



*AIMS: Australia's tropical marine research agency.*

# **LABORATORY SAFETY INDUCTION MANUAL**

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## **INSTRUCTIONS**

Induction begins with the viewing of the Laboratory OH&S Induction Film. At the end of the film you are directed to this manual, which you must read and then complete the attached questionnaire.

The HSE Coordinator is automatically notified when these steps are completed and then signs off on your induction on AIMSCAPE, the AIMS Intranet. As you are asked to complete more tasks at AIMS your supervisor may require you to complete other lab-related inductions and safety training. This is all part of the ongoing responsibility AIMS has to achieve a safe workplace.

## **INTRODUCTION**

The sections are arranged so that they begin with a summary statement, this is then explained and a contact is given for further information if appropriate. The induction has a goal of raising awareness of safety as an important part of your work at AIMS and we expect that you have this knowledge before you begin at any of our workplaces.

This Induction Manual will also be available on AIMSCAPE, for your future reference.

## DEFINING SAFETY TERMINOLOGY

- Safety** implies security and protection, the absence of danger
- Hazard** that which may cause harm / loss
- Risk** likelihood of occurrence, exposure to risk and other factors such as the preventative maintenance schedule, competence of the operators and safety training

A Hazard Rating is the product of the severity of the hazard and the likelihood of the risk. By combining the two we may compare hazards and thus prioritise hazards at AIMS

It is vital that once we complete a hazard assessment that we keep the control measures under review so that their effectiveness may be known and changed as necessary. Your supervisor/lab manager will help with an introduction to hazard assessments at AIMS

## SAFETY LEGISLATION

***Duties of the Employer may be summed up as: Safe Person, Safe Place, Safe Plant, Safe Access / Egress.***

***Duties of the Employee may be summed up as: Co-operate with Employer, Report defects in equipment, Do not endanger others, Use Personal Protective Equipment as instructed.***

Hazardous Substances are the most prevalent hazard in a Laboratory. Associated duties include:

- Ensure MSDS are available, see Chemwatch at AIMSCAPE;
- provide for labelling of all containers, labels are available on Chemwatch;
- make available a Register of Hazardous Substances for chemicals used in your area of responsibility;
- train all staff in the risk assessments of hazardous substances;
- instruction and training on the control measures to be adopted;
- health surveillance (if required) often collectively known as Occupational Hygiene;
- record keeping of all the above to kept locally and notified to the responsible supervisor or manager.

## RISK MANAGEMENT CYCLE

**Task / Project Specific Hazard Assessment** – Supervisors are responsible for ensuring safety of their workers (Line Management).

Safety relies on Hazard Identification, Risk Assessment, implementing Control Measures and reviewing the effectiveness of the controls to ensure Continuous Improvement.

Incidents often occur because the controls, which were noted in procedures, were not in place thus not implemented. The AIMS approach is that ongoing safety depends on regular assurance that these controls are working as intended.

## INCIDENT REPORTING

***All accidents, incidents or near misses must be reported.***

An incident report form (filled out with your supervisor) must be used to report all such incidents. This form can be found on the OHS&E section of AIMSCAPE.

## GENERAL LAB SAFETY RULES

- ❑ Entrance to a Lab (often designated by red / orange flooring) is prohibited unless inducted or, for ad hoc visits, by escort under the supervision of an inducted person
- ❑ Wear suitable PPE whenever working in a lab. The minimum standards may be at the direction of a Lab Supervisor / Manager or dependant on the minimum requirements particular to an area. PPE must be considered during the risk assessment which includes reference to the relevant MSDS
- ❑ Only fully enclosed footwear shall be worn in a lab (sandals, thongs, crocks etc prohibited)
- ❑ Food, drink and chewing gum are forbidden in laboratories.
- ❑ Smoking is strictly prohibited
- ❑ Long hair should be tied back
- ❑ Do not store or prepare foodstuffs or drinks in lab fridges/freezers
- ❑ Keep all workspaces clean and tidy
- ❑ Ensure that all hazards are clearly signed
- ❑ Hazardous work should be restricted to core time (0800 -1640hrs) and only with another member of staff being present and aware of the hazards
- ❑ Report all incidents
- ❑ Consult with Lab Manager/HSE Coordinator
- ❑ Always use an Experiment in Progress Form if leaving an experiment unattended
- ❑ Always ensure that heat sources are turned off after use
- ❑ Do not keep more than one days supply of flammables at the bench
- ❑ Securely store highly toxic materials
- ❑ Do not leave any bottles unlabelled
- ❑ Look after your own chemical waste
- ❑ Do not run waste materials down the sink
- ❑ Store all materials in accordance with the instructions contained within their MSDS
- ❑ Ensure that easy access to MSDS is available at all times
- ❑ Safety carriers must be used to transport large bottles
- ❑ Do not use any piece of equipment for which you have not received training
- ❑ Do not attempt to repair any defect in equipment or machinery yourself
- ❑ Report any defects in machinery or equipment immediately to the lab supervisor. Use a 'Caution Out of Order' tag if appropriate

## HOUSEKEEPING

***25% of all accidents are caused by slips, trips and falls.***

Laboratory floor space is to be kept clear. This includes storerooms. Access to eyewash stations and safety showers must be kept clear.

Hazardous areas must be clearly signed e.g. Biohazard, Safety Spectacles Area etc.

In accordance with the regulations for labelling hazardous substances, all chemical containers must be clearly labelled indicating contents, person's name or project, risk and safety phrases.

## SAFETY TRAINING

There are mandatory rules in some labs. Work in these labs cannot commence until the appropriate training has been successfully undertaken.

The Institute can provide or facilitate training in the following areas:

1. Manual Handling
2. Fire Fighting
3. First Aid
4. Radiation Safety
5. Chemical Handling/Disposal Procedures

Be aware that risk assessments for projects may identify that training be sought in other procedures. Risk assessments thus become part of the planning process for how we intend to work.

## MATERIAL SAFETY DATA SHEETS

***Material Safety Data Sheets are our basic reference for handling all hazardous and dangerous substances.***

When using a hazardous chemical it is the users' obligation to be aware of the applicable MSDS, particularly with respect to handling, storage, disposal and required PPE. Always follow the guidance provided.

AIMS provides an on-line MSDS database, manifest and labelling system using Chemwatch, a program available on our internal Intranet AIMSCAPE. The MSDS provides the following information:

1. Identification of substance / preparation / company
2. Composition / information on ingredients.
3. Hazard identification.
4. First Aid Measures.
5. Fire Fighting Measures.
6. Accidental Release Measures.
7. Handling and Storage.
8. Exposure controls / personal protection.
9. Physical and Chemical Properties.
10. Stability and Reactivity.
11. Toxicology Information.
12. Ecological Information.
13. Disposal Considerations.
14. Transport Information.
15. Regulatory Information.

## COMMON TERMS USED IN MSDS

**Asphyxiant** - A substance that can cause unconsciousness or death by suffocation is an extreme hazard when working in enclosed spaces. e.g. Carbon Monoxide gas

**Chronic Health Effect** - An adverse health effect resulting from long-term, (i.e. months or years) exposure to a substance. An example would be liver cancer from inhaling low levels of benzene over several years. The term is also applied to a persistent (months, years or permanent) adverse health effect resulting from a short-term exposure.

**Acute Health Effect** - The adverse effects resulting from a single or short term exposure to a substance, e.g. headaches from inhaling solvents.

**Explosive Limits** - Applies generally to vapours and are defined as the concentration range in which a flammable substance can produce a fire or explosion when an ignition source (such as a spark or open flame) is present. There are upper and lower explosive limits (UEL and LEL). Any concentration between the upper and lower limits can ignite, e.g. methane flammability limits are 5%-15%, Ammonia 15%-28%.

**Flash point** - This is the lowest temperature at which a liquid can form an ignitable mixture in air near the surface of the liquid. The lower the flash point, the easier it is to ignite the material. For example, petrol has a flash point of -40 °C

**Flammable liquids** – Liquids that produce vapour that can be ignited in air on contact with a suitable ignition source (flash point < 60.5°C)

Note: - The older term, inflammable is identical in meaning to flammable. To avoid confusion, only use the term flammable. Something that is not flammable is called non-flammable

**Boiling Point** - The temperature at which a liquid changes to a gas at normal atmospheric pressure

**Relative Vapour Density** - The relative density of a vapour relative to air. If <1 vapour will rise, if >1 vapour will collect on floors. Important in using gases and solvents.

Refer to the following web site for a full glossary of terms: <http://www.ilpi.com/msds/ref/index.html>

## RISK AND SAFETY PHRASES

The risk phrases and combination risk phrases are those adopted by the European Communities in EC Council Directive 67/548/EC3 to describe health effects and they apply to Australia. These phrases are used in conjunction with the Hazardous Classification and there are 64 e.g. R25: Toxic if swallowed. Safety Phrases, there are 62 e.g. S24: Avoid contact with skin.

More than one phrase may be combined. e.g. S3: Keep in a cool place, S9: Keep in a well ventilated place. S3/9: Keep in a cool well ventilated place. e.g. Methylene chloride Xn-R40-S2/S23/S24-25/S3-37 Harmful-possible risk of irreversible effects-keep out of the reach of children-do not breath vapour-avoid contact with skin and eyes-wear suitable protective clothing and gloves.

## CLASSIFICATION OF HAZARDOUS SUBSTANCES

Classification will be detailed within the MSDS. There are 15 different classification groups:

1. Explosive (E) May explode if subjected to heat, shock, friction or any ignition source, e.g. Nitro-glycerine (formula)
2. Oxidising (O) Contain readily available easily released oxygen, e.g. Peroxides such as ether
3. Extremely Flammable (F++) Liquids that are flammable on contact with air at ambient temperature and pressure, e.g. Hydrogen H
4. Highly Flammable (F+) Substances which become hot and catch fire on contact with air at ambient temperature or solid substances which burn easily after a brief contact with an ignition source, e.g. dimethylcarconate.
5. Flammable (F) Liquid substances having a low flash point.
6. Very Toxic (T+) Can cause death or serious damage to health when inhaled, ingested or absorbed through skin in very low quantities, e.g. fluoroacetic acid.
7. Toxic (T) Substance has capacity to produce acute damage to an organism.
8. Harmful (Xn) A substance determined to be hazardous according to APPROVED CRITERIA FOR CLASSIFYING HAZARDOUS SUBSTANCES [NOHSC:1008(1999)]
9. Corrosive (C) May destroy living tissues on contact, e.g. H<sub>2</sub>SO<sub>4</sub>.

10. Irritant (Xi) Non corrosive substances that may damage mucous membrane through contact with mucous membranes, e.g. Valinamide .
11. Sensitisers (Sen) Capable of producing an allergic reaction such that further exposure can have serious health effects, e.g. formalin.
12. Carcinogenic Category 1. Known human carcinogen, e.g. benzene. Category 2. Suspected Human Ca based on animal studies should be regarded as carcinogenic to man, e.g. beryllium. Category 3. Substances causing concern because of possible carcinogenic effects.
13. Mutagenic. May produce heritable defects or increase their incidence if inhaled, absorbed or ingested. Same categorisation as carcinogens, e.g. Acrylamide.
14. Toxic for Reproduction. May increase the chance of non-heritable adverse affects in children.
15. Dangerous to the Environment may cause damage to flora and fauna as well as air, water and soil.

## OCCUPATIONAL EXPOSURE LIMITS (OEL)

***An occupational exposure limit is the maximum concentration of an airborne contaminant a person may be safely exposed to in a given period.***

These are based on the concentrations at which it is calculated that the majority of the population will have no adverse health reactions. These are detailed in the MSDS. Limits are set at 8 hour exposure limits (TWA) and 15 minute exposure limits (STEL). Often high levels of a chemical will paralyse peripheral nerve sensation, thus making it difficult to detect the presence of the contaminant, e.g. NH<sup>3</sup>. If there is potential to be exposed to levels above the TWA (as referred to in the MSDS) additional exposure controls must be implemented including the use of fume cabinets and / or respirators.

To reduce exposure to chemicals which give off noxious vapours (e.g. solvents) these should be used inside a fume cabinet.

Reduction of exposure to chemicals can be avoided by:

- always working in a well-vented fume cabinet with the door sash lowered as far as practicable;
- avoid the creation of airborne particles outside of a fume hood;
- ensure that the fume cabinet service tag is dated to within the last 6 months. Otherwise inform the Facilities Manager, Andrew Blair ext: 4435; and
- by referring to MSDS

The use of hydrofluoric acid and cyanides should be avoided where possible. Their substitution with less toxic reagents should be investigated as a priority and their use is not advised. If such chemicals are used, appropriate emergency response facilities need to be readily available (eg calcium gluconate gel for hydrofluoric acid).

Different exposure limits may apply to pregnant or breastfeeding women. Please discuss with your supervisor if there is a need to change your activities.

## WORKING ALONE OR LONE WORK

***Working alone during out-of-hours periods is not recommended.***

To reduce risk when working alone, avoid laboratory work where possible. If this is not practical then only low risk processes should be carried out. The potential risk from each process should be examined by means of a hazard assessment.

The risk assessment should be carried out in conjunction with your supervisor and written permission received from you supervisor before working alone in a lab after hours.

When in the building during after-hours periods always sign the out of hours register at the building entrance.

If you need to leave the building inform Security by signing out of the register at the main entrance when entering and leaving the building.

## PERSONAL PROTECTIVE EQUIPMENT

***Wear PPE at all times.***

***Ask for training if you have not used an item of PPE before***

Wear suitable PPE whenever working in a lab. The minimum standards may be at the direction of a Lab Supervisors / Manager or dependant on the minimum requirements particular to an area. PPE must be considered during the risk assessment which includes reference to the relevant MSDS.

Only fully enclosed footwear shall be worn in a lab (sandals, thongs, crocks etc prohibited).

Use of PPE is the responsibility of the individual (duties of employees). A guide to the personal protective equipment required should be available from the MSDSs and associated risk assessments.

Laboratory coats and/or other appropriate protection must be worn by all staff whilst working with any hazardous substances in all areas (e.g. laboratories, workshops, shops) - consult the MSDS and risk assessment.

A variety of safety wear such as spectacles and gloves are available from stores and must be worn at any time a biological, chemical or physical hazard exists.

All PPE must be worn in accordance with manufactures specifications.

## EYE PROTECTION

Safety glasses must be worn at all times in the laboratory if identified during the risk assessment process, and must have integral side protection devices (available from stores). Standard prescription glasses are not suitable as safety glasses.

If you wear prescription glasses then they must be covered with over-glasses, alternately prescription safety glasses should be purchased at your own expense.

When working with exposed UV light sources, appropriate safety glasses must be worn with UV protection lenses.

Check your safety glasses every day, if they are damaged have them replaced.

## LABORATORY COATS

Lab coats should be laundered on a regular basis and at least monthly.

## GLOVES

Gloves must be worn when handling hazardous chemicals including lab chemicals. The selection of the appropriate glove is specified in the MSDS. These are available from stores.

Approximately 20% of people are allergic to standard latex gloves. Others will develop sensitivity to the powder on any glove type. If you develop a skin rash or irritations stop using them at once.

The useful websites and links section at the end of this manual contains a link to a database that provides information on the chemical compatibilities, permeation times etc for various brands and types of lab gloves.

## CHEMICAL PURCHASES

***Consider use, amount, storage and disposal before you buy a chemical substance. Substitute for less hazardous materials if possible.***

You must ensure that all purchased chemicals are provided with a current material safety data sheet (Chemwatch) and are easily accessible to users.

## CHEMICAL STORAGE AND COMPATIBILITY

***Chemicals must always be stored under the conditions recommended by their MSDS.***

Take note of such things as incompatible chemicals, temperature restraints, flammability, toxicity, etc. Highly toxic materials should always be locked away securely.

Materials with a low flash point should always be risk assessed before finding the appropriate store area.

Flammables should always be stored in a flammables cabinet, with only the minimum amounts removed for use at the bench.

Refer to the Australian Dangerous Goods Code Part 9 on Segregation which can be found on AIMSCAPE.

## CHEMICAL SPILLS

General laboratory spill kits are available for use at Safety Stations situated around the AIMS facility. These kits are suitable for spills up to 2 ½ litres. Specialist kits (e.g. specific to acids, caustics etc) may also be available. Ask your laboratory supervisor about these kits.

Always follow the instructions as detailed on the general laboratory spill kits and ensure used items are replaced immediately. Please contact the HSE Coordinator for replacements.

## FLAMMABLE SOLVENTS

Organics must never be used / stored near oxidising compounds e.g. perchloric acid, peroxide. Solvents must never be used in laboratories where naked flames are in use. Flammable solvents should be kept in small quantities with excess returned to a flammable liquids cupboard. Eg 10 ml of ether vaporising in a refrigerator at 10 °C ignited by a spark from a thermostatic control switch has an explosive force equivalent to five sticks of dynamite. On-line vacuum systems must have solvent traps for flammable vapours.

## FUME CABINET

***When using a fume hood keep the sash as low down as possible.***

If a sash is left open the efficiency of the air extract decreases and noxious fumes may escape from the cupboard. When working at a fume hood keep the amount of equipment within the hood to a minimum in order to minimise any disruptive effect on the air flow.

Do not use fume hoods as ventilated storage cabinets.

If equipment must be held in the hood while working keep it to the rear of the cabinet to remove it from the extract air flow.

Do not use a standard fume hood for work involving perchlorates or potentially explosive materials unless it has been designed for these uses. There will be sign on the cabinet to this effect.

Do not use a fume hood for work with microorganisms unless specifically designed for this purpose (i.e. within the PC2 lab).

Minimise the amount of arm movement within the hood.

Upon completion of the work close the sash and leave the fans running for a period of time to ensure that the hood is fully evacuated of any residual chemical. Leave fume cabinets ON if they are ventilating chemical storage cabinets.

Avoid the use of loose, light items (e.g. paper tissues, pieces of cling wrap) in fume cabinets – they may get picked up by the airflow and block the exhaust system.

Avoid the use of bunsen burner in fume hoods unless properly risk assessed and determined safe.

If significant amounts of flammables are being used or the release of large amounts of flammable vapour is expected, ensure that the materials within the hood are flame proof and that a fire extinguisher or fire blanket is nearby. Our cabinets also have a 'Fan Boost' button that increases airflow for 10 minutes.

Always use an 'Unattended Experiment Form' if leaving a hood unattended. Always use a fume cabinet, NOT a pull-down extractor hood, for operations with very hazardous chemicals e.g. acrylamide.

Do not use a fume hood for writing up your work. Workstation space is provided.

## WASTE CHEMICAL DISPOSAL

***Clean up procedures for chemicals should be known before a spill occurs.***

***Each laboratory will need to have site specific kits available.***

***Do not allow waste to build up, dispose of your waste on a regular basis and do not wait until the end of your research!***

To reduce waste always order in minimum amounts of chemicals. Cheap bulk purchase prices equal expensive disposal costs, so the initial economy is lost. Clearly label waste containers with the contents, the date of filling, the lab number and your name, using a permanent label and ink.

Waste disposal containers must be suitable for the waste liquid being stored in it. Refer to MSDS. Use the same waste container for the same types of waste, e.g. keep all mercury contaminated waste separate to other waste, always separate chlorinated solvents from non-chlorinated solvents where possible, water-based from non-water-based, polar solvents from non polar-solvents, methanol from ethanol, hexane, methylene chloride.

Waste solvents are still flammable, store under the same regulations for its pure form.

Certain chemicals can be disposed of within the AIMS facility at Cape Ferguson. Evaporation is conducted in the chemical waste management shed. This procedure applies to only volatile non-chlorinated solvents (e.g. acetone, ethanol). Staff members who use this facility must read the procedural risk assessment and complete a procedural checklist before disposing of waste. A log of chemical disposals is kept in the Research Managers office.

## EQUIPMENT SAFETY

***Do not use any piece of laboratory equipment unless you have received instructions in how to use it and are confident that you are fully aware of all of the potential hazards.***

Supervisors/sponsors are responsible for ensuring users have received appropriate training and induction prior to authorising the use of specialist equipment.

Plastic or rubber tubing bringing cooling water to rotary evaporators, solvent stills and other semi-permanent systems should be fastened onto the apparatus and water taps with wire, plastic tags or screw clips. The exit tube must pass the water down a drain that is able to cope with the flow, and be anchored to prevent ejection of water if flow rate or water pressure rises.

Supervisors/sponsors are responsible for making sure their charges know how to use equipment.

Be aware of the hazards posed by the super conducting magnets used in Biomolecular Analysis Facility. Those wearing pacemakers should be especially careful. The hazard is most easily controlled by always seeking permission before entering the area and not bringing any visitors into the area with being supervised by the staff working with the NMR.

## ELECTRICAL SAFETY

***Only certified electricians may perform electrical work of permanently wired AC powered equipment.***

***Only persons authorised in writing, or a certificated electrician, may perform electrical work on portable AC powered equipment (e.g. changing fuses and bulbs).***

***All AC powered equipment/setups of experimental systems involving wet or potentially wet spaces must be checked and approved before operation.***

***Any electrical defects must be reported to an electrician and your supervisor immediately.***

Why is it so important to work safely with or near electricity?

The electrical current at AIMS has enough power to cause death by electrocution. Even changing a light bulb without isolating the light socket can be hazardous; coming in contact with the "hot" or live part of the socket can cause serious injury or could even kill a person.

Electricity is an energy source that will take the path with least resistance to earth to complete its circuit.

The human body is a great conductor of electricity and if you are in contact with an energized wire or any energized electrical component, and also with any grounded (earthed) object, you will receive a shock!

Electric Shock disturbs the electrical heart rhythm, delayed cardiac arrest can happen sometime after the shock has occurred. All shocks, 'twinges', 'boots', 'static' etc... must be reported to your supervisor, no matter how minor.

Persons who have received an electrical shock will be transported to a medical facility for monitoring.

### General Electrical Safety

Always be aware of your surroundings / underground electrical cables / overhead electrical cables. Electricity and water does not mix.

Approval must be sought prior to performing any electrical work on portable AC powered electrical equipment, including the changing of light bulbs and fuses. This is to ensure that the individual has a safe work method and is competent to perform the work safely. An AIMS Electrical Work Exemption Form is available on the Electrical safety Page on AIMscape. For those seeking dispensation, the form must be completed with the inclusion a safe work method or risk assessment.

Similarly, approval must be sought when setting up or modifying experiment set-ups in high-risk work areas (e.g. wet, salty areas). Consideration must be given to the safe location of electrical equipment, test and tagging, equipment condition; the risk of electrical items falling into the water, cords plugs etc. An "*Experimental Electrical Set Up Checklist*" has been developed to assist users in setting up equipment prior to assessment. This form must be completed and signed off by an authorised person when an experiment begins or the set-up changes. The "*Experimental Electrical Set Up Checklist*" is located on AIMscape, Health & Safety tab / electrical safety page.

All electrical installations must be protected by an Electrical Safety Switch; portable electrical equipment must have a Residual Current Detector (RCD) in place.

Prevent overloading power outlets and power boards ensure power boards / cords are suitably rated for the current draw.

Do not tamper with the internal switches or terminals of electrical equipment.

Unplug / turn off all electrical equipment while

Changing attachments

Making adjustment

Carrying out maintenance and servicing and

When the equipment is not in use

All Electrical equipment must be inspected prior to use,

ensure an in date "Test Tag" is attached to the equipment and or electrical lead.

ensure the equipment is in good condition

Things to look for,

cracked or split casings,

frayed cords , exposed electrical components

bent or missing plug pins

cracks in the plug

loose or missing casing screws

splits or damage to the power cable insulation

exposed wires

loose connection between the power cable and the tool

If any of the above are found the equipment must not be used and an "Out Of Service "tag must be attached to the equipment.

Only conduct electrical work if you are qualified or authorised to do so

At AIMS Electrical work **does** include:

connecting electricity supply wiring to electrical equipment or disconnecting electricity supply wiring from electrical equipment

installing, removing, adding, testing, replacing, repairing, altering or maintaining electrical equipment or an electrical installation

replacing electrical equipment or a component of electrical equipment (components that form part of a circuit)

replacing light bulbs, fluoro tubes, fuses, etc

At AIMS Electrical work does **not** include:

work that involves connecting electrical equipment to an electricity supply by means of a flexible cord plug and socket outlet (eg plugging a power drill into a power point)

work on a non-electrical component of electrical equipment if the person carrying out the work is not exposed to an electrical risk e.g. filter replacement on water purifying units, changing photocopier toner cartridges.

If you believe that you have a valid reason why you may be exempt from the above defined electrical work and wish for an assessment of the task (including individual competence requirements), then please complete the AIMS Electrical Work Exemption Form

The AIMS Electrical Work Exemption form is available on AimScape under the HSE / Electrical Safety Tab

The form is also available from

Dominique Wiseman ext 4481

Paul O'Regan ext 4319

John Chappell ext 4211

Additionally, all electrical equipment, plant and electrical leads must be used in a safe manner so they do not impede or endanger the safety of workmates or yourself.

## GLASSWARE

***Check all glassware for cracks before use.***

Always check the integrity of glassware - an evacuated glass flask should be coated with adhesive tape in case of implosion and do not heat borosilicate glassware 1L and beyond 450 °C. Examine all glassware carefully for any cracks or damage before use. Only suitable glassware may be placed under a vacuum. When glassware under vacuum breaks, the implosion may spray glass pieces anywhere. Glassware under high pressure should only be used with total containment.

Cleaning and storage - glassware for washing must be rinsed with water before being placed in washing baths, avoid storing glassware above eye level, do not store caustic solutions in glass stoppered containers and heavy or awkward items should not be stored above eye level.

Disposal - dispose of chipped, cracked or broken glassware into waste bins labelled "glass only" (usually blue). Glass blowing by staff is not permitted. It is to be done only by qualified trade persons. Smaller objects can be placed in sharps containers (usually yellow). Do not put glass in a general usage bin.

## SHARPS

All metal sharps such as syringe needles and blades MUST be disposed of properly into a proper Sharps Container (usually yellow). A variety of these containers of different sizes are available through AIMS stores. If a needle stick injury occurs, wash the injury site with soap and water, immediately contact your supervisor and the applicable Lab supervisor.

## LASER SAFETY

***Do not use lasers without full training.***

Use the lowest output possible. Use totally shielded systems (class 4) where possible. Where required, strictly restrict access to areas of use and install appropriate signage in accordance with Australian Standards. Wear suitable eye protection. Remove all reflective materials from area, e.g. wrist watches. Where practicable, ensure that all beams are operated at a height well below eye level.

## CENTRIFUGE SAFETY

***Never use a centrifuge before you have received instruction in its use.***

Keep a log of all ultra-centrifuge use. Before use, examine the rotor and seals for damage or build up of material. Never over fill centrifuge tubes. Do not exceed maximum rotor speed. Ensure that rotor is correctly balanced. Samples must be positioned correctly and ensure that rotor is properly attached to spindle and will not dislodge during spin (refer to Safe Operating Procedure if in any doubt). Check that tube material is compatible with contents. Never try to open the centrifuge lid when the rotor is still in motion. Only authorised persons may affect repairs to a centrifuge.

## CARCINOGENS

All containers holding carcinogens must be clearly labelled "CARCINOGEN". Note that the Hazardous Substances Regulations and Codes of Practice apply.

Carcinogens are a special group of Hazardous Substances which have a higher level of regulations and requirements as noted in the National Code of Practice for the Control of Workplace Hazardous Substances, Part 2: Scheduled Carcinogenic Substances, NOHSC:2014 (1995)

You'll need to check this out with your supervisor and/or Lab Manager before using any known or suspected carcinogen.

## CRYOGENIC SAFETY

***Liquid Helium, Nitrogen etc can cause severe cold burns and frostbite. Asphyxiation is the greatest danger associated with nitrogen and other inert gases since they do not support life and are capable of reducing oxygen concentration to very low levels through displacement and dilution. Always take extreme care when handling these materials and refer to your supervisor for training.***

When handling or pouring cryogenic liquids suitable gloves, protective clothing and fully enclosed footwear must be worn.

Ensure that the bung of a cryogenic liquid dewar ALWAYS fits loosely in the neck of the dewar – escape of gas from a dewar must NEVER be blocked as dewars don't have safety valves.

Never travel in a lift with containers of cryogenic liquids

## COMPRESSED GAS SAFETY

### *Use fittings specifically for the gas being used*

AIMS has approximately 120 cylinders at any one time. It is one of our major hazards and we expect that you will only use high-quality fittings on this equipment and keep them serviced to prevent them eroding and possibly failing.

A few basic points to note are:

- never use grease or oils on gas connections;
- all gas cylinders must be secured upright;
- all gas cylinders are to be turned off at main valve when not in use;
- cylinders of highly flammable or toxic gas are not to be stored in laboratories (unless being used);
- use gas specific regulators and always check for leaks after connecting a regulator to a cylinder;
- check with supplier for the cylinder/regulator compatibility;
- do not use excessive force on joins or threads, hand tighten only;
- open gas valves slowly and always wear safety spectacles;
- long gas lines are to be labelled or coded;
- never store corrosive substances near gas cylinders.
- never use compressed gases without being trained in their handling:
- understand cylinder safety, ask the HSE Co-ordinator;
- always ensure that the regulator in use is suitable for that particular gas and for the contained pressure within the cylinder;
- ensure that the gas tubing is in good condition and is suitable for the gas, e.g. never use natural rubber tubing with oxygen;
- never lay cylinders on their side;
- when using gases that are flammable, remove potential sources of ignition from the lab where possible;
- always transport cylinders in a cylinder trolley equipped with straps for securing cylinder in place and check condition of the trolley before use;
- be aware of the potential manual handling issues when moving cylinders;
- ensure that cylinders are securely fastened, at 2/3 their height, to the bench or wall;
- make sure you are aware of the valve thread direction to avoid damaging regulators, e.g., Oxygen right hand thread and Hydrogen left hand thread;
- never travel in a lift with a cylinder; never use lubricants or teflon/plumber's tape on cylinder valves and regulators.

## USE OF RADIOISOTOPES

***You must consult with the Radiation Safety Officer (RSO) prior to considering any work involving radioisotopes. Only persons who have completed an accredited radiation safety course are allowed to handle or use radioisotopes. Radiation user accreditation must be renewed every 5 years.***

Once appropriate radiation safety training has been undertaken, a risk assessment and standard operating procedures must be completed, then approved by your supervisor and the RSO. Templates for the risk assessment and standard operating procedure can be obtained from the RSO. The risk assessment and standard operating procedure will detail the nature of the experiment, type of radioactive source, storage conditions, safety aspects including personal protection, spill and contamination control and ultimate disposal routes of the radioactive material.

Any work with radioisotopes must be performed in designated areas. Ordering of radioactive material must be approved by the RSO. Any radioactive waste generated must be packaged appropriately. The RSO can provide advice for suitable packaging of radioactive waste.

Storage of radioactive waste must also be approved by the RSO.

## FREEZER-ROOM / COLD-ROOM SAFETY

Don't work for in a freezer-room (and some cold-rooms) without telling somebody where you are. Remember to dress according to the intended length of exposure to avoid hypothermia. Your extremities will quickly lose feeling in cold environments and so you must have trousers and gloves on when working in these areas.

## SHIPBOARD LABORATORY SAFETY

***At sea, all laboratory rules are the same as on land. The rolling of a ship increases the risk of inadvertent spills and as such only use small amounts of chemicals and be prepared for spills.***

All gas cylinders must be secured (e.g. cylinder clamps and straps).

Chemicals generating toxic or flammable fumes are not be used in shipboard laboratories without the approval of the Vessel Master. Such chemicals shall be specified in the LogReq (refer Field Safety Procedure).

It is the responsibility of the Cruise Leader to inform the Vessel Master of highly toxic or flammable substances on board, before the cruise departure date, and ensure compliance to Department of Transport Regulations.

The Cruise Leader is responsible for administering AIMS laboratory safety policy onboard ship laboratories in cooperation with the Vessel Master.

The Vessel Master should inform the Cruise Leader of impending weather changes which could create a laboratory hazard.

Hazardous chemicals are not to be disposed down laboratory sinks without the approval of the Vessel Master.

## REFERENCES

AS 2243 SAFETY IN LABORATORIES

### ***Other useful Australian Standards***

AS 2982 LABORATORY CONSTRUCTION

AS 1216 CLASSIFICATION, HAZARD IDENTIFICATION AND INFORMATION SYSTEMS FOR DANGEROUS GOODS

AS 1715 SELECTION, USE AND MAINTENANCE OF RESPIRATORY PROTECTIVE DEVICES

AS 1716 RESPIRATORY PROTECTIVE DEVICES

AS 1940 SAA FLAMMABLE AND COMBUSTIBLE LIQUIDS CODE

AS 2830 GOOD LABORATORY PRACTICES Part 1 Chemical Analysis

AS 2031 SELECTION OF CONTAINERS AND PRESERVATION OF WATER SAMPLES FOR  
CHEMICAL AND MICROBIOLOGICAL ANALYSIS Part 1 Chemical Part 2 Microbiological

**Compressed gases safety**

AS 4267-1995	Pressure regulators for use with industrial compressed gas cylinders
AS 4267-1995/Amdt 1-1995	Pressure regulators for use with industrial compressed gas cylinders
AS 4267-1995/Amdt 2-1998	Pressure regulators for use with industrial compressed gas cylinders
AS 4484-1997	Industrial, medical and refrigerant compressed gas cylinder identification
AS 4484-1997/Amdt 1-1997	Industrial, medical and refrigerant compressed gas cylinder identification
AS 4484-1997/Amdt 2-1998	Industrial, medical and refrigerant compressed gas cylinder identification
AS 4603-1999	Flashback arresters -Safety devices for use with fuel gases and oxygen or compressed air
AS 4706-2001	Pressure gauges for regulators used with compressed gas cylinders
AS 4840-2001	Low pressure regulators for use in industrial compressed gas reticulation systems

## USEFUL WEBSITES AND LINKS

<http://toxnet.nlm.nih.gov/>

<http://hsis.ascc.gov.au/>

[http://www.uq.edu.au/hupp/index.html?page=25068&pid=25015##schedule\\_9](http://www.uq.edu.au/hupp/index.html?page=25068&pid=25015##schedule_9)

<http://www.uq.edu.au/ohs/pdfs/schpoisonsdrugs.pdf>

<http://www.cdc.gov/niosh/npg/npgsyn-a.html>

<http://www.aiha.org/Content>

[http://www.safeworkaustralia.gov.au/NR/rdonlyres/317D25BA-E837-4F5B-AC65-24FE588888CA/0/ExposureStandards4AtmosphericContaminants\\_Nov06version.pdf](http://www.safeworkaustralia.gov.au/NR/rdonlyres/317D25BA-E837-4F5B-AC65-24FE588888CA/0/ExposureStandards4AtmosphericContaminants_Nov06version.pdf)

<http://www.safeworkaustralia.gov.au/NR/rdonlyres/C5FA8374-318E-49AC-A1FB-5E75BEE5868C/0/GuidanceNoteontheInterpretationofExposureStandardsforAtmosphericContaminant sintheOccupa.pdf>

<http://www.safeworkaustralia.gov.au/NR/rdonlyres/648DBF24-97B6-4494-B3E5-93BCEB5F6EB8/0/AtmosphericContaminants.pdf>

<http://www.coleparmer.com/TechInfo/GloveChemComp.asp>