to -

http://staff.mq.edu.au/human_resources/health_and_safety/policies-procedures-guidelines_forms/

HAZARDOUS SUBSTANCES AND TOXICITY

Do not confuse toxic with hazardous! Toxicity is the ability of a substance to produce injury after reaching an appropriate site in the body.

A hazard is the risk that a substance will adversely affect health when used in a certain way.

The concept of a hazard may be generalised to include physical objects (such as equipment) or operations (such as work practices), as well as chemicals; it is very different to toxicity.

In some cases, there may be:

- extreme toxicity but low hazard, e.g. a sealed nickel-cadmium (NiCad) battery
- low toxicity but extreme hazard, e.g. carbon dioxide in a beer brewing tank which has no warning sign.

The word toxic is used loosely to cover every adverse effect of a substance. A hazard assessment, if involving chemicals, **must** assess the effects chemicals may have on sensitive parts of the human body (i.e. its toxicity).

For the effects of chemicals on sensitive organs, we must consult the toxicity literature. The manufacturer's Safety Data Sheets (SDS), which accompany all purchased chemicals, are a good starting point.

FORMS OF TOXICITY

A toxicologist divides toxicity into a number of subdivisions:

Toxicity

Toxicity refers to how effective a substance is as a poison and the term is reserved for the acutely poisonous properties of the material. The toxicity, of a material, is most commonly specified by the LD50. This is the lethal dose of poison needed to kill 50% of organisms under specific test conditions.

Corrosiveness

Corrosiveness refers to how corrosive a substance is to the skin, eye or gut. Strongly acid or alkaline materials will damage the eyes, skin and gut (if swallowed).

Mutagenicity

Mutagenicity refers to the ability of the substance to cause mutations in test systems and is most commonly tested on a bacterial system (e.g. Ames test) or human cell culture.

Teratogenicity

Teratogenicity refers to the ability of a substance to cause birth defects.

Carcinogenicity

Carcinogenicity refers to the ability of the substance to cause cancers.

CARCINOGENIC SUBSTANCES

Carcinogenic substances are substances that can cause cancer.

Researchers intending to worth with these chemicals will need to notify WorkCover NSW before commencing work.

There are two types of listed carcinogens under the Regulation which require notification:

- notifiable carcinogens (those which can be used) and
- prohibited carcinogens (those which are prohibited except for research and analysis).

Notifiable carcinogenic substances

- Acrylonitrile [107-13-1].
- Benzene [71-43-2] – when used as feedstock containing more than 50% of benzene by volume.
- Chrysotile [12001-29-5] (white asbestos) – when used for the manufacture of asbestos products.
- 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 [612-83-9].
- 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-Actetylaminofluorene [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 in situations where amosite occurs naturally and not used in 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).
- Crocidolite [12001-28-4] (blue asbestos) – except for removal, disposal, maintenance, encapsulation, and enclosure purposes and in situations where crocidolite occurs naturally and not used in any new application.
- 4-Dimethylaminoazobenzene [60-11-7].
- 2-Napthylamine [91-59-8] and its salts.
- 4-Nitrodiphenyl [92-93-3].

CHEMICALS OF NATIONAL SECURITY

Australia is a safe and resilient country. However, there is a real risk of dangerous chemicals being used for a terrorist attack on our own soil.

We can reduce this risk by ensuring that good security measures are in place across the chemical supply chain - from importers and manufacturers right through to retailers - as well as in places where chemicals are used, such as in laboratories or on farms.

The Australian Government, together with state and territory governments, businesses and industry sectors, has developed a National Code of Practice for Chemicals of Security Concern. The code provides guidance to sectors who work with one or more of the 11 high-risk chemicals that could be used to make homemade bombs.

CHEMICALS OF SECURITY CONCERN

A
Aldicarb
Aluminium phosphide
Ammonia (anhydrous)
Ammonium nitrate*
Ammonium perchlorate
Arsenic pentoxide
Arsenic trioxide
Arsine
Azinphos methyl

B
Bendiocarb
Beryllium sulfate
Bromine

C
Cadusafos
Calcium cyanide
Carbofuran
Carbon disulphide
Carbon monoxide
Chloropicrin
Chlorfenvinphos
Chlorine
Cyanogen bromide
Cyanogen chloride

D
Diazinon
Dichlorvos
Diethyl phosphite
Dimethyl phosphite
Dimethyl mercury
Dimethyl sulfate
Disulfoton

E
Endosulfan
Ethion
Ethyl mercury chloride
Ethyldiethanolamine

F
Fenamiphos
Fluorine gas
Fluoroacetic acid
Fluoroethyl alcohol
Fluoroethyl fluoroacetate

H
Hydrochloric acid
Hydrogen chloride
Hydrogen cyanide
Hydrogen peroxide
Hydrogen sulfide

M
Magnesium phosphide
Mercuric chloride
Mercuric nitrate
Mercuric oxide
Mercurous nitrate
Mercury cyanide
Methamidophos
Methidathion
Methiocarb
Methomyl
Methyl fluoroacetate
Methyldiethanolamine
Mevinphos

N
Nitric acid
Nitric oxide
Nitromethane

O
Omethoate
Osmium tetroxide
Oxamyl

P
Paraquat
Parathion methyl
Perchloric acid
Phorate
Phosgene
Phosphine
Phosphorus
Phosphorus oxychloride
Phosphorus pentachloride
Phosphorus trichloride
Potassium chlorate
Potassium cyanide
Potassium nitrate
Potassium perchlorate
Propoxur

S
Sodium azide
Sodium chlorate
Sodium cyanide
Sodium fluoroacetate
Sodium perchlorate
Sodium nitrate
Strychnine
Sulfur dichloride
Sulfur monochloride
Sulphuric acid

T
Terbufos
Thallium sulfate
Thionyl chloride
Thiophosphoryl chloride
Triethanolamine
Triethyl phosphite
Trimethyl phosphite

Z
Zinc cyanide
Zinc phosphide

* Security-Sensitive Ammonium Nitrate (SSAN) [ammonium nitrate, ammonium nitrate emulsions and ammonium nitrate mixtures containing greater than 45 per cent ammonium nitrate, excluding solutions]

For a full list of UN numbers, CAS numbers and common uses of these chemicals (and products containing the chemicals) go to www.chemicalsecurity.gov.au Chemicals in red italics are the 11 chemical precursors to homemade explosives. Details on form and concentration of the other chemicals in this list are yet to be determine

TOXIC, EXPLOSIVE AND INCOMPATIBLE CHEMICALS

Some chemicals are toxic and/or explosive on their own, whereas others are dangerous after contact with other non-compatible substances

Examples of toxic and explosive chemicals

Compound Class	Hazard	Prevention, treatment and clean up
Aliphatic Azo Compounds	▪ Explosive; e.g., azo-N-chloroformamidine decomposes explosively at 155^{o}C.	
Aromatic Amines	▪ e.g. as aniline, or nitroaniline, and benzidine ▪ One of the few chemical groups that can readily be absorbed through the skin and cause rapid systemic poisoning. ▪ Toxic amounts of solid amines may be absorbed as readily as liquid amines. The amines react in the blood to convert haemoglobin to methemoglobin, a form that cannot carry oxygen. ▪ Poisoning can also occur by inhalation or ingestion.	▪ Skin exposure requires prolonged washing with water, because most of the amines are only slightly soluble in water. ▪ Small spills can be removed with absorbent paper. Larger spills should be absorbed with sand or soil. ▪ Work in the fume hood whenever possible, and use rubber gloves when working with aromatic amines.
Aromatic Nitro Compounds	▪ Similar to aromatic amines in that they are easily absorbed through the skin, and they convert hemoglobin to methemoglobin e.g. nitrobenzene. ▪ Trinitro aromatic compounds explode at elevated temperatures. Trinitrotoluene (TNT) at 240^{o}C & trinitrophenol (picric acid) at 300^{o}C. ▪ Nitrobenzene and nitric acid will form an explosive mixture in the absence of water.	▪ Treatment of spills and skin exposure is similar to that for aromatic amines.

Benzene **and its homologues**	▪ Absorbed by inhalation or ingestion. ▪ Toxic dose will cause dizziness, headache, nausea, vomiting, chest pain, convulsions, coma & death from respiratory failure. ▪ Delayed effects from chronic exposure are leukaemia and anaemia.	▪ Benzene should always be handled in a fume hood. ▪ Wherever possible benzene should be substituted with toluene.
Bromofluorene	▪ Causes severe dermatitis (to the skin) with a delayed reaction of three to four weeks.	
Beryllium	▪ Latent period between exposure and the onset of illness, and usually one or two weeks may elapse before an X-ray will show pneumonitis. ▪ Exposure to beryllium oxide has been known to cause a chronic lung disease as late as 25 years after the last exposure.	
Carbon Disulfide	▪ Toxic ▪ More flammable than ethyl ether. Vapours can be ignited with static electricity.	▪ Due to the toxicity of CS_2 small laboratory spills should be allowed to evaporate. ▪ If not possible, the CS_2 can be absorbed with a sponge, cloth, or paper and then allowed to evaporate in the hood. ▪ Small quantities can be flushed down the sink, using plenty of cold water.
Caustic Alkalis	▪ Sodium hydroxide and potassium hydroxide are highly caustic. ▪ Contact with the skin or eyes being the most common hazard. ▪ Permanent eye damage may result from concentrated alkali (NaOH or KOH) splashed in the	▪ Wash skin or eyes continuously for at least 15 minutes following exposure. ▪ Concentrated alkali-solution spills should be flushed to a floor drain.

	eye.	▪ Can be mopped using water, but this corrodes the mop head. Sand is also useful for absorbing spilled solutions.
Chromium Trioxide	▪ Toxic effects of chromium trioxide are due to its behaviour as an acid & an oxidising agent. ▪ Contact with CrO_3 dust or concentrated solutions may cause skin inflammation or open sores. Ingestion of <6g CrO_3 is fatal. ▪ Continued inhalation may cause damage to the respiratory tract.	▪ Chromium trioxide should be thoroughly and immediately washed from the skin after contact. ▪ Spilled solutions can be converted to less toxic trivalent chromium if reaction with a reducing agent e.g. sodium sulfite.
Cyanides and Nitriles	▪ Organic compounds combined with the -CN group are commonly called nitriles, although they may be called cyanides, as the inorganic compounds are. ▪ Commonly used organic cyanide is CH_3CN, called acetonitrile or methyl cyanide. ▪ Cyanide compounds are powerful poisons that prevent utilization of oxygen by the body tissues, due to selective inhibition of respiratory enzymes: the transfer of oxygen from the blood to the tissues is prevented. ▪ Cyanide in the body is converted to the much less toxic thiocyanate, SCN-. Such conversion prevents any build-up of cyanide in the body. ▪ Poisoning from chronic, daily exposure to cyanide is less common than acute exposures. ▪ Nitriles are less toxic than inorganic cyanides, but cause a greater irritation of the nose & eyes	▪ Use amyl nitrite as an antidote ▪ Wash cyanides and nitriles from the skin immediately. ▪ Spilled cyanides should be placed in a special container for disposal. ▪ Cyanide in (alkaline) solutions can be converted to thiocyanate by being boiled with sulfur, or to a polysulphide or ferrocyanide by addition of ferrous sulfate. Conversion should be done before solutions are washed down the sink (lots of water!). ▪ Nitriles can be converted to amides by reaction with hydrochloric acid.

Diazomethane	▪ Toxic and explosive. ▪ Exposure to diazomethane will cause severe headache, chest pains, aching muscles and an overwhelming fatigue. ▪ After sensitisation even traces of the gas will cause severe reactions.	
Diazomethane **continued**	▪ The gas explodes at temperatures above 100^{o}C, or under high intensity lighting or in contact with ground glass joints, even when diluted with nitrogen	
Dioxane	▪ 15 minutes exposure at 300 ppm will cause mild transient irritation of the eyes, nose & throat. ▪ In large doses it is a weak anaesthetic and a liver and kidney poison.	
Ethers	▪ Not highly toxic, but they do cause dizziness, headaches, and other side effects. ▪ Dioxane & ethylene oxide are more toxic than ethyl & isopropyl ether; continual exposure may cause kidney & liver damage. ▪ Dioxane can be absorbed through the skin. ▪ Ethers are highly flammable. Fumes are heavier than air & can accumulate in a low spot, flow to an ignition point, then flash back to the vapour source. ▪ Static electricity can ignite the vapours. ▪ Ethers react slowly with oxygen to form explosive peroxides. Frequent exposure to air and sunlight hasten the process. ▪ Evaporation can cause accumulation of peroxides	▪ Spilled ethers can be removed with a sponge or cloth and then allowed to evaporate in a fume hood. ▪ Laboratory work with ethers should be confined to fume hoods ▪ To test for peroxides shake a sample of the ether with an acidified solution of potassium iodide. Iodine (brown colour) is formed in the presence of peroxides. Shaking with a solution of ferrous sulfate or sodium sulfite eliminates peroxides. Addition of sodium metal to the container will prevent accumulation of peroxides.

	around the cap or stopper of a container. ▪ Peroxides are less volatile than ethers and so distillation or evaporation of the ether will result in concentration of the peroxides. If a distillation goes too near to completion, an explosion may result.	
Ethylenediamine	▪ Sensitisation of the skin and respiratory system.	
Halogenated Hydrocarbons	▪ toxic effect is their anaesthetic or narcotic action e.g. carbon tetrachloride. ▪ Delayed effects more dangerous than immediate effects. Damage to the kidney, liver, or nervous system may result, as well as cancer. ▪ Saturated organic halides are usually more toxic than halides of the unsaturated ethylene series. ▪ Bromo & iodo derivatives are usually somewhat more toxic than the chloro derivatives. ▪ Carbon tetrachloride is about ten times more toxic than chloroform. Most common absorption route is by inhalation. Carbon tetrachloride is sufficiently non-flammable to be used in fire extinguishers. At elevated temperatures, many organic halides decompose to give carbonyl chloride (phosgene), $COCl_2$, which is far more toxic than the original compound. ▪ Carbon tetrachloride should not be used as a fire extinguisher, nor aspirated into flames.	▪ Methylene chloride should be used when possible.
Mercury and Its Derivatives	▪ Toxic by virtue of the fact that they interfere with or inhibit	▪ Mercury is volatile so spills must be minimised

	enzyme systems in the body. ▪ Both metallic mercury and mercury compounds can be absorbed by inhalation, ingestion, or contact with the skin. ▪ Mercury readily amalgamates with gold, and you should never wear rings or other jewellery when working with it. ▪ Chronic exposure or acute exposure can cause poisoning. With chronic inhalation exposure, the poisoning symptoms usually disappear when the source of exposure is removed. Complete recovery may, however, require several years. Emotional disturbance & kidney damage and other effects are common. ▪ Mercury oxide can react with ammonia, or ethyl alcohol and nitric acid, to form the highly explosive mercuric fulminate, $Hg(ONC)_2$. ▪ At room temperature, mercury-saturated air contains about 20 mg/m^3 of mercury. However, this point will rarely be reached, because of air movements and air exchanges.	& containers stoppered. ▪ Complete recovery of mercury from spills is impossible. Pools and droplets can be pushed together and collected by suction into a filtering flask. ▪ Mercury sweeps contain an amalgamated copper coil, which will collect the mercury & scoop it into a small shovel attachment. ▪ Small & unseen mercury droplets trapped in crevices can be left to vaporise in ventilated laboratories. ▪ Its volatility decreases rapidly as oxides, dust, and oils coat the surface. ▪ Frequent spills may result in an airborne concentration in excess of the recommended limit. ▪ Residual mercury can be fixed with sulphur dust. However, a slurry of sulphur and calcium oxide is more effective as a fixing agent.
Some METAL HYDRIDES	▪ Sodium hydride, ignites and explodes in contact with water or high humidity. ▪ Other hydrides are less reactive, but once burning they are difficult to extinguish.	
Osmium Tetroxide	▪ Causes irreversible eye damage ▪ Vapour irritates all parts of the respiratory system.	▪ Osmium tetroxide must always be handled in fume cupboards.

Oxalic Acid and Oxalates	▪ Oxalic acid and its soluble salts, when absorbed into the blood or tissues, precipitate calcium oxalate. ▪ Ingestion is the most common form of absorption. Severe pain & vomiting rapidly occur , may be followed by convulsions & death. ▪ The most common soluble compounds of oxalic acid used in the laboratory are sodium, potassium, and ammonium oxalate.	
Perchloric Acid and Perchlorates	▪ Violent explosions when they come in contact with organic matter.	▪ Reagent bottles should be kept on stainless steel or plastic trays and away from wooden shelves and bench tops. ▪ Fumes from the evaporation of perchloric acid or of acid solutions of perchlorates should be collected or should be carried out in fume hoods made for perchloric acid work. ▪ Wooden surfaces soaked with perchlorate may spontaneously ignite years later. ▪ Rinse perchloric acid bottles after use. ▪ Remove spills immediately. ▪ Can use mop, dilute the spill first, rinse with water, dry, and dispose of.
Peroxides	▪ Irritating to the respiratory tract, skin, and eyes. ▪ A 30% hydrogen peroxide solution is commonly used in the laboratory, and this rarely	▪ Peroxides in general should not be stored for long periods.

	presents an inhalation problem. ▪ Contaminants in the more concentrated 70% solution can initiate violent decomposition.	
Sodium and Potassium	▪ Contact with moist air will oxidise, melt and ignite. ▪ Potassium is more reactive than sodium and the sodium potassium alloy is more reactive.	

INCOMPATIBLE CHEMICALS

Many explosions, fires, and asphyxiations are caused by the accidental combination of potentially dangerous substances. The following is a partial list of such potentially dangerous combinations.

DO NOT CONTACT:	WITH
ALKALI METALS, SUCH AS CALCIUM, POTASSIUM, AND SODIUM	water, carbon dioxide, carbon tetrachloride and other chlorinated hydrocarbons.
ACETIC ACID	chromic acid, nitric acid, hydroxyl-containing compounds, ethylene glycol, perchloric acid, peroxides, permanganates.
ACETONE	concentrated sulfuric and nitric acid mixtures.
ACETYLENE	copper (tubing), fluorine, bromine, chlorine, iodine, silver, mercury, and their compounds.
AMMONIA, ANHYDROUS	mercury, halogens, calcium hypochlorite, hydrogen fluoride.
AMMONIUM NITRATE	acids, metal powders, flammable fluids, chlorates, nitrates, sulfur, finely divided organics or combustibles.
ANILINE	nitric acid, hydrogen peroxide.
BROMINE	ammonia, acetylene, butadiene, butane, hydrogen, sodium carbide, turpentines, finely divided metals.
CHLORATES	ammonium salts, acids, metal powders, sulphur, finely divided organics or combustibles, carbon.
CHROMIC ACID	acetic acid, naphthalene, camphor, alcohol, glycerine, turpentine other flammable liquids.
CHLORINE	ammonia, acetylene, butadiene, benzene and other petroleum fractions, hydrogen, sodium carbides, turpentine, finely divided powdered metals.
CYANIDES	acids.
HYDROGEN PEROXIDE	copper, chromium, iron, most metals or their respective flammable fluids and other combustible materials, aniline, nitromethane.
HYDROGEN SULFIDE	nitric acid, oxidising gases.
HYDROCARBONS (general)	fluorine, chlorine, bromine, chromic acid, sodium peroxide
IODINE	acetylene, ammonia, etc. (see bromine).
MERCURY	acetylene, fulminic acid, hydrogen.
NITRIC ACID	acetic, chromic and hydrocyanic acids, aniline, carbon, hydrogen sulfide, flammable media, fluids or gases, substances that are readily nitrated.
OXYGEN	oils, grease, hydrogen, flammable liquids, solids, and gases.
OXALIC ACID	silver, mercury.
PERCHLORIC ACID	acetic anhydride, bismuth and its alloys, alcohol, paper, wood and other organic materials.
PHOSPHORUS PENTOXIDE	water.
POTASSIUM PERMANGANATE	glycerine, ethylene glycol, benzaldehyde, sulphuric acid.
SODIUM PEROXIDE	any oxidisable substances, for instance methanol, glacial acetic acid, acetic anhydride, benzadehyde, carbon disulfide, glycerine, ethylene glycol, acetate, furfural, etc.
SULPHURIC ACID	chlorates,

Appendix

FORMS AND PROCESSES WHEN WORKING WITH CHEMICALS

Following is a summary of forms and processes involved when working with chemicals at Macquarie University.

Chemical Induction - Chemical inductions are held regularly on Fridays. You must attend induction before working with chemicals in the laboratory. Special arrangements are made for people who cannot attend on Fridays due to other commitments. Contact the Chemical Safety Officer for further information.

Identify Hazardous substances being used - Safety Data Sheets provide information on hazardous chemicals used in the laboratory. Safety Data sheets should be read prior to the use of chemicals and are an important tool for conducting risk assessments.

Label decanted solutions - Follow GHS labelling requirements for all decanted solutions

Safety Data Sheets - Hard copies are stored alphabetically by chemical name, in Yellow folders in the laboratory of use. SDS needs to be checked regularly to ensure that they are kept up to date. (i.e. A revision date of less than 5 years) SDS are available from ChemAlert or Supplier

Hazardous Chemical Risk Assessments - (HCRA) Risk assessments need to be completed by each user for each of the chemicals used. This means that for a group there may be several copies of the same Chemical Risk Assessment, done by different individuals.

Risk assessments should be revised every 5 years unless changes occur. Each HCRA must be signed by the appropriate supervisor. This process is to ensure that a discussion about the hazardous chemicals being used is conducted and that any concerns are raised with the supervisor prior to use (or during the use) of the product.

Further on, if there is an issue with the use of the chemical then this document may be put up in court to say that the supervisor and the individual were aware of hazards before the product was used and that proper controls were put in place so as to foreseeably prevent an accident.

Submit completed HCRA to Chemical Safety Officer for recording and who will return hard copies for filling alphabetically by chemical name in the Blue folders in the laboratory.

The HCRA forms can be found on the University Health & Safety webpage

http://staff.mq.edu.au/human_resources/health_and_safety/policies-procedures-guidelines_forms/

Then select Risk Assessments, Hazardous Chemical Risk Assessment.

Purchasing Chemicals - Complete Purchase Requisition form and complete a Chemical Compliance Declaration form and submit to your department administrator.

Purchase requisition forms can be found on *Faculty of Science* webpage.

http://web.science.mq.edu.au/intranet/procedures/finance/ and select

Purchase Requisition/Fax Order form (updated 17/12/2013)

Chemical Compliance Declaration forms - With the start of the New Year, came (which year) an upgrade on information required by government agencies on chemicals used in the workplace. To facilitate this information, a Chemical Compliance Declaration form has been developed. This form must be used when ordering/reordering chemical substances/products, and must be submitted with a completed purchase requisition form to your department administrator.

These forms can be found on the Health & Safety webpage at –

http://staff.mq.edu.au/human_resources/health_and_safety/policies-procedures-guidelines_forms/

Then select Chemical Ordering Forms.

To help you complete the Chemical Compliance Declaration form, information such as what chemicals are notifiable carcinogenic substances, what chemicals require health monitoring and what are the chemicals of national security, can be found on the Faculty of Science webpage
http://web.science.mq.edu.au/intranet/ohs/forms/ under the section
Relevant Acts, Regulations and Code of Practice go to -

- Notifiable Carcinogenic Substances
- Prohibited Carcinogenic Substances
- Hazardous chemicals requiring Health Monitoring
- Chemicals of Security Concern List

ChemAlert - The University has purchased an online software database package to ensure the effective management and maintenance of chemicals.

The ChemAlert stock management facility allows you to identify products stored (inventory), quantities and incompatibilities of chemicals stored together.

The system also allows you to print ChemAlert Reports, Labels and Safety Data sheets in accordance with WH&S Regulations 2011.

Laboratory Managers will be given a Username and Password for access to the laboratory inventory in the ChemAlert database so that they will be able to manage their own Stock controls, Labels and Safety Data Sheets. The Chemical Safety Officer will provide training as needed.

The ChemAlert data base can be accessed by everyone in the University from the Macquarie University Health & Safety webpage on the following link.

http://staff.mq.edu.au/human_resources/health_and_safety/

Then on the bottom right hand side click onto **ChemAlert MSDS** button.

Unattended Reaction Form

Experiment/Task:	
Date:	
Person Involved:	
Signature:	
Phone:	
Location where Experiment/Task will be performed (Include building/room # and bench):	
Has a Risk Assessment been Carried Out:	**Yes** **No**
Summary of Experiment/Task:	
Equipment/Services Used:	
Chemicals Used:	
Reason the Reaction must be Performed Unattended:	

EMERGENCY PROCEDURES:	
Emergency Contact(s):	**Phone Number:**

APPROVED BY:	**The experimental setup should be inspected before approval is given. A Risk Assessment must be Performed**
Viewed Risk Assessment:	**Yes** **No**
Supervisor	
Signature	

This completed form should be placed with the Reaction with copies to the Departmental Manager and for your own records

Taken from Department of Chemistry and Bimolecular Sciences

Reference No:	
Date:	

MACQUARIE UNIVERSITY

Hazardous Chemical Risk Assessment Form

A risk assessment must be carried out by **EACH** person for **EVERY HAZARDOUS CHEMICAL** used. Each chemical needs a separate form. Consult and read the Safety Data sheets before completing. Ideally this form is completed in consultation with Supervisor. **If no SDS is available go to H and tick 4**

Substance Name:		**Date of Assessment**	/ /

Assessors Name:		**Signature:**	
Supervisors Name:		**Signature:**	

AREA of USE (Bld, & Room No.)		**Is SDS Available** (and < 5 years old)	☐ YES ☐ NO	**Date of SDS?**	/ /	**Quantity used in procedure.**	
CAS No:		**Chemical Supplier**		**Catalogue No.**			
UN No:		**DG Class:**		**PG No:**			

Hazard Statements or Risk Phrases (List in full, include code)
Precautionary Statements or Safety Phrases (List in full, include code)
Description of work/ activities/ use

A. Concentration Used

Concentration used_____ (*A concentration cut off level for a substance represents a level* [expressed as a percentage on a weight/weight basis] *at above which that substance must be considered hazardous*).

Is the concentration above level listed as hazardous? (*as listed in Designated Hazardous Substances http://hsis.safeworkaustralia.gov.au Hazardous Substances Information System*) ☐ **Yes** Go to B ☐ **No** Go to H and tick 1

B. Dangerous Good Class Labeling *(all products must be labeled in accordance with regulations)*

Which (if any) Dangerous Goods Class does the substance belong?

☐ **3** (Flammable)	☐ **4** (Flammable solid)	☐ **5** (Oxidizing)	☐ **6** (Toxic)	☐ **8** (Corrosive)	☐ (Other)

Are the correct Storage facilities in place?	☐	Yes	☐	No Go to H tick 3
Has the product been decanted?	☐	Yes	☐	No Go to C
If **YES** then has it been labeled in accordance with regulations?	☐	Yes	☐	No Go to H tick 3

C. Method of Use and Exposure Risks

Is the chemical used in way in which fumes, gases or dust particles are given off?	☐	Yes	☐	No
Are any of the following, Eyes, Skin, Inhalation, or Ingestion an exposure risk?	☐	Yes	☐	No
Is the substance a Carcinogen or a Mutagen or a Teratogen?	☐	Yes	☐	No

D. Protective Controls

What Controls have been applied to reduce risk (see page 4) ☐ **Elimination** ☐ **Substitution** ☐ **Isolation** ☐ **Engineering** ☐ **Administration** ☐ **PPE**

Is it necessary to work in a fume hood?	☐	Yes	☐	No

Is it necessary to wear suitable protective clothing, gloves, eye/ face protection?	Protective clothing	Gloves	Eye / Face protection	Other
	☐ YES ☐ NO	☐ YES ☐ NO	☐ YES ☐ NO	☐ YES ☐ NO

If **YES** specify type;-

Are all protective controls readily available, clean and functional	☐	Yes	☐	No

E. First Aid and Spills

What first aid measures should be taken in the event of an accident occurring whilst using this chemical?	Is First Aid Kit available	☐	Yes	☐ No
What steps should be taken in the event of a spill of this chemical?	Is Spill Kit available	☐	Yes	☐ No

F Training

Have you received training in the correct handling of this substance?	☐	Yes	☐	No
Are you satisfied you understand the hazards involved in the use of this chemical?	☐	Yes	☐	No **Go to H tick 3**

G. Disposal

Outline your disposal method -				
Are the required resources and facilities in place?	☐	Yes	☐	No **Go to H Tick 3**

H. RISK RATING ***(Tick the appropriate Risk Class Box)***

1	☐	**Risks are not significant and are not likely to increase.**	Select if you are using a concentration less than which is considered hazardous or no precautions required.
2.	☐	**Risks are significant but are effectively controlled.**	Select if you are satisfied that adequate controls are in place.
3.	☐	**Risks are significant and are not adequately controlled**	Select if adequate controls are **NOT** in place
4.	☐	**There is insufficient information to assess risk and level of exposure**	Select if you are uncertain about risks and no SDS is available

If you select 3 or 4 the chemical MUST NOT be used, until the risk can be reduced to 1 or 2. If risk/s cannot be reduced then protocol may have to be changed or an alternative chemical found. Use Hierarchy of Control to reduce risks (Page 4)

EXAMPLES OF HIERARCHY OF CONTROL	
Safety Measure	**Explanation**
Elimination: Eliminate the use of the substance	• use a physical process instead of a chemical process e.g. using ultrasound to clean equipment instead of a process involving chemicals; using clips/bolts or nails instead of adhesive.
Substitution: Use a safer substance or a safer form of the substance	**Safer substance form or process** • use water-based chemicals instead of solvent-based • use chemicals where compatible • paint with a brush instead of spraying • purchase a substance in a safer form
Isolation: Separate people or property from the substance by distance or barriers	• use closed systems • isolate the process to one room with restricted access or use appropriate barriers/screens to separate substances • distance workers from substances/processes through the use of remote controls • distance property, incompatible chemicals and ignition sources (e.g. flames, sparks) from goods
Engineering: Use physical controls (such as plant/equipment) that eliminate or reduce the generation of substances; suppress or contain substances; or limit the area of contamination in the event of spills and leaks.	• use fully or partially enclosed ventilation booths or exhaust extraction • use local exhaust or natural ventilation systems (e.g. air ducts, open doors/windows) • use bunding to contain spillage • install drains, install automatic fire protection and chemical suppression systems
Administration: Use safe work practices including good housekeeping.	• reduce the amount of property or the number of employees exposed • reduce the duration and/or frequency of exposure e.g. through job rotation • reduce the amount of goods/products stored and used • ensure safe interim storage of wastes/products (e.g. labeled properly in suitable containers stored away from people, the environment, incompatible chemicals, ignition sources etc) • vacuum or wet sweep to suppress dust being generated • cover containers and make sure lids are attached • clean up spills immediately (includes provision of suitable aids, equipment and isolate floor and strom water drains) • ensure no eating, drinking or smoking in areas where substances are used • provide suitable washing facilities and First Aid facilities • instruct employees on how to use substances safely
Personal Protective Equipment (PPE): Provide protective clothing and equipment for employees, supervisors and visitors. NB: items must be compatible with chemical(s) being used/stored	• overalls, aprons, gowns, chemical resistant suits • footwear (enclosed shoes, safety boots) • gloves • chemical resistant glasses (safety glasses) • face shields/masks, respirators . full/partial • head protection

SAFE USE OF MICROWAVE OVEN

Before using this microwave oven you must:

1) Receive instruction in the safe use of the microwave oven from your supervisor.
2) Read, understand and attach a copy of the appropriate Safe Work Procedure.
3) Sign and date this page.
4) Get your supervisor to sign and date this page.
5) Put this and the SWP in the appropriate folder adjacent to the microwave.

I have received instruction in the safe use of this microwave oven from my supervisor. I have read and understood the Safe Work Procedure/s attached for its use. I understand that there is an absolute ban on placing any bottle or other container with a lid inside the microwave oven.

USER	SUPERVISOR
NAME (Print):	NAME (Print):
SIGNED:	SIGNED:
DATE:	DATE:

Safe Working Procedures			
MACQUARIE UNIVERSITY	**USE OF MICROWAVE OVEN** To melt agarose		
Safe Working Procedure No:	SWP - 2014-040	**Version:**	V2
Faculty:	Science	**Department/Office:**	Biology/CBMS
Contact(s):	Marita Holley		

Location of Equipment	Various laboratories within the Faculty of Science				
Approvals, Training or Qualifications required:	Safe Work Procedure read & understood. Safe use of Microwave form completed. All new users to be trained/instructed by competent person.				
Supervision Required	Regular lab visits by Supervisor				
Warnings *(Insert symbol & wording)*					
	Explosive risk	Hot surfaces			
Restrictions *(Insert symbol & wording)*					
	NO Schott bottles	**DO NOT** use sealed containers	No metal objects, paper or flammable material	Only use microwave safe containers	
Personal Protective Equipment *(Insert PPE symbol and wording)*					
	Heat resistant gloves	Enclosed footwear	Lab coat	Safety glasses	

Potential Hazards	Hazard	Possible Consequences	Controls
	High temperatures Heat burns/ Steam release	Burns or Scalding to skin, damage to eyes.	Wear appropriate PPE (lab coat, eye protection, heat resistant gloves, covered footwear); avoid contact with hot surfaces by unprotected skin
	Exploding vessels	Major personal injury And damage to equipment Exploding vessels Physical injury, fatality, time off work, damage to machine and property, machine downtime, decreased productivity, loss of sample, cost of repair/replacement	Remove lid from flask/container
	Fires	Major personal injury And damage to equipment	Do not put paper/tissues and other combustibles in the oven

Environment	Check microwave prior to use for damage, in particular check glass window, door seat and power cord. Microwaves must be cleaned prior to and following use to avoid contamination.
Procedure *(e.g. preparation, pre-operation checks, process/method)*	**REMOVE LIDS FROM ALL CONTAINERS** 1. Use 500ml Erlenmeyer flask 2. Measure out the required amount of TBE Buffer (Tris-borate, EDTA) or TAE Buffer (Tris-acetate, EDTA) add to flask ensuring the volume of buffer **DOES NOT** exceed 60% of flask volume. 3. Weight out the required amount of agarose, add to flask. 4. Cover flask with glad wrap and poke holes in top. 5. Microwave Erlenmeyer flask on medium until agarose is completely dissolved (usually between 3 and 5 minutes). 6. Set up agarose gel tray. 7. Put on heat resistant gloves 8. Cool agarose to approximately 50°C under running water or by leaving on bench until desired temperature is reached. 9. Pour cooled agarose into gel tray. If pre-staining add DNA stain (Gel Red or Sybr Green) to gel prior to pouring.
Emergency Procedures	If a fire should start inside the oven, leave the door closed, disconnect the power cord, if safe to do so, and call the emergency number 9850 9999. In case of scalding: cool affected area under cold running water. Seek medical advice if necessary.
Clean Up & Waste Disposal	Ensure oven is left clean and rinse flask.
Maintenance	Consult lab manager if you suspect oven is not functioning correctly.

Date Approved	27/03/2014
Date of Commencement	27/03/2014
Date for Next Review	27/03/2016
Supporting Documentation	Risk assessment dated July 2011
Relevant Legislation, Guidelines and Standards	AS/NZS 60335.2.25:2002 Household and similar electrical appliances - Safety - Particular requirements for microwave ovens, including combination microwave ovens (IEC 60335-2-25 Ed 5.2, IDT) http://www.arpansa.gov.au/pubs/emr/microwave.pdf

(Dept. Admin to complete) Order Reference Number:	
Date:	

MACQUARIE UNIVERSITY

Chemical Compliance Declaration

This form must be used when ordering/reordering chemical substances/products, and must be submitted with a completed purchase requisition form to your department administrator.

INSTRUCTIONS TO PURCHASER	INSTRUCTIONS TO LABORATORY MANAGER
1. Print and read the chemical/product(s) Safety Data Sheet (SDS). If the product is hazardous determine if there is a non-hazardous or less hazardous substitute. 2. If the product is hazardous complete a Hazardous Chemical Risk Assessment form (unless up-to date copy is already on file). 3. For each hazardous substance used, forward a copy of SDS and completed and signed Risk Assessment Form to the lab manager for the nominated area 4. Forward this form with your purchase requisition forms to your department administrator.	1. Check Risk assessments have been signed by the laboratory supervisor and recorded by the Health & Safety Coordinator-Chemical Safety 2. File the SDS and Risk Assessments in the hazardous substances Register 3. Ensure the chemical inventory is updated

Purchaser and Users Details *(please print details)*			
Purchasers Name		Phone Ext:	
Users Name		Phone Ext:	
Users Name		Phone Ext:	
Users Name		Phone Ext:	

CHEMICAL NAME	Supplier	Catalogue Number	Cost $ / Mole or Litre	UNIT / PACK SIZE	CAS #	Building & Room Number where chemical will be used/stored	Is the Chemical a hazardous substance * Yes	No
							☐	☐
							☐	☐
							☐	☐
							☐	☐
							☐	☐
							☐	☐
							☐	☐
							☐	☐
							☐	☐

*** Risk Assessment has been completed and risks are controlled.**

If you have nominated a hazardous substances, complete this section:
One or more of the chemicals I wish to purchase

☐ **Is a** notifiable / prohibited carcinogenic substance and I have made the appropriate notifications to WorkCover (Efforts should be made to eliminate or substitute for a safer product if possible). Copies of WorkCover documents to be held by Health & Safety Coordinator – Chemical Safety.

☐ **Requires** health surveillance for users ((Work Health & Safety Regulations 2011 Regulations 2011 Part 7.1) Purchaser to advise Health & Safety Unit to arrange appropriate assessments.

or

☐ **Is a** chemical of National security? Further information can be found at - (www.chemicalsecurity.gov.au).

The chemical product I wish to purchase is a chemical of National security concern. I understand that to be supplied with this product, a signed end-user declaration must be provided together with an order/ purchase.

INTENDED USE: Please specify details of intended use of the chemical product.

Is the area where this is stored locked and secure? ☐ **YES** ☐ **NO**

or

☐ **NONE** of the above are applicable to the hazardous chemicals being purchased.

Declaration			
I certify that I have obtained and read the Chemical/Product Safety Data Sheet and confirm that the Chemical/Product will be used for the identified legitimate purpose and any remaining chemicals will be disposed of in an agreed too , documented and responsible way.			
Name:			
Signature:		**Date:**	
Approval of Laboratory Supervisor (or Laboratory Manager where applicable)			
Name:			
Signature:		**Date:**	

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