THE UNIVERSITY OF AUCKLAND
NEW ZEALAND
Te Whare Wānanga o Tāmaki Makaurau

# Induction Kit – Part 2
## Classification and Safe Handling of Chemicals

### Introduction

- Chemicals can be classified according to their hazardous properties. The UN Classification of chemicals is used extensively for transport of chemicals. The universally accepted pictograms corresponding to each hazard class are often found on the sides of chemical containers. UN Classification of any chemical can also be found by consulting Chem Gold II.

- **If you are unsure of the properties of any chemical check the MSDS sheets/databases for information. Chem Gold II is one such database which specifies the appropriate UN Class and is available throughout the University (a separate section of the induction pack details how to access and use these databases).**

- **Chem Gold II is available to University staff and students on a 24 hour/7 day week basis via the LEARN Database.**

- More detail on safe handling can also be found by consulting the specific Safe Method of Use for each class of chemical (available on the Chemical Safety Website).

- If you are unsure of any aspect of chemical handling or storage consult your Laboratory Manager

### UN CLASSIFICATION OF CHEMICALS AND SOME SIMPLE RULES FOR HANDLING EACH UN HAZARD CLASS

The UN Classification system categorises chemicals into one of 8 different hazard classes. The following is a brief description of the UN Classification along with a few simple class specific rules for their safe handling and storage.

### UN CLASS 2 - GASES

All gas cylinders must be properly restrained.

Class 2.1 – Flammable Gases (e.g. hydrogen, acetylene)
In addition to restraining cylinders:


- All cylinders of Class 2.1 Flammable gases that **are used with a source of flame** must be fitted with flashback arrestors.

- All Class 2.1 Flammable gases must be stored in a well ventilated area.

Cryogenic Liquids

- Ensure appropriate protective gear (thermal mittens and face protection at a minimum) are used.
- Liquid nitrogen must NEVER be stored in enclosed area.

Class 2.3 - Toxic gases


- Cylinders of toxic gas attached to regulators must be stored in fume cupboards.
- Notify your lab manager if you find older cylinders of toxic or corrosive gas that show any signs of corrosion.

## UN CLASS 3 - FLAMMABLE LIQUIDS (e.g. xylene, ethanol, diethyl ether)


- Flammable solvents MUST be stored in flame-proof cupboards.
- Waste solvent in excess of 10 litres must be stored in DG store.
- If fridges are used for storage of highly flammable solvents, these fridges must be spark-proofed and labelled as such.
- Flammable solvents must never be stored with Class 4 and 5 compounds (Remember to segregate Classes 3, 4 and 5).
- Flammable liquids MUST be stored and used well away from ignition sources.
- Explosive organic peroxide may accumulate in ethers such as diethyl ether. All bottles of ether solvent must have date of purchase or date of last test. Notify your lab manager when a bottle has not been tested in last 18 months.
- As a general rule all highly flammable solvents must be decanted in a fume cupboard.
- Bulk quantities of flammable solvents MUST be stored in a DG store.
- Waste solvent must NEVER be disposed to sewer.

## UN CLASS 4 - REACTIVE SOLIDS

- You are unlikely to have these compounds in your lab. However they are highly reactive – you must take care and follow any instructions given in the MSDS.
- Always store Class 4 solids away from compounds that are Class 3 (Flammable Liquids) and 5.1 (Oxidisers). (Remember to segregate Classes 3, 4 and 5).
- Always store Classes 4.1 and 4.3 stored away from Class 4.2.

- Always store Class 4.3 stored away from water and moisture

Class 4.1 – Flammable solids (Phosphorous) or desensitised explosives (e.g. Picric acid)


- Take care to check that desensitised explosives such as picric acid is always stored with sufficient quantities of desensitising agent (water). NEVER let picric acid become dry!

Class 4.2 – Spontaneous combustible solids (e.g. diethyl zinc)


- Never store Class 4.2 compounds with 4.1 and 4.3

Class 4.3 – Dangerous when wet (e.g. Sodium metal, Sodium borohydride)


- Always store Class 4.3 compounds away from water and moisture

**UN CLASS 5.1 - OXIDISERS (e.g. perchlorates, peroxides)**


- Always store oxidisers away from Class 3 and Class 4 compounds. (Remember to segregate Classes 3, 4 and 5)
- NEVER store oxidisers with combustible organic compounds
- Remember that in addition to oxidising acids such as perchloric acid, strong mineral acids such as nitric acid are also oxidising acids.

**UN CLASS 5.2 – ORGANIC PEROXIDES (e.g. Benzoyl peroxide)**


- You are unlikely to have these compounds in your lab. However they are highly reactive – you must always ensure separate cool storage.

## UN CLASS 6 – TOXIC AND HARMFUL

Many chemicals fall into category of toxic or harmful.

Acutely Toxic Compounds


- Special care needs to be taken when handling acutely toxic compounds (labelled 'very toxic').
- An LD50 (oral) <20 mg/kg indicates a highly toxic compound.

Harmful Compounds

- The harmful effects of some chemicals are only evident after repeated exposure (e.g. hypersensivity associated with formaldehyde or glutaraldehyde exposure).
- Some chemicals are known to be mutagenic, carcinogenic or teratogenic, so exposure must be kept to a minimum.

Simple Rules for Handling Toxic or Harmful Chemicals

- Always wear correct gloves when handling toxic and harmful compounds (more information about the compatibility of gloves can be found on the chemical safety website).
- ALWAYS use fume hoods to reduce exposure to an absolute minimum.
- Always consult MSDS databases.
- Where highly toxic compounds are stored in laboratories, these compounds must be secured in locked cupboards.
- Some highly toxic compounds may have specific rules for their safe handling – please consult your Lab Manager for further information.

## UN CLASS 7 – RADIOACTIVE COMPOUNDS

There are separate rules for handling radioactive compounds. They have been included in this induction kit for the sake of completeness

## UN CLASS 8 – CORROSIVE COMPOUNDS


- Do not store acids and bases together
- Review phosphorous and sulphur halide stocks regularly.
- Remember that concentrated Nitric and sulphuric acids are also oxidising agents and must NEVER be stored with organic compounds