Charles Sturt University

Chemical Safety Manual

Booklet 2 - Preparation for Work

IN THIS BOOKLET

1. Preparation for work

1.1. Training & Induction

The purpose of information, instruction and training is to ensure that personnel handling chemicals have the skills and knowledge they need to perform their tasks in a manner that is safe and without risks to health (their own and that of colleagues working around them) and the environment, so far as is reasonably practicable. It should enable them to follow health and safety procedures and use risk controls that are set in place for their protection. It should also provide them with an appreciation of the nature of the chemicals used in the workplace and the risks associated with their use, and the reason why risk controls are used.

The mix of information, instruction and training provided will depend on the severity of the hazards, the level of responsibility of the person and what the person already knows about the chemicals and their use. Where staff hold management responsibilities for chemicals in the workplace, additional training may be required.

All staff and research students with potential for exposure to (working with) chemicals, shall undertake training and induction on the use of chemicals.

The topics that should be covered in chemical safety training and induction as required include:

- pre-purchasing requirements;
- legislation requirements;
- classification of chemicals;
- chemical risk assessment;
- labelling;
- storage and segregation requirements;
- spills management and emergency procedures:
- handling, storing and disposing of chemical waste and containers;
- transportation requirements;
- PPE
- SDS and other information resources;
- Safe Work Procedures (SWP):
- managers and supervisors training:
- Hazardous Materials:
- Gas safety; and
- ChemWatch Gold FFX.

1.2. Personal Hygiene

Irrespective of the chemical and its associated risks, personal hygiene when handling and storing chemicals is an integral part of controlling physical exposure. Personal hygiene requirements include:

- providing readily available wash up facilities;
- washing hands immediately after using chemicals;
- storing food or drink separately from chemicals (i.e. do not store chemicals and food together);
- ensuring that laboratories, workshops and other areas where chemicals are used, are free from eating and drinking;
- displaying “rules” in laboratories and workshops that include hygiene requirements; and
- wearing and storage of suitable PPE, such as eye/face protection, gloves and over garments (overalls, laboratory coats).

1.3. Family planning and early child care

The University recognises that for those who are intending to conceive, are pregnant or breastfeeding, precautions in addition to normal safe work procedures and practices may be required. If you work directly or indirectly with hazardous chemicals, please advise your line manager/supervisor as soon as possible of your intention to conceive, of your pregnancy or if you are breastfeeding so that all practicable steps may be taken to minimise risks to you and your child. This information will be used solely for the purpose of assessing the risks and any need to modify your role or transfer you to a safe position. The information will be confidential to those staff/students who are directly involved in such decisions and putting such procedures in place.

1.4. Chemical Handling

1.4.1. Introduction

In addition to the documentation required for the activity to be undertaken, a review of the working area should also be checked to determine if it is appropriate. This should include (but not limited to):

- is the work that is being planned compatible with the activities currently utilising the space?
- is the right equipment available?
- does a fume cupboard need to be used? If so what type (recirculating or non-recirculating) and does it need a scrubber? Is this available for use and are the previous chemicals used compatible with what I am using?
- is there adequate space to work in?
- do I have the equipment and appropriate storage for the waste products being generated?

1.4.2. Package opening and transfer

Packages should not be opened, or the contents accessed, in the actual storage cabinet, shelf or immediate storage area to avoid the risks resulting from handling obstructions, close proximity to other packages, accidental escape of chemicals, escape of vapours or dust during transfers and possible reaction with other substances (AS2243.10).

Ventilation shall be provided for the dispensing area to remove vapours and dusts to levels that ensure a safe environment. Exposure standards may be used for guidance. Fume cupboards may be necessary for particularly hazardous chemicals. Handling of hazardous substances should be done with another person present within the laboratory for your own safety.

Manual handling equipment and/or safe practices shall be utilised when opening or transferring packages.

Where packages are opened for transfer of contents, sampling and repackaging, and for the decanting of cryogenic liquids from one vessel into another, at the end of transfer operations the original package either ‘empty’ or with the residual contents shall be removed from the decant area. After cleaning its exterior to remove any material adhering to the package, the original package shall be returned to storage or disposed.

Liquid dangerous goods should not be poured except from small containers while using appropriate personal protection.

Decanting or pouring should be avoided to reduce the risk of splashing, overfilling, vapour escape and, for flammable liquids, the risk of static electricity discharge. Hand-operated dispensing pumps should be used instead. If decanting is

unavoidable (e.g. with viscous liquids), self-closing, non-combustible (preferably metal) taps should be used, labelling to appropriate GHS is used.

2. Safety Data Sheets

A Safety Data Sheet (SDS) is a document available in written form or online produced by the manufacturer/supplier/importer for a specific hazardous chemical. This must be made available on purchase of the chemical (see section 5). **IMPORTANT**: If a chemical is ordered directly from an overseas supplier, Charles Sturt University becomes the importer (See section 5.2 below).

The manufacturer/supplier/importer must update each of their SDS's at least every five years. If the manufacturer/supplier SDS listed on ChemWatch is more than 5 years old, the Manager/Supervisor shall request from the manufacturer/supplier a more recent version and provide it to the ChemWatch Administrator so that it may be uploaded into ChemWatch Gold FFX.

Areas are required to retain copies of SDS's for the hazardous chemicals that they order and must provide employees with access to these SDS's in either hard copy or electronic format.

A Safety Data Sheet (SDS), previously called a Material Safety Data Sheet (MSDS), is a document that provides information on the properties of chemicals and how they affect health, safety and the environment in the workplace. For example an SDS includes information on:

- the identity of the chemical,
- health and physicochemical hazards,
- safe handling and storage procedures,
- emergency procedures, and
- disposal considerations.

A safety data sheet must:

- be in English
- contain unit measures expressed in Australian legal units of measurement under the National Measurement Act 1960 (Commonwealth)
- state the date it was last reviewed, or if it has not been reviewed, the date it was prepared
- state the name, Australian address and business telephone number of the manufacturer or the importer
- state an Australian business telephone number from which information about the chemical can be obtained in an emergency.

A SDS must state information about the chemical in the following 16 sections:

Section 1 – Identification: Product identifier and chemical identity

Section 2 – Hazard(s) identification

Section 3 – Composition and information on ingredients

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

An explanation of how to read a Safety Data Sheet.

Where a chemical manufacturer is no longer in business and a supplied chemical is in use/stored the chemical must be disposed when the SDS expires, unless appropriate justification can be made to the Head of School/Area to keep it. The justification will need to include an alternative comparable SDS and approved risk assessment which includes an assessment of the chemical age, stability, container & label.

3. ChemWatch Gold FFX

3.1. Electronic Chemical Management System

Charles Sturt University uses ChemWatch Gold FFX as its electronic chemical management system to assist in meeting regulatory requirements. It provides a register of hazardous chemicals stored, provides access to current manufacturer safety data sheets, and can be used to generate substance labels, local hazardous substance registers and provides dangerous goods manifests for emergency services.

Authorised users with passwords can access ChemWatch Gold FFX for viewing and maintaining chemical stores and manifests and creating GHS compliant labels.

It is recommended that copies of SDSs for all chemicals be held by each School or Faculty and also notify the ChemWatch Gold FFX Administrator if a request for a new SDS is required prior to use of the chemical.

Online training for ChemWatch Gold FFX is available for all staff and HDR students who may be required to use chemicals. For further information in regards to gaining access to the ChemWatch FFX email chemicalsafety@csu.edu.au

3.2. Chemical Holdings

All University workplaces must enter the maximum quantities of hazardous chemicals stored into the ChemWatch Gold FFX Stockholding for the relevant storage location (a partly empty container must be considered as full for this purpose). Each area shall check the ChemWatch Gold FFX Stockholding against the physical stock held (i.e. stocktake) at least twice yearly to ensure all chemicals are entered and the information is correct. This process should be completed prior to the bi-annual chemical waste disposal.

3.3. Other ChemWatch Gold FFX Functions

Authorised login holders can use ChemWatch Gold FFX to produce various reports and information about the stock holdings. These include an Incompatibility Report to assist with the identification of potential chemical storage incompatibilities. ChemWatch Gold FFX also has report functionalities that can provide information to identify other regulatory information such as poisons scheduling on chemicals held. It should be noted that these reports are a guide and are not a replacement for SDS's or risk assessment.

4. Risk Assessment of Tasks involving Chemicals

4.1. General Information

Before undertaking any task using hazardous or dangerous chemicals a risk assessment must be undertaken to determine the possible hazards of the product and the control measures required for its safe use. When performing risk assessments, utilise sources of health and safety information such as SDS's from ChemWatch Gold FFX, (SDS database) and/or potential suppliers, together with information available from reputable sources, such as Safe Work Australia, Worksafe and the World Health Organisation. Risk assessment should be performed using the Hazardous chemical risk assessment form

4.2. Roles and Responsibilities

Who is responsible for ensuring the risk assessment is completed?

Managers and supervisors are responsible for ensuring that risk assessments are undertaken in the areas of their control. The manager/supervisor is also responsible for ensuring risk assessments are stored, available and reviewed as required.

Who Completes the Risk Assessment?

Task based risk assessments should be conducted by the person conducting the activity/work with chemicals. The manager/supervisor endorses the risk assessment ensuring that it has been reviewed by a competent person who has understanding of the work being undertaken and that appropriate hazard control measures will be implemented prior to commencement of work. (The competent person may also be the manager supervisor)

Who is responsible for authorisation?

Supervisor, Facility Manager, Head of School/ Centre Director must authorise the risk assessment to allow work to commence. Facility manager is only required if project is in a facility.

4.3. Review of Chemical Task Risk Assessment

It is good work practice to review assessments whenever undertaking an activity. Safe Work Procedures should be developed when an activity becomes routine and is used by multiple people. The Safe work procedure records the residual risk only.

Risk Assessment should also be reviewed where there are changes to the environment or systems of work that alter the effectiveness of the original controls such as:

- change of chemical supplier;
- a new chemical is introduced into the work area;
- the process or plant is modified;
- new information on the hazards for the chemical becomes available;
- monitoring (environmental or health surveillance) indicates that controls are not adequate;
- accidents and near misses occur;
- chemicals are moved to a new location; and
- improved control measures become available.

4.4. Area Monitoring

Area monitoring refers to the measurement of chemical contaminants in the air (gases, vapours, fumes, dusts, particles etc.), in comparison to the Airborne Exposure Standards of contaminants measured.

Commonly monitoring is undertaken:

- during the risk assessment process to help determine that the controls are adequate and the Airborne Exposure Standards are not being exceeded; or
- continuously in an area as part of the required controls (e.g. oxygen monitors in a room that stores oxygen depleting gas cylinders and/or cryogenic liquids).

Where monitoring is required, it should be completed by a competent person with the appropriate calibrated equipment. Monitoring is a specialised area and needs to be carefully considered and the results need expert interpretation.

Records of the requirement for monitoring and its outcomes must be kept for 30 years and must be made available to persons likely to be exposed as soon as results are available and must remain accessible to them at all reasonable times.

4.5. Health Surveillance

Health Surveillance is the surveillance of a person to identify changes in a person's health status because of potential exposure to certain substances.

Proactive health surveillance should be provided when risk assessment indicates that exposure to a chemical presents a reasonable likelihood that adverse health conditions could occur under particular conditions and there is a scientifically

validated method available to monitor it. The purpose of health surveillance is to ensure that control measures are effective and to provide an opportunity to reinforce specific preventive measures and safe work practices.

The initial surveillance should occur prior to the commencement of work and further surveillance during and/or after the period of work involving the substance. Health surveillance records are treated as confidential and must be kept for 30 years. CSU Health Surveillance and Monitoring Procedure

The Work Health and Safety Regulations list some specific hazardous substances that require health surveillance where there is a risk to health from exposure. For detail about these substances, refer to section 17. This is not an exhaustive list of the substances for which health surveillance should be considered. Some other substances for which Health Surveillance should also be considered include carcinogens not listed in section 17 or nanomaterials as identified by risk assessment.

There may be a need for reactive health surveillance where a person is suspected of being exposed to hazardous substances. For details on these requirement and procedures this should be discussed with one or a number of the following:

- Line Manager, School Manager, Faculty Manager etc.
- Human Resources
- Critical Incident Response Group (CIRG) and the Emergency Planning Committee (EPC)
- Medical staff (doctor)

4.6. Fieldwork

Fieldwork is any approved practical work, teaching, study or research activity, usually conducted outside the normal place of University business. Where chemicals are required to be used in fieldwork, this should be identified in this process and the hazards adequately addressed. Please also refer to section 8.1.3 below regarding the transport of chemicals in fieldwork. Where fieldwork is being conducted at an international location staff and students need to be aware of restrictions on transporting chemicals between sites or internationally. Wherever possible chemicals should be ordered with delivery to the place of use. Users need to be aware and conform to the legislation of the country that the work takes place in.

5. Purchase

5.1. Chemical Pre-Purchase Checklist

It is a Charles Sturt University requirement when ordering new chemicals into an area, that it is done only through the Unimarket system, no credit card purchases are allowed for chemicals. Where the substances are regulated or controlled, evidence of appropriate purchasing authority must be provided prior to sign off.

All chemicals must be purchased from an Australian supplier where possible. This ensures that the chemical has come from a supplier required by Australian legislation to provide a compliant SDS and labelling. Where this is not possible, chemicals purchased from overseas suppliers will be considered, however this incurs significantly greater regulation, See Section 8.3.

For further information regarding the purchase of chemicals e-mail chemicalsafety@csu.edu.au

5.2. Purchasing Chemicals from Overseas Suppliers

When a chemical is purchased directly from an overseas supplier, the purchaser is then considered to be the importer or supplier of that chemical. Under Australian Work Health and Safety legislation, this means the purchaser will be required to meet the legislative responsibilities of an importer and supplier. This includes ensuring that the labelling of the chemical is compliant to Australian Legislation and the production of an Australian Compliant Safety Data Sheet (see Section 2 above).

Dependant on the chemical being purchased, there may also be additional legislative restrictions and/or requirements that apply to the importation of that substance. Importation controls or restrictions may apply under the following legislation. This is not an exhaustive list.

- Customs Act 1901 & Customs (Prohibited Imports) Regulations 1956 & Narcotic Drug Act 1967 (For example controls apply to the import of narcotic drugs, psychotropic substances, precursors chemicals and antibiotics androgenic/anabolic substances)
- Chemical Weapons (Prohibition) Act 1994 & Regulations 1997
- Industrial Chemical (Notification and Assessment) Act 1989
- Agricultural and Veterinary Chemicals Code Act 1995 & Regulations 1995
- Defence Trade Act 2012

Research and educational institutions are often subjected to lighter import restrictions due to the nature of the intended use of imported chemicals. Import restrictions should be investigated and confirmed on a case by case basis.

5.3. Personal Acquisition or Supply

Chemical Donations	As a general rule Charles Sturt University will not accept chemical donations. It is inadvisable, as most often their provenance age and stability are difficult to verify. Exceptions can be made with the approval of a manager/supervisor, where sufficient justification is made as to why Charles Sturt University is to accept the chemical. This must include a risk assessment incorporating the life cycle of the chemical and cost of disposal.
Samples	When Charles Sturt University receives samples for research and or analytical purposes, planning and risk assessment must be in place prior to receiving the samples. A sample management plan should be generated detailing what is being accepted. This should include a risk assessment incorporating the life cycle of the sample. Specific attention must be made to the disposal requirements of the samples. This must be agreed with a client. All disposal costs should be defined with a client as part of the research contract before accepting the samples into the university.

6. Labelling

6.1. GHS Labelling

The purpose of labelling is to ensure that the contents of a container can be readily identified by product name, and to provide basic information about the contents of the container – its ingredient(s), hazards and precautions for safe use.

Labelling of containers must adhere to Globally Harmonized System of Classification and Labelling of Chemicals 3rd revised edition (GHS).

The *Globally Harmonized System of Classification and Labelling of Chemicals* (GHS) is a single internationally agreed system of chemical classification and hazard communication through labelling and Safety Data Sheets (SDS). The GHS is published by the United Nations and is sometimes referred to as 'the purple book'. It includes harmonised criteria for the classification of:

- physical hazards,
- health hazards, and
- environmental hazards.

6.2. Labelling responsibilities

https://www.safework.nsw.gov.au/hazards-a-z/hazardous-chemical/chemical-labelling

Table 1: Duties and responsibilities for labelling

Duty holder	Responsibilities

Manufacturers and importers	• ensure that the chemical is correctly labelled.
Suppliers	• must not supply a hazardous chemical to a workplace if the supplier knows, or ought reasonably to know, that the chemical is not correctly labelled.
Person who is conducting a business or undertaking (Charles Sturt University)	• ensure that any hazardous chemical that is used, handled or stored at the workplace is correctly labelled. • ensure that a hazardous chemical is correctly labelled if the chemical is manufactured at the workplace; or transferred or decanted from the chemical's original container at the workplace. • ensure, so far as reasonably practicable, that containers are correctly labelled while holding a hazardous chemical. • ensure that containers that are labelled for holding a hazardous chemical are used only for the use, handling or storage of the hazardous chemical.

6.3. What information must be included on a label?

A hazardous chemical is correctly labelled if the chemical is packed in a container that includes the following:

- is written in English
- the product identifier
- the name, Australian address and business telephone number of either the manufacturer or importer
- the identity and proportion disclosed, in accordance with Schedule 8 of the WHS Regulations, for each chemical ingredient
- any hazard pictogram(s) consistent with the correct classification(s) of the chemical
- any hazard statement(s), signal word and precautionary statement(s) that is consistent with the correct classification(s) of the chemical
- any information about the hazards, first aid and emergency procedures relevant to the chemical, which are not otherwise included in the hazard statement or precautionary statement, and
- the expiry date of the chemical, if applicable.

You may include any information on the label that does not contradict or cast doubt on any other information that is required on the label. The following additional information should also be included on the label, where available:

- an emergency phone number, for specific poisons or treatment advice
- the overseas name, address and telephone number of the manufacturer or supplier
- a valid website or internet address
- reference to the safety data sheet, for example a statement on the label that says: "Additional information is listed in the safety data sheet".

6.4. Labelling design layout

The label must be written English.

The size of a label should be:

- large enough to contain all of the relevant hazard and other information in a size and style that is easily visible and legible in the workplace
- appropriate to the size of the container, with larger labels present on larger containers.

The information on a label may be presented using one or more panels, or sections, dependent on the size and shape of the container. The label should be firmly secured to the outside of the container and should be visible in the normal storage position. The label should be sufficiently durable so as to remain legible and firmly attached to the container for the foreseeable lifetime of the product under normal storage and handling conditions.

The information and hazard pictograms on any label should be printed in a colour or colours that provide a distinct contrast to the background colour.

The following table is provided as a guide for the minimum dimensions for hazard pictograms and sizes of text on containers of various capacities:

Table 2: Minimum dimensions for hazard pictograms and sizes of text

Container capacity	Minimum hazard pictogram dimensions	Minimum text size
≤ 500 mL	15 x 15 mm	2.5 mm
> 500 mL and ≤ 5 L	20 x 20 mm	3 mm
> 5 L and ≤ 25 L	50 x 50 mm	5 mm
≥ 25 L	**100 x 100 mm**	**7 mm**

Note 1: Refer to the ADG Code for marking requirements for dangerous goods being transported.

ChemWatch Gold FFX labels for original containers	In most cases the simplest method to produce compliant labels is to print them from ChemWatch Gold FFX which provides a range of labels suitable for drums, Winchesters and small bottles, including some label templates. Additional labels may be required in the event that the vendor cannot or will not provide replacement labels swiftly, or where decanting from the original container into smaller/additional containers has occurred.
Special Labelling Situations	
Small Containers	Where a hazardous chemical 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 be written in English and include the following: • the product identifier • the name, Australian address and business telephone number of either the manufacturer or importer. • a hazard pictogram or hazard statement that is consistent with the correct classification of the chemical, and • any other information required for hazardous chemicals labels in general that is reasonably practicable to include.
Research Containers or samples for analysis	If a hazardous chemical is used for research purposes only or is a sample for analysis, the label must, at a minimum, be written in English and include the product identifier and a hazard pictogram or hazard statement that is consistent with the correct classification of the chemical.
Decanted or transferred hazardous chemicals	If 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, the label must, at a minimum, be written in English and include the following: • the product identifier, and • a hazard pictogram or hazard statement consistent with the correct classification of the chemical. *decant* means to transfer a hazardous 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. Where the entire amount of a decanted hazardous chemical will be used immediately, labelling of its container is not required. A decanted hazardous chemical can only be considered to be used immediately in situations where: • it is not left unattended by the person who decanted it • the decanted hazardous chemical is used only by a person present at the decanting process • the container is subsequently rendered free from any hazardous chemical immediately after use, so the container is in the condition it would be in if it had never contained the chemical.
Container Incorrectly labelled	If a container is not properly labelled, for example the label has been lost, the container should have the product name, if known, attached to it. Unlabelled containers of an unknown chemical shall be labelled: ***"CAUTION DO NOT USE: UNKNOWN SUBSTANCE".*** The container shall be removed from use and the Chemical Waste Management Contractor contacted to arrange for its disposal.

7. Storage

7.1. Storage of Chemicals

Chemicals must be stored appropriately according to legislative requirements. SafeWork Australia document on managing risks when storing chemicals in the workplace.

7.2. Storage Requirements

7.2.1. Storage principles

The following general principles apply to the storage of chemicals.
The quantities of hazardous chemicals stored shall be kept to a minimum, commensurate with their usage and shelf life. Some chemicals degrade in storage and can become more hazardous. Such chemicals shall be identified and managed appropriately.
Containers that have held hazardous chemicals shall be treated as full, unless the receptacle or package has been rendered free from hazardous chemicals.
Storage of chemicals, including wastes, shall be based on the properties and mutual reactivity's of the chemicals. Incompatible chemicals shall be kept segregated from one another, e.g. by fire isolation in a chemical storage cabinet or segregation in space. A separate spill catchment shall be provided for each incompatible liquid.
Opening of packages, transferring of contents, dispensing of chemicals or sampling shall not be conducted in or on top of a cabinet or a cupboard for storing hazardous chemicals unless it is specifically designed for this purpose and appropriate procedures and equipment are used.
Provision shall be made for the receiving and dispatch of materials, and the inspection of packages for damage.

Packages shall be inspected regularly to ensure their integrity. Leaking or damaged packages shall be removed to a safe area for repacking or disposal. Labels shall be reattached or replaced, as necessary, to clearly identify the contents of the package.

Procedures shall be established to deal with clean up and safe disposal of spillages. Supplies and materials needed to control the spillages shall be readily accessible.

Substances which are unstable at ambient temperature shall be kept in a controlled temperature environment set to maintain an appropriate temperature range. Reliable alternative safety measures shall be provided for situations when utilities, such as power, fail. Substances that can present additional hazards on heating shall be clearly identified.

Sunlight can affect some plastic containers or the chemical contents. Containers or chemicals that can be affected shall not be stored in a laboratory where they can be exposed to direct sunlight if there is potential for the sunlight to create a safety hazard. If the stability of the chemical can be affected without creating a safety hazard, procedures shall be in place to ensure the chemical is assessed prior to use.

Substances subject to additional regulation may stipulate additional storage requirements.

7.3. Segregation & Incompatibility of Chemicals

When storing chemicals it is imperative to consider storage compatibility for chemicals from different dangerous goods classes. Chemicals may need to be isolated or separated by sufficient distance to eliminate the risk of fire, explosion, or accumulation of toxic gases or vapours from a leak or spillage etc. The principal source of guidance regarding conditions for safe storage and compatibility is the SDS for the relevant chemicals. Information on compatibilities should be identified within the SDS. Table 3 provides some guidance as to compatibility between the classes of dangerous goods.

Table 4: Guidance to compatibility between classes of dangerous goods

Class / Division		2.1	2.2	2.3	3	4.1	4.2	4.3	5.1	5.2	6.1	8	9
2.1	**Flammable gas**	A	E	C	B	B	D	B	D	D	C	B	B
2.2	**Non-flammable non-toxic gas**	E	A	B	E	E	E	E	B	E	B	B	B
2.3	**Toxic gas**	C	B	A	C	C	C	C	C	C	B	B	B
3	**Flammable liquid**	B	E	C	A	B	D	B	D	D	C	B	B
4.1	**Flammable solid**	B	E	C	B	A	D	B	D	D	C	B	B
4.2	**Spontaneously combustible**	D	E	C	D	D	A	B	D	D	C	B	B
4.3	**Dangerous when wet**	B	E	C	B	B	B	A	D	D	C	D	B
5.1	**Oxidizing agent**	D	B	C	D	D	D	D	A	D	F	D	F
5.2	**Organic peroxide**	D	E	C	D	D	D	D	D	G	F	D	F
6.1	**Toxic**	C	B	B	C	C	C	C	F	F	A	B	B
8	**Corrosive**	B	B	B	B	B	B	D	D	D	B	G	B
9	**Miscellaneous dangerous goods**	B	B	B	B	B	B	B	F	F	B	B	A

Note: In this table, combustible liquids should be included with Class 3.

A	Most dangerous goods of the same class have similar primary hazards and are usually considered to be compatible
B	With a few exceptions, which should be indicated on the SDS, goods of these two classes are usually non-reactive with each other. However, in an emergency such as a spill, leak or fire, the presence of the second class may lead to different hazards or increased risk such that additional control measures are required.
C	While goods of these two classes are usually non-reactive with each other, a fire involving the fire risk goods may lead to the release of large clouds of toxic gases or vapours.
D	Goods of these two classes are likely to interact with each other in such a way as to significantly increase risk. In some cases, interaction may result in fire or evolution of toxic vapours. For those that do not interact, a fire involving one may be violently accelerated by the presence of the other. These classes should not be kept in the same area unless it can be demonstrated that the risks are fully controlled
E	If the Division 2.2 has a Subsidiary Risk 5.1, then this is D, otherwise it is B.
F	If the Division 6.1 or 9 is a fire risk substance, then this is D, otherwise it is B.
G	If one material is a concentrated, strong acid and the other is a concentrated, strong alkali, then this is D, otherwise it is A.

Unstable chemicals — unstable at or below ambient temperature requiring storage in a cold store; unstable at or above ambient temperature and requiring some shade.

ChemWatch Gold FFX has an incompatibility reporting function that can assist in the identification of incompatible chemicals based on DG class. Additional chemical specific incompatibilities will also need to be considered.

7.4. Decanting

Where reasonably practicable chemicals should be kept in their original container with the original labelling from the manufacturer/supplier. Where chemicals are decanted the new containers must be appropriate for the chemical they will hold and be correctly labelled (section 6 above).

Decanting chemicals in explosive atmospheres or chemicals that may produce explosive atmospheres require special arrangements that will not produce static electricity (e.g. fume cupboards, earthing equipment, non-synthetic protective garments). Decanting shall not be performed in chemical stores.

Particular attention must be given to decanting chemicals that pose unique hazards such as:

- solvents which can create explosive atmospheres; and
- asphyxiants.

7.5. Storage of Time Sensitive Chemicals

Time-sensitive chemicals are those chemicals that, when stored for prolonged periods, under poor storage conditions or not correctly maintained, can develop hazards that were not present in the original formulation.

There are four general categories of time-sensitive chemicals loosely based on those unsafe properties that can develop, being:

1. peroxide formers,
2. peroxide formers that can undergo hazardous polymerization,
3. materials that become shock or friction sensitive upon the evaporation of a stabilizer, and

4. materials that generate significant additional hazards by undergoing slow chemical reactions.

It should be noted that time-sensitive chemicals can be pure reagents or they can be commercial mixtures formulated as cleaners, adhesives and other products.

All time-sensitive chemicals should be immediately indelibly marked with an expiration date upon receipt and listed on the laboratory chemical inventory to ensure timely disposal. The SDS for the chemical will state whether it is unstable under certain conditions or after a period of time in storage, and this information should be highlighted in the risk assessment.

Containers should be inspected periodically to verify their condition. Signs of peroxide formation include: crystal formation in the container, discoloration of liquids, or a “mossy” appearance around the cap. If suspect materials are recognized, do not handle the container. Particularly, **do not** attempt to remove the cap. If explosive crystals have formed around the cap, the friction created by the unscrewing of the cap may be enough to detonate the compounds.

When purchasing time sensitive chemicals it is important to purchase minimum quantities, document the purchase date, maintenance regime and dispose after the end of use or expiry date, whichever is sooner.

Table 5: Guidance on Storage Limits of Some Common Time Sensitive Chemicals.

Peroxide hazard on storage – Discard after 3 months	
Divinyl acetylene	Potassium metal
Divinyl ether	Sodium amide
Isopropyl ether	Vinylidene chloride
Potassium amide	
Peroxide Hazard on Concentration-Discard After One (1) Year	
Acetal	Ethylene glycol dimethyl ether (glyme)
Cyclohexane	Furan
Cyclooctene	Metal acetylene
Cyclopentene	Methyl cyclopentane
Cumene	Methyl-i-butyl ketone
Diacetylene	Tetrahydrofuran
Dicyclopentadiene	Tetrahydronaphthalene
Diethylene glycol dimethyl ether (diglyme)	t-Butyl alcohol
Dioxane	Vinyl ethers
Ethyl ether	
Hazardous to peroxide Initiation of Poymerization – Discard after 1 year	
Acrylic acid	Styrene

Acrylonitrile	Tetrafluoroethylene
Butadiene	Vinyl acetate
Chlorobutadiene (Chloroprene)	Vinyl acetylene
Chlorotrifluoroethylene	Vinyl chloride
Dibenzocyclopentadiene	Vinyl pyridine
Methyl methacrylate	Vinylidene Chloride
Other Time sensitive chemicals	
Chloroform (on contact with air)	Sodium azide (on contact with metals)
Picric acid (when dry)	Picrylsulfonic acid (when dry)
Picryl Chloride (when dry)	Anhydrous Hydrogen flouride

7.6. Chemical Storage in Laboratories

The quantities of hazardous chemicals stored in laboratories should not exceed those specified in Table 6. Incompatible chemicals shall not be stored together unless properly segregated (Table 4). It is recommended that chemicals stored in the laboratory are located within a chemical storage cabinet and not purely reliant on these exempt volumes.

Table 6: Quantities of hazardous chemicals permitted to be stored in a lab other than in a chemicals storage cabinet

Type of substance or Class of dangerous goods	Maximum per 50m^2 (kg or L)	Maximum pack size (kg or L)	Conditions for storage
Class 3 primary or sub-risk	10	5	Labelled standard laboratory cupboard or in small amounts throughout the laboratory
Combustible liquids	50	20	Labelled standard laboratory cupboard or in small amounts throughout the laboratory
Classes 4.1, 4.2, 4.3, 5.1 or 5.2	20 but less than 10 of any one Class	10	Labelled standard laboratory cupboard or, for Classes 4.1, 4.3 and 5.1, in small amounts throughout the laboratory
Class 6.1	PG I 10 Other 50	PG I 10 Other 20	Labelled standard laboratory cupboard or in small amounts throughout the laboratory
Class 8	20 for liquids 50 for solids	20	Labelled standard laboratory cupboard or in small amounts throughout the laboratory
Class 9 and aerosols	50 for liquids 100 for solids	5 for liquids 20 for solids	Labelled standard laboratory cupboard or in small amounts throughout the laboratory
Maximum aggregate quantity	**200**		

Hazardous Substances		5 for liquids 20 for solids	Labelled standard laboratory cupboard or in small amounts throughout the laboratory

Taken from AS/NZS 2243.10: 2004. Please refer to the AS for more details and additional table notes.

Chemicals kept on shelves or racks shall be subject to the following restrictions:

- shelving and its fixtures shall be compatible with the goods stored, or shall be suitably protected from the goods (NOTE: the use of particle board is not recommended as they may fail when subjected to moisture or chemicals
- the maximum holding capacity of the shelving systems shall not be exceeded
- shelves used for chemical storage shall be restrained against lateral movement and shall have lips on them to prevent containers being pushed through to the other side.

Where there is a specific requirement to hold greater quantities of chemicals in the laboratory the design and management can be changed to accommodate this. Chemicals in quantities above those stated in Table 6 will be stored within a chemical storage cabinet.

The capacity of any chemical storage cabinet used in a laboratory to store chemicals of Classes 4.1, 4.2, 4.3, 5.1 or 5.2 shall not exceed 50 L. For other chemicals, the capacity shall not exceed 250 L.

Within a radius of 10 m, measured from any one cabinet, the cabinet storage capacity aggregated for all cabinets in that radius shall not exceed 250 L or 250 kg. Incompatible chemicals shall not be stored together. Separate chemical storage cabinets shall be used to maintain proper segregation. For further information refer to the Design Guideline

7.7. Chemical Storage Using Refrigerators

Laboratory refrigerators that are used to store flammable solvents or other volatile chemicals may accumulate flammable or explosive atmospheres inside the unit. Under these conditions ignition sources from the refrigerator may cause an explosion. AS 2243.2 Section 4.4.3 (c) requires the following:

A refrigerator may be used to store flammable chemicals provided it has been designed and manufactured to eliminate ignition sources. It may be possible for a domestic refrigerator to be modified by a competent person to eliminate ignition sources.

Domestic refrigerators or freezers shall not be used for storing flammable or explosive chemicals. The potential for hazardous situations arising through loss of electrical power is to be considered, for example, release of flammable or toxic vapours; energetic decomposition of reactive materials on warming.

‘Intrinsically safe’ purpose-built laboratory refrigerators or freezers are preferred for all chemical storage where refrigeration is required, and is mandatory in the case of flammable or explosive chemicals.

Electrical equipment shall comply with AS 3000 – Electrical Installations if installed or other appropriate standards if portable.

Storage of chemicals, including wastes, shall be based on the properties and mutual reactivities of the chemicals. Incompatible chemicals shall be kept segregated from one another, e.g. by fire isolation in a chemical storage cabinet or segregation in space. A separate spill catchment shall be provided for each incompatible liquid.

It is strictly forbidden to store food or drink items in laboratories unless they are for research purposes. Food or drink that will be consumed as part of a research study must be kept in a dedicated refrigerator which is not used for any other purpose. All other laboratory refrigerators must be clearly marked “NO FOOD OR DRINK ITEMS TO BE STORED IN THIS FRIDGE”.

7.8. Chemical Stores

For details of the requirements of chemical stores please refer to the design guideline.

8. Transportation of Chemicals

8.1.1. General transport around campus

The transport of samples, chemicals and/or gases should be actively minimised.

Chemicals should be purchased in quantities to be used at that time and not be stored for long periods of time. Where a chemical is required in more than one location it shall be purchased in multiple small quantities and the chemical is delivered and stored at each location where it is required. Where transport of chemical, samples and/or gases is deemed essential, a risk assessment of the transportation must be undertaken.

Chemicals capable of emitting vapours or large quantities of gas,(eg. Liquid Nitrogen, dry ice, ammonia) are not be carried within the cabin of a vehicle, please refer to the Safe Work Procedure within the work area.

8.1.2. Movement within a building /School area

The movement of chemicals within a building or school will be controlled and managed by the building manager and/or technician. For transportation to occur the following must be properly documented and approved:

- risk assessment
- movement/traffic routes (starting point and finishing point)
- time of movement
- does the end location have all the requirements for that chemical
- package requirements
- equipment requirements (i.e. trollies)
- adherence to SDS recommendations

The possibility of incompatible materials contacting one another, as a result of a container failure while being transported through or moved in the store, shall be evaluated. It shall be ensured that such materials can be conveyed in a manner which will not allow chemical interaction.

8.1.3. Field investigations

Charles Sturt University does not and will not transport dangerous goods as defined in the Australian Dangerous Goods Code. If under exceptional circumstances dangerous goods of these quantities are required on site they will be transported by specialist contractor licensed to transport dangerous goods.

From time to time there may be a requirement to transport chemicals into the field. Any requirement for the transport of chemicals for field work should be identified at the start of a project as part of the risk assessment documentation. All appropriate documentation identified in Section 4.4 above must be developed and approved prior to going to site.

In addition to the above documentation any requirements presented in the Australian Dangerous Goods Code for small quantities must be adhered to. The requirements of the SDS must also be adhered to.

9. Chemical Waste and Disposal

9.1. Introduction

Chemical waste and its disposal is controlled by the Environmental Protection Act 1997 and the Environmental Protection (Controlled Waste) Regulations 2004 in order to protect the environment. For the purposes of this section, chemical waste is defined as any chemical whether solid, liquid, gaseous which is discharged, emitted or deposited in the environment in such volume, constituent or manner as to cause an alteration in the environment.

Chemical waste includes any otherwise discarded, rejected, unwanted, surplus or abandoned chemical whether intended for sale or any further use (including recycling) regardless of value.

A full list of controlled waste can be found in Schedule 1 of the Environmental Protection (Controlled Waste) Regulations 2004.
Where practicable chemical waste should be reduced to lower the impact on the environment. For example a trained person could neutralise unwanted hydrochloric acid by adding sodium bi-carbonate. This would reduce the impact on the environment as transport of the waste would be eliminated. Please refer to the local area waste procedures and water corporation guidelines.

9.2. Responsibilities

Executive Deans and Executive Directors are responsible for ensuring there is sufficient waste management process in place. Managers/Supervisors must ensure, so far as is reasonably practicable, that chemicals are acquired in minimum quantities that mitigate or reduce waste. Chemical waste remains the responsibility of the purchaser or producer until the point of its authorised discharge or disposal.

Chemical waste should not be allowed to accumulate and must only be mixed with compatible classes, personal protective equipment should be used when handling chemical waste as recommended in the SDS and risk assessment.

9.3. Chemical Waste Disposal

Charles Sturt University arranges for a licenced contractor to collect chemical waste on site four times a year. Please refer to the Chemical Waste Management Process within your area. If individual areas require waste collection more frequently, the area can arrange an additional waste collection directly with the waste contractor. Chemical disposal contractors will issue a receipt outlining the waste collected, which must be kept as a record for 4 years.

9.4. Trade waste

Many Charles Sturt University facilities have Trade Waste Permits that allow for certain types of chemical waste that meet stipulated acceptance criteria to be discharged by the sewer system. However, chemical waste disposal by a licenced contractor (as described in section 9.2) is the preferred method of waste disposal.

9.5. Labelling Chemical Waste

Where waste is collected for disposal it must be stored in container that is fit for the purpose and cleaned of spills on the outside. The label must contain the following information:

- chemical name or, mixture ingredients, waste category, waste type, UN No., class and HAZCHEM Code.;
- the statement “Chemical Waste For Disposal” on at least two sides of the container, departmental name and number;
- dangerous goods class label or GHS pictogram (if applicable);
- packaging group;
- volume

9.6. Storage of Chemical Waste

Chemical waste must be stored appropriately (including segregation and bunding) so that the container/receptacle is impervious to rodents and insects, and in such a way that it does not detrimentally affect the surrounding area by odour, visual pollution, air pollution, noise pollution and so on.

Chemical containers of some hazardous and/or dangerous goods may be classified as chemical wastes and require dedicated disposal. Check the SDS and the ChemWatch Gold FFX product information for information about a given chemical. All chemicals and used spill kits shall be disposed of safely in accordance with the Safety Data Sheet and legislated requirements, by an Environmental Protection Authority (EPA) approved registered contractor.

9.7. Old or Obsolete Chemicals

Chemicals older than 5 years shall be disposed of as a Charles Sturt University preference, unless appropriate justification can be made to keep it. The justification will need to include a current compliant SDS and approved risk assessment which includes an assessment of chemical age, stability, container & label.

When you finish a project, leave a building/department or cease working at Charles Sturt University you must ensure that all chemicals and reagents are safely dealt with before you leave. Check storage areas including fridges and freezers for any items that were your responsibility while at Charles Sturt University and arrange a chemical handover with your facility manager.

9.8. Contaminated items

Empty chemical containers that have contained dangerous/hazardous goods or may still contain residue, contaminated equipment, such as pipettes, broken glassware, contaminated PPE and used spill kit items should also be treated as chemical waste. These items should be disposed of as laboratory waste through the clinical waste system, segregated where necessary from other types of controlled waste (i.e. biological waste to be autoclaved rather than incinerated.)

10. Chemical spill or Gas leak

10.1. General University Procedure

The Facility manual should provide guidance for what to do in the case of a chemical spill or gas leak, which are outlined below in section 10.1.1 and 10.1.2. In a life threatening situation call 000.

Hazardous Material Spill or Gas Leak	If the identity of the chemical spill is unknown treat it as poisonous material and do not attempt to clean up. Attempts to contain or clean up spills or releases should not be attempted unless you have been trained to do so. (See 10.4 below) Action Steps • **advise others in the immediate area to vacate immediately and report to the assembly area;** • **upon leaving the contaminated area close all doors;** • **do not allow other people to enter the contaminated area;** • **if anyone is contaminated set up an isolation area and if available assist them to a safety shower to wash off contamination. Affected area should be rinsed for a minimum of 15 minutes;** • **report what you have seen and done to Security at 400 from an internal phone or 1800 931 633 from an external phone;** • **do not re-enter the contaminated area until the all clear has been given by security or other emergency personnel.**

Gas leak or Flammable Liquid Spill	• activate the alarm by pushing the break glass unit (red box); • turn off all mobile phones • do not operate any electrical equipment • advise others to clear the area immediately and report to the assembly point.

10.2. Preparedness

Each workplace shall be prepared for a spill event. This will be different for each laboratory and it will be the responsibility of the Technical Manager or area supervisor to ensure appropriate preparedness is in place.

Procedures for the handling and management of spills will be documented and approved. The procedures will also state any special requirements (i.e. additional storage of calcium gluconate where hydrofluoric acid is being used, the use of CO_2 or appropriate foam fire extinguishers where DG4.3 are being stored).

All areas where chemicals are being used and stored will have appropriate spill kits and cleaning facilities. This may also include appropriate PPE suitable for the chemicals being cleaned up.

10.3. Spill prevention and containment

In order to try and prevent spills the following will be undertaken/ available:

- procedures for the handling and management of spills
- display response steps and contact numbers in work locations where spills are foreseeable
- test chemical spill response preparedness at regular intervals
- ensure a First Aider is available, and first aid kit, with access to any special first aid provisions necessary (e.g. calcium gluconate for hydrofluoric acid)
- suitable spill kits readily accessible and checked on a regular basis
- spill kit are restocked/replaced after a spill event
- provision of suitable PPE
- unobstructed access (within 10 seconds) to an eye wash station and emergency shower
- provide safe facilities e.g. laboratory bench surfaces, drainage systems and ventilation systems
- ensure chemicals are stored appropriately including provision of well-sealed containers, bunding trays, cabinets with inbuilt spill retention, and stores with bunding
- ensure suitable equipment (fume cupboards and ventilation systems) are available and used.

10.4. Spill clean-up

Spill clean-up should only be undertaken by trained personnel who can make a determination if the spill clean-up can safely be managed locally. The procedures and spill clean-up will be undertaken using advice provided in the SDS. Generally chemical spills will be cleaned up by taking the following actions:

1. ensure the surrounding area is secured and if appropriate evacuated.
2. if safe to do so, stop the spill if required
3. ensure any casualties are accounted for. If safe, apply first aid (this includes moving to emergency shower and eye wash) and/or if appropriate move to a safe location
4. ensure the facility manager/ supervisor has been informed of the incident and alert the appropriate authority (this may depend on the level of spill and severity of casualty)
5. if safe to do so, start cleaning up the spill following the procedures developed:
6. apply spill kit
7. if appropriate dilute and wash down with water

8. if a spill is on the floor or walkway ensure appropriate signage is in place informing people to be aware of potentially slippery surfaces
9. appropriately dispose of waste material

10.5. Chemical incidents and spill reporting

In a life threatening situation call 000. If there is an incident that requires an emergency response call Security ext 400 or 1800 931 633 and follow the procedures in Booklet 3 Section 1.

All incidents and spills involving hazardous substances must be reported on the online reporting system. Investigation of these incidents will occur in line with the Charles Sturt University incident investigation procedures.