

Lecture Demonstrations – Safety Manual & New Staff Induction

Overview

The lecture demonstrations team provides and maintains demonstrations to lectures, tutorials and outreach. Demonstrations and equipment are kept in several storage rooms in A28 and transported across different floors and buildings at the Camperdown Campus.

The main hazards that are present in lecture demonstrations have been identified and reduced to their lowest practicable level via the risk management process. This information has been recorded in [Riskware](#) and is reviewed on an annual basis or as risks change. Despite this process, there always remains a risk of injury from workplace hazards to staff, students and visitors. The goal of this induction is to help reduce these risks by providing appropriate training and information to lecture demonstrations staff before they commence work.

Hazards

Hazards	Risk Assessment Reference Number ¹ (Riskware)
Manual Handling	39
UV Radiation	42
Ionising Radiation	47
Liquefied Gases	43
Compressed Gases	45
Noise	46
Lasers	44
Electrical (Demonstrations)	48
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Machinery Use	51
Working After Hours	N/A

¹ This is not a “risk score” but a reference number. When you log into Riskware look up the relevant risk assessment number to see further details.

Safety Information

Manual Handling

Large amounts of equipment are moved between storage rooms and lecture theaters both between floors and across different buildings. To minimize the risk of personal injury, demonstration staff should:

- Never lift, push or pull objects that you feel uncomfortable moving. If in doubt always ask for help. As a general guide, the Manual Handling Code of Practice 1990 suggests:
 - In seated work, it is not advisable to lift loads in excess of 4.5kgs
 - Risk of injury increases significantly when weights between 16kgs and 55kgs are being handled
 - No person should be required to handle weights over 55 kgs without mechanical aids or team lifting.
- Use the lift and trolleys to transport large or heavy pieces of equipment. Trolleys are located in 411 or in the mechanical workshop.
- Always use gloves when transporting sharp objects. Gloves are located in 410F20
- Use ladders to access objects located above shoulder height. Ladders are located in each prep-room and the mechanical workshop.

UV Radiation

Some of the mercury light sources used in lecture demonstrations emit ultraviolet light (UVC) that can be harmful to the eyesight and skin. All harmful UV light sources have “UV” stickers attached to them and lecture demonstrations that utilize UV light sources have safe operating procedures in the lecture demonstrations catalogue.

- Show the staff member where the UV producing light sources are stored.
- Show the staff member the safe operating procedures in the lecture demonstrations catalogue
- Lab-coats, gloves and safety glasses or other appropriate eye/skin protection such as UV protective glasses or a UV protective face shield must be worn when working with UV light sources.
- In order to minimize the risk of exposure to lecturers and students, follow the safe operating procedure for setting up the photoelectric effect or any other experiments that utilize UV light sources in lectures (see the lecdem catalogue).

Ionising Radiation

Low activity radioactive sources are used in lecture demonstrations. The activity of these sources is equal to standard smoke alarm sources, which are not harmful and have been approved by government bodies. The sources are such low activity that they do not need licensing and can be shipped in the post. Thus they pose no health threat but the following precautions should be followed to minimise exposure and prevent theft:

- Show the staff member where the sources are stored
- Sources must be removed from the lecture theatre immediately after the lecture
- Sources are to be stored and transported in their lead containers.
- If you setup a demonstration that involves radioactive sources and will not be present for packing up the demonstration, make sure you organise someone else to remove the sources.

Liquefied Gasses

Liquid nitrogen containers are filled at the Chemistry building and stored in the lecture demonstration preparation rooms before use in lectures. Liquid oxygen is produced on site and used immediately. The main hazards associated with liquefied gases involve asphyxiation, cold burns and explosion with liquid oxygen.

- Safety glasses and loose fitting gloves must be worn when handling liquid nitrogen containers. Safety glasses and gloves are located in 410F20
- Use only insulated containers (eg. Specialized dewars or Thermos flask) for transport and storage of liquid nitrogen (currently sotred in 2nd/32d year lab).
- Ensure that liquid nitrogen containers are never sealed. Thermos flask lids should NOT be screwed in.
- Always use a trolley and ensure dewars are securely attached to the trolley when transporting liquid nitrogen
- Never travel in a lift or enclosed vehicle with containers of liquid nitrogen.
- Training in using hazardous good key to transport hazardous items between floors
- To avoid asphyxiation in the event of a total spill, never store more than 10 liters in any lecture demonstration room
- Before refilling a dewar, ensure that it is totally empty.
- Become familiarized with the filling procedure and monitoring equipment installed in the liquid nitrogen room of the Chemistry building before filling any containers.
- Follow the safe operating procedure for creating liquid oxygen
- When producing liquid oxygen, ensure that all ignition sources and flammable materials are kept well clear

- Liquid oxygen may render materials generally considered inert (stainless steel, Teflon etc) flammable, and can explosively react with oxidisable materials. Minimize the risk by using smallest possible quantity at any one time.

Lasers

Lasers are used as pointing devices and as components of certain demonstrations.

- Classes of laser used in lecture dem:
 - o Class 1 – Safe
 - o Class 1M - Safe provided optical instruments are not used.
 - o Class 2 - Visible lasers. Safe for accidental exposure (< 0.25 s).
 - o Class 2M - Visible lasers. Safe for accidental exposure (< 0.25 s) providing optical instruments are not used.
 - o Class 3R - Not safe. Low risk.
 - o Class 3B - Hazardous. Viewing of diffuse reflection is safe.
 - o Class 4 - Hazardous. Viewing of diffuse reflection is also hazardous. Fire risk.

Noise

Some demonstrations produce loud noise. Maintenance/production of equipment can also involve high noise levels.

- Hearing protection (ear muffs & ear plugs) are located at 410F19
- Sudden loud noises can be damaging, if a demonstration involves this type of noise, ask the lecturer to warn students beforehand that a loud noise is imminent (especially crushing drum, hydrogen bomb and CO2 cart demos).
- If a demonstration produces loud noise, provide hearing protection to the user and encourage them to use it.

Compressed Gases

Helium and hydrogen are collected in small quantities from compressed gas cylinders stored in laboratories.

- Be aware of laboratory hazards. If in any doubt see the laboratory staff before entering
- Become familiar with the operation of regulators and valves, always leave the cylinder connections as found.

Electrical Demonstrations

Lecturers and students use electrical demonstrations and equipment that could be hazardous if damaged or incorrectly setup.

- Some demonstrations have electrical interlocks that should be checked before operation (eg. pinch effect, fusing wire).
- Ensure the lecturer is familiar with any electrical hazards (Van De Graaf high voltage)

Electrical Repair & Manufacture

Much of the equipment used in lecture demonstrations is electrically powered. Before conducting repairs or manufacturing electrical equipment, personnel must be deemed competent for the work they are to conduct as per the School's electrical repair and manufacture guidelines.

- Define the extent in which personnel can conduct electrical repairs and maintenance by going through the School's repair and manufacture guidelines
- Define training requirements for the staff member
- Schedule training if required

Chemicals

Small quantities of chemicals are stored in Rm. 410 and used in lecture demonstrations

- Show the staff member the chemical storage area
- Show the staff member how to access chemical safety information in the event of an accident, including material safety data sheets (MSDS) and Chem Alert online <http://www.usyd.edu.au/ohs/course-notes/chemalert.shtml>
- Ensure all ignition sources are kept well clear when using flammable chemicals
- Use only in a well ventilated areas
- Avoid skin and eye contact with any chemicals by using gloves and eye protection
- Outline local procedures for hazardous waste disposal in accordance with the University's Guidelines for Hazardous Waste Disposal http://www.usyd.edu.au/ohs/ohs_manual/hazwaste.shtml

Machinery Use

Equipment frequently requires repair and maintenance using mechanical machines such as drills and grinders. There may also be occasions where new equipment needs to be manufactured. Before using machinery, personnel must undergo training and be deemed competent for the work they are to conduct.

- Define the extent in which personnel can conduct electrical repairs and maintenance by going through the School's Machinery Use Guidelines.
- Define training requirements for the staff member
- Schedule training if required

Working After Hours

The lecture demonstrations team works within [normal operating hours](#), which are from 8am to 6pm.

- Working outside of normal operating hours in lecture demonstrations requires supervisor approval