# CHEMICAL SAFETY STANDARDS

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1 INTRODUCTION

Chemicals are used extensively in University teaching and research activities. Some chemicals can be harmful to your health if you are exposed, other chemicals pose a risk of serious incidents and injuries when not handled or stored appropriately.

2 PURPOSE

This document outlines the framework for the management of chemical risks associated with University activities.

These safety standards give effect to the Work Health & Safety Policy 2016. Compliance with these performance standards assists the University to meet the specific requirements of the NSW Work Health & Safety Act and Regulation 2017.

3 SCOPE

These performance standards apply to all staff, students, affiliates and contractors, and all activities conducted by or on behalf of the University.

These performance standards do not apply to work with radioactive or biological substances.

4 PERFORMANCE STANDARDS

The University has established minimum performance standards to manage health & safety risks associated with hazardous operational activities. Compliance with performance standards is compulsory. Below are the performance standards for working with chemicals.

<table>
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<td>2 The quantity of hazardous chemicals procured, stored and used is actively minimised</td>
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<td>3 Regulated chemicals are identified and managed in accordance with specific regulatory requirements</td>
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<td>4 Procurement, storage and use of high risk chemicals is approved by the relevant Head of School (or equivalent)</td>
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<td>5 Only authorised staff, students and affiliates have access to hazardous chemicals</td>
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<td>6 A register of the hazardous chemicals used or stored in the workplace is regularly maintained and accessible to workers</td>
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<td>7 Safety Data Sheets (SDS) are readily available to workers</td>
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<td>8 High risk activities involving chemicals are identified and subject to a documented risk assessment, which addresses health and physicochemical hazards and identifies appropriate risk controls in accordance with the hierarchy of control</td>
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5 DEFINITIONS

**ChemAlert**
An online database of chemical safety data sheets and labels. Access is available to all staff and students via the Safety Health & Wellbeing website.

**Chemicals of security concern**
Chemicals identified as a potential precursor to homemade explosives. These chemicals are listed in the National Code of Practice for Chemicals of Security Concern.

**Dangerous goods**
Substances and mixtures that present an immediate risk due to their physical or chemical properties. For example, explosives, flammable liquids and gases, corrosives, chemically reactive or highly toxic substances. Dangerous goods are classified in accordance with the criteria in the Australian Code for the Transport of Dangerous Goods by Road and Rail.

**Hazardous chemicals**
Chemicals that pose a risk to safety due to their health or physicochemical hazards. Hazardous chemicals are classified in accordance with the Globally Harmonised System of Classification and Labelling of Chemicals (GHS) and Schedule 6 of the Work Health and Safety Regulation 2017.

**High risk chemicals**
An internal University of Sydney classification for all explosives, self-reactive substances and organic peroxides, and any other chemicals that have one or more GHS category 1 physicochemical or health hazard.

**Drug precursors**
Chemicals which can be used for illicit drug manufacture and are regulated by the Drug Misuse and Trafficking Regulation, 2011.

**Regulated chemicals**
An internal University of Sydney classification for chemicals that have additional regulatory requirements for purchasing, handling, storage or use. These currently include Scheduled 4, 7 and 8 Poisons, Restricted and Prohibited Carcinogens, Chemicals of Security Concern and Drug Precursors.

**Restricted or prohibited carcinogens**
Carcinogens that are listed in Schedule 10 of the NSW Work Health and Safety Regulation, 2017.

**Safety data sheet**
A Safety Data Sheet (SDS) provides information on the properties of a chemical, how it will affect health and safety in the workplace, and precautions for safe handling and use.

**Scheduled poisons**
Chemicals and pharmaceuticals that are regulated by the NSW Poisons and Therapeutic Goods Regulation 2008. These chemicals have special controls applied to how they are packaged, labelled, dispensed and used to ensure the safety of the community.
6 RESPONSIBILITIES

6.1 DEANS, DIRECTORS, HEADS OF SCHOOL (OR EQUIVALENT)

Deans, Directors and Heads of School (or equivalent) are responsible for ensuring that local processes and procedures are established to ensure that the performance standards for working with chemicals are implemented within their area of control.

6.2 SUPERVISORS AND MANAGERS

Supervisors are required to implement local processes and procedures for the management of chemical safety within their workgroup. This includes, but is not limited to:

- Controlling the introduction of new chemicals into the workplace and the disposal of chemical waste
- Restricting access to hazardous chemicals and chemicals of security concern
- Complying with regulatory requirements for work with regulated chemicals
- Ensuring that all staff and students have access to adequate chemical information including current SDSs and the local chemical register
- Identification of high risk activities involving chemicals
- Ensuring that risk assessments are carried out and safe work procedures are developed for high risk activities involving chemicals
- Approval of safe work procedures
- Ensuring that staff and students are provided with specific training, instruction and supervision
- Ensuring that chemicals are appropriately labelled and stored
- Preparing for common and plausible emergency situations including chemical spills, exposure to chemicals and other dangerous incidents including fire and explosion.

The Supervisor remains responsible for the safety of their staff and students irrespective of whether or not they have delegated actions to other staff, e.g. a post-doctoral staff member or a laboratory manager.

6.3 WORKERS

Workers using hazardous chemicals are required to:

- Be familiar with the hazards and procedures required to safely handle, store and transport the hazardous chemicals used
- Participate in the risk assessment process and the development of safe work procedures
- Follow established safe work procedures
- Label decanted and mixtures of hazardous chemicals
- Dispose of chemical waste in accordance with the University Hazardous Waste Guidelines.

7 MANAGING CHEMICAL SAFETY

To effectively manage chemical safety in the workplace consideration must be given to the whole chemical life cycle, from the point of introducing a new chemical into the workplace through to disposal.
7.1 CHEMICAL HAZARDS

There are two broad types of hazards associated with chemicals; health hazards and physicochemical hazards. Chemical labels and safety data sheets (SDS) are required to state both the health and physicochemical hazards, where relevant.

7.1.1 HEALTH HAZARDS

Some chemicals have the potential to cause adverse health effects as a result of direct contact or exposure. Exposure is most commonly through inhalation, skin contact or ingestion. Health effects can be acute (short term) or chronic (long term). Examples of acute health effects include headaches, nausea and vomiting or skin irritation. Examples of chronic health effects include sensitisation, asthma, dermatitis, infertility or cancer.

7.1.2 PHYSICOCHEMICAL HAZARDS

Some chemicals have physical or chemical properties that pose a risk to workers other than an adverse health effect. Injury or illness can occur as a result of inappropriate storage, handling or use. Examples of physicochemical hazards include flammable, corrosive, oxidising or highly reactive. Physicochemical hazards should not be overlooked and can have significant implications for safety.

7.1.3 UNKNOWN HAZARDS

In situations where the health or physicochemical hazards are unknown the chemical must be treated as hazardous. Examples include:

- chemicals which are synthesised within a research laboratory and
- engineered nanomaterials.

An indication of the hazard severity of an unknown may be given by chemicals that have known hazards and are of a similar class or structure.

7.2 SAFETY DATA SHEETS

A safety data sheet (SDS) is a document prepared by the manufacturer or importer of a chemical substance or product and provided to the user by the supplier. The SDS for a product will include specific information about the chemical identity, classification, health and physicochemical hazards, safe handling and storage, emergency procedures and waste disposal considerations for a specific product.

Manufacturers and suppliers are required to review and update the SDS every 5 years. Many large chemical suppliers now provide their customers with access to an electronic database of SDSs rather than supplying hard copies with each purchase.

Many chemicals are manufactured overseas. It is the responsibility of the Australian supplier to ensure that the SDS is in the Australian compliant format.

7.2.1 UNIVERSITY ACCESS TO SDS
Within the University, the SDS for each hazardous chemical must be readily available to the staff and students who actively work with those chemicals or may otherwise be exposed to them in the workplace. SDS can be sourced through ChemAlert or directly from the supplier.

It is acceptable to store SDS electronically or to keep printed copies, as long as they are readily accessible to the relevant workers. In some circumstances, it may be useful to keep hardcopy SDS in the immediate vicinity of where the work is carried out, e.g. when working with high risk chemicals.

### 7.2.2 USING SDS

Reading the SDS is the first step to understanding the hazards associated with a chemical. It is expected that staff and students will be provided with instruction and training on how to read the SDS and talk to their supervisor about any information that they don’t understand prior to commencing work with a chemical.

### 7.2.3 RESEARCH SAMPLES

Research groups that synthesise or manufacture chemical products that will be transferred or supplied to another organisation for further testing or use are required to prepare a SDS and provide it to the other organisation.

In situations where limited information is known and it is not reasonably practicable to comply with the standard requirements of the SafeWork NSW Code of Practice for the Preparation of Safety Data Sheets for Hazardous Chemicals, a simplified SDS can be provided. The minimum requirements of the simplified SDS are:

- Australian contact details for the group that synthesised or manufactured the chemical
- A statement indicating that full identification and hazard information is not available
- Chemical identify, structure and composition, as far as is reasonably practicable
- Known or suspected hazards
- Precautions for storage and handling, with particular regard to stability,
- Safe disposal procedures.

For additional information, contact Safety Health and Wellbeing.

### 7.3 PROCUREMENT OF CHEMICALS

Regardless of whether a chemical is purchased or procured by other means, e.g. donation or transfer from another area, the hazards and associated risk controls must be considered prior to introducing the chemical to the workplace.

#### 7.3.1 GENERAL PROCUREMENT CONSIDERATIONS

The SDS must be reviewed to identify the relevant health and physicochemical hazards. Some chemicals are incompatible with other materials or become unstable with age, others require special storage and handling facilities for use.
In all cases, safer alternatives must be considered and chemicals must only be procured in quantities that match the expected short-term demand for use.

Below is a list of factors to be considered by the supervisor prior to procurement approval:

- Safer alternatives, e.g. substitution with a less hazardous chemical
- Access to adequate storage facilities, considering chemical incompatibilities and stability
- Access to adequate facilities for use, e.g. fume cupboard, PPE, spill kits, safety stations
- Competency of workers to safely handle the chemical
- Quantities to match short-term demand for use
- Waste disposal
- Additional regulatory approvals and requirements
- Emergency response materials (spills, fire-fighting and first aid) which may be specific to the chemical.

### 7.3.2 HIGH RISK CHEMICALS

The procurement of high risk chemicals must be approved by the Head of School (or equivalent). To facilitate approval, the relevant supervisor must demonstrate that there is no safer alternative and that the general procurement considerations have been applied (Ref section 7.3.1).

### 7.3.3 REGULATED CHEMICALS

Regulated chemicals include, but are not limited to, Scheduled 4, 7 and 8 poisons, restricted and prohibited carcinogens, drug precursors and chemicals of security concern. The procurement of regulated chemicals must also be approved by the relevant Head of School (or equivalent).

There are a range of specific requirements for regulated chemicals. Some require approval of the Regulator prior to procurement while others have specific requirements for storage and use. Ensure that necessary authorisation has been sought prior to ordering the chemical.

### 7.4 CHEMICAL SECURITY

Only authorised staff, students and affiliates with a legitimate need should have access to chemicals. Some chemicals have the potential to be diverted from legitimate use and be used for the manufacture of homemade explosives and toxic weapons. Similarly, there is the potential for some chemicals and pharmaceuticals to be diverted from legitimate use and be used for the manufacture of illicit drugs or for self-harm.

The Council of Australian Governments (COAG) has identified 96 chemicals of specific security concern, including ammonium nitrate and 11 other precursors to homemade explosives. Security sensitive ammonium nitrate (emulsions and mixtures of ammonium nitrate with >45% concentration) is regulated by the NSW Explosives Act 2003 and Regulation 2005, and a voluntary National Code of Practice for Chemicals of Security Concern has been introduced to promote effective chemical security practices in Australia. The voluntary code of practice currently applies to the 11 other precursors to homemade explosives, but may be expanded to cover some of the other identified chemicals of security concern.

Below is a summary of the general security requirements.
- Ensure that the perimeter entrances to all areas where chemicals are used or stored are secured whenever unattended
- Keep the entrance to laboratories, workshops and studios closed, even when in use
- Supervise visitors and contractors when required to enter areas where chemicals are used or stored
- Politely challenge strangers in the workplace, i.e. “Can I help you?”
- Store high risk chemicals and chemicals of security concern in locked storage areas, e.g. a locked cabinet within a laboratory
- Closely monitor the inventory of all high risk chemicals and chemicals of security concern to identify unexplained losses
- Report unexplained chemical losses to Security Services (T. 9351 3487)
- Investigate and report suspicious behaviour to Security Services (T. 9351 3487)

7.5 KEEPING TRACK OF CHEMICALS

It is important to know what chemicals are in the workplace, how they are classified and where they are stored. Good chemical tracking helps to understand our chemical risk profile, to plan for emergencies and identify unexplained chemical losses.

7.5.1 CHEMICAL REGISTER

A requirement of the NSW WHS regulation 2017 is that a chemical register is maintained. A chemical register is also a tool for the management of chemicals used and stored by a University workgroup. The University chemical register template is a list of hazardous chemicals including their classification, storage locations and typical storage volumes. The template also allows for the workgroup to record information about how each chemical is used with links to the relevant SDS and the associated risk assessments and safe work procedures.

The chemical register must be updated regularly throughout the year and reviewed annually to ensure that it is kept current. A chemical inventory is a more detailed version of a chemical register that is also used to keep track of actual stock quantities, in real time.

7.5.2 CHEMICAL MANIFESTS

When hazardous chemicals are stored locally in quantities above placard limits this needs to be reported to Safety Health and Wellbeing. Faculties, schools and relevant professional service units are surveyed annually to gather this data. The information gathered is used to maintain the University’s summary hazardous chemical manifest. This manifest is used internally and submitted to SafeWork NSW.

7.6 RISK MANAGEMENT

7.6.1 RISK ASSESSMENTS

Risk assessments must be completed in accordance with the University’s WHS Risk Management Procedures. A risk assessment considers both the hazards of the chemical and the activity for which the
SAFETY HEALTH & WELLBEING

chemical is to be used. A basic risk assessment for tasks involving chemicals must include the following steps:

- Reviewing the SDS to identify the health & physicochemical hazards
- Considering the proposed work processes including the quantities and concentrations of the chemicals used, the equipment, work environment and the people involved
- Identifying the possible routes of exposure and the likelihood of exposure
- Identifying the likelihood of a dangerous reaction, fire, explosion occurring during the work process; and the associated risk factors.
- Where necessary, implementing additional risk controls (according to the hierarchy of controls) to reduce the risk of exposure or incident.

A detailed risk assessment must be completed for all high risk activities involving the use of chemicals. The risk assessment must be documented, accessible within the workplace and regularly reviewed (at least annually).

7.6.2 SAFE WORK PROCEDURES

A safe work procedure (SWP) documents the agreed method for completing a particular activity safely. The content of the SWP must be based on the outcome of a completed risk assessment following consultation with the workers involved in the activity. SWPs must be established for high risk activities involving chemicals (risk as determined by risk assessment). Documentation of safe work procedures is also recommended for medium risk activities which are performed frequently, or are complex or undertaken by a number of people. The SWP must be available to all workers who are undertaking the task and used as the primary reference document for the training of new staff or students. The SWP must be reviewed whenever the activity changes or when an incident relating to the task occurs, but at least annually for high risk activities.

7.7 TRAINING, COMPETENCY AND SUPERVISION

7.7.1 TRAINING

Individual training requirements should be determined via training needs analysis. As a minimum, staff, affiliates and research students who work with chemicals must be provided with the following training:

- University chemical safety training, e.g. how to find chemical safety information, understand chemical hazards and apply the risk management process to work with chemicals
- Workplace chemical safety training, e.g. information about the specific chemicals to be used, review of the relevant SDS, risk assessments and safe work procedures
- Practical task specific training, e.g. demonstration of the work to be performed with direct supervision, e.g. face to face until deemed competent.

7.7.2 COMPETENCY

For complex and high risk activities, training and achievement of competence must be recorded. Workgroups can choose to keep training records for lower risk procedures.
Trainers must have been previously deemed competent in the particular activity and have considerable practical experience.

### 7.7.3 SUPERVISION

The level of supervision is dependent upon the level of competency of the worker. If a student or staff member is new to a task, direct supervision is recommended until the Supervisor is satisfied that the level of competency permits a more general supervisory role. Undertaking high risk activities in isolation or alone is not permitted.

### 7.8 LABORATORY DESIGN CONTROLS

Laboratories must conform to a number of relevant Australian Standards. Laboratory design must consider specific engineering risk controls that minimise the likelihood of serious incident or chemical exposure. For example the risk of exposure by inhalation is controlled by the use of fume cupboards and other mechanical ventilation; the risk of fire and explosion can be reduced by isolating flammable vapours from ignition sources. New laboratories, those to be refurbished or ‘repurposed ‘must consider the incorporation of relevant risk controls during the design phase. For more information refer to the University guidelines on Laboratory Safety.

### 7.9 PERSONAL PROTECTIVE EQUIPMENT

The personal protective equipment (PPE) chosen for working with chemicals is dependent on the chemicals handled, the activities being performed and the facilities within the work environment. The minimum personal protective equipment and clothing standards for work with hazardous chemicals are:

- Fully enclosed shoes made of non-absorbent material with a non-slip sole
- Safety glasses or goggles which fit well around the eyes
- Laboratory coat or gown made of a fire retardant material.

Chemically resistant disposable gloves are also required where exposure to hazardous chemicals is possible. PPE must be:

- Properly selected for the activity (appropriate protection) and individual (proper fit)
- Readily available, clean, functional and in good condition
- Correctly used with training when appropriate
- Maintained so that it is in good repair and ready to use
- Australian Standard approved, where possible.

### 7.10 LABELLING CHEMICALS

The Code of Practice for the Labelling of Workplace Hazardous Chemicals describes the workplace labelling requirements from the Globally Harmonised System for the Classification and Labelling of Chemicals (GHS) and includes recommendations for the labelling of smaller containers and research samples. ChemAlert can be used to print labels in various sizes, which meet compliance requirements.

All labels must be in good condition and easy to read. The Supervisor is responsible for ensuring that all laboratory workers under their supervision are appropriately labelling chemicals within the workspace.
7.11 CHEMICAL STORAGE

Incorrect storage can lead to incompatible chemicals reacting dangerously. Other chemicals can deteriorate to an impure, unsafe or explosive state. When storing chemicals always:

- Minimise volumes
- Segregate and store in accordance with SDS and Australian Standards
- Use Dangerous Goods cabinets for separation of larger volumes
- Review chemical integrity regularly to ensure that a chemical has not become unstable or decomposed.

Specific storage requirements apply to working volumes of chemicals within a laboratory, chemicals stored in dedicated storage cabinets and stored in purpose built dangerous goods depots.

7.12 TRANSPORTING CHEMICALS

Transporting chemicals outside of the workplace poses the risk of chemical spill and uncontrolled release. When transporting chemicals outside of the immediate work area:

- The primary package must be sealed, e.g. with a cap, stopper or lid
- Secondary containment must be provided for the transport of high risk chemicals and liquid chemicals
- Cryogenic liquids and compressed gases must not be transported in a lift with people.

Transportation of Dangerous Goods by road and rail must meet the Australian Dangerous Goods (ADG) code. Transportation of Dangerous Goods by air complies with IATA (International Air Transport Association) Dangerous Goods Regulation and is carried out so that the goods are packaged by a certified dangerous goods packer.

7.13 CHEMICAL DISPOSAL

Waste products derived from hazardous workplace chemicals often have similar hazard characteristics to the chemicals from which they were derived. Appropriate consideration must be given to the packaging, labelling, handling and storage of waste products, just as for other hazardous substances. Chemical waste must be separated from general waste into compatible waste streams and stored in suitable containers prior to disposal, for example halogenated, non-halogenated, aqueous acidic, aqueous alkali.

All chemicals must be disposed of according to the University Hazardous Waste program.

7.14 EMERGENCY PROCEDURES

Each workgroup that uses chemicals must be prepared to quickly shut-down equipment or processes so that they can be safely left unattended in the event of a building evacuation. Local emergency and chemical spill response plans must be developed prior to an incident occurring, particularly if a chemical has specific requirements or is a high risk chemical. Workers are to be trained to respond to an emergency according to these plans. It is recommended that safe work procedures include emergency response and shutdown procedures and that key laboratory and workshop staff are encouraged to attend First Aid and First Attack fire-fighting training.
7.14.1 EMERGENCY EQUIPMENT

Emergency equipment includes:

- safety showers,
- eye wash,
- fire-fighting apparatus,
- gas monitors and
- alarm systems
- chemical spills kit
- first aid kit

Emergency equipment must be maintained and easily accessible. For example, eye wash facilities should be flushed weekly by laboratory workers and the surrounding area kept clear of obstruction. Annual maintenance checks on safety shower, eye wash and fire-fighting apparatus will be managed by Campus Infrastructure Services (CIS).

7.14.2 CHEMICAL SPILLS

Chemicals spill kits must be available in workspaces where significant quantities of hazardous chemicals are handled and in chemical stores where chemicals are decanted. A chemical spill kit must contain the appropriate type and quantity of spill containment materials.

The response to a chemical spill should be as indicated in a spill management procedure located within the spill kit and/or in the safe work procedure for the use of the chemical. A procedure should identify likely minor spills and the trigger for seeking external assistance in the event of a major spill. Workers should be trained to determine if the spill requires a minor or major spill response.

7.14.3 FIRST AID

Staff and students who work with chemicals must be familiar with:

- general first aid procedures for exposure to chemicals
- location of the nearest first aid kit
- the identity and location of local first aiders

Some chemical injuries may require specific first aid treatment (for example the use of calcium gluconate for hydrofluoric acid contact) and this should be identified and available prior to use. Refer to the SDS for each hazardous chemical. Staff, students and local first aiders should be aware of any specific first aid procedures for the chemical. First aid supplies specific to a particular chemical will be maintained by the workgroup. For some chemicals medical attention must be sought following any suspected exposure, even if symptoms are not apparent, due to a possible delay in effects.

The details of any work related incident, injury or illness must be recorded at the time of submitting an incident report via RiskWare. If this cannot be done within 24 hours of occurrence please contact the Injury Management Team for immediate assistance. Refer to the Hazard and reporting guidelines for further detail.
7.15 HEALTH MONITORING

No worker is to be exposed to a hazardous chemical that exceeds the workplace exposure standards as designated by Safe Work Australia. Health monitoring must be provided if there is significant risk of exposure to a hazardous chemical referred to in Schedule 14 of the NSW Work, Health and Safety Regulations 2017, or another chemical where:

- An identifiable disease or other health effect on health is known to be related to the exposure
- A valid technique for detecting the biological exposure or effect on health is available.

Further advice on health monitoring should be sought from Safety Health and Wellbeing.

8 REVIEW AND EVALUATION

Performance standards and the associated procedures and guidelines will be reviewed by Safety Health & Wellbeing at least once every two years to identify and implement opportunities for improvement.

9 REFERENCES

NSW Work Health and Safety Regulation, 2017
SafeWork NSW Code of Practice Managing risks of hazardous chemicals in the workplace 2014
SafeWork NSW, Code of Practice, Labelling of Workplace Hazardous Chemicals, 2011
SafeWork NSW, Code of Practice, Preparation of safety data sheets for hazardous chemicals, 2012
Safe Work Australia, Guidance on the Classification of Hazardous Chemicals under the WHS Regulations, 2012
Safe Work Australia, Workplace Exposure Standards for Airborne Contaminants, 2013
Australian Code for the Transport of Dangerous Goods by Road and Rail 2014
National Voluntary Code of Practice Chemicals of Security Concern 2013
NSW Drug Misuse and Trafficking Regulation, 2011
NSW Poisons and Therapeutic Goods Regulations, 2008
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<td>Sandra Chapman, Matthew Mitchell</td>
<td>Manager, WHS Services</td>
<td>Director, Safety Health &amp; Wellbeing</td>
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