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UNIVERSITY OF KELANIYA ,SRI LANKA

MANUAL FOR
SAFE HANDLING AND DISPOSAL OF LABORATORY CHEMICALS AND HAZARDOUS WASTE

VERSION 1.0

PREPARED BY
COMMITTEE FOR DEVELOPING GUIDELINES FOR LABORATORY WASTE MANAGEMENT

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MANUAL FOR SAFE HANDLING AND DISPOSAL OF LABORATORY CHEMICALS AND HAZARDOUS WASTE UNIVERSITY OF KELANIYA

1. Introduction and Objectives

The University of Kelaniya, Sri Lanka is committed to creating a safe and healthy workplace for students, staff and visitors. The objectives of this manual are to provide a comprehensive guide to manage risks to health and safety that can result from exposure to laboratory and hazardous chemicals, to reduce chemical and hazardous waste generation and to dispose such waste in compliance with national and international guidelines. This manual covers the standard operational procedures (SOPs) for ordering, inventory, labeling, storage, safe handling and management of hazardous waste at the University of Kelaniya.

2. Responsibilities

2.1 University Health and Safety Service [UHSS]

The UHSS consists of a University level steering committee and two functional centres established at the faculties of Medicine and Science. Primarily UHSS shall oversee the chemical handling, occupational safety, laboratory waste management and fire safety program for the University of Kelaniya. Further, it is responsible for monitoring compliance of all University laboratories with the chemical safety related SOPs set out in this manual, through routine inspections and evaluations.

The specific duties of the UHSS include:

- implementation and monitoring of policies on laboratory and fire safety and hazardous waste management established by the University
- guiding each laboratory to develop and display an emergency action plan
- design and implement the procedures for disposal of hazardous waste
- arrangements for and coordination of disposal of chemical waste and incinerable materials with external parties
- assuring that University policies and guidelines on safe chemical handling are followed by relevant employees and students
- preparation, submission and maintenance of relevant records, reports and manifests as required by the Sri Lankan Government regulations
- maintaining up to date University-wide chemical inventory
- monitoring and reviewing of chemical handling and disposal procedures in a timely manner to comply with national and international regulations
- developing, coordinating and conducting Laboratory Health and Safety (LHS) training programmes

2.2 Deans, Heads of Departments and Academic Staff

The Deans, Heads of Departments and academic staff are responsible for ensuring that the guidelines set forth by the UHSS on laboratory operations are followed by all personnel including non-academic staff, students and other researchers under their supervision. Further, they are responsible for ensuring that appropriate staff training, support strategies and risk control plans are implemented according to the guidelines.

2.3 Laboratory Supervisors

The technical officer in-charge of the laboratory is required to ensure that the laboratory staff and work areas under his/her supervision comply with the UHSS guidelines. The responsibilities include:

- appropriate labeling, storage and disposal of materials
- maintenance of proper inventory and records
- conducting routine workplace inspections for compliance and implementation of corrective actions when necessary
- ensuring equipment is operated safely and maintained in safe, efficient working order
- completion of risk assessments and safe work procedures when necessary
- providing training or requesting induction training in the use of hazardous chemicals and assess competency of laboratory staff when required
- ensuring that relevant Personal Protective Equipment (PPE) is provided, used appropriately and maintained securely/safely
- ensuring that signs on PPE requirements and access restrictions recommended in this manual are communicated to relevant personnel

2.4 Students, staff and others

The success of the chemical handling and laboratory safety program at the University of Kelaniya depends upon the conscientious effort of each individual research supervisor, lecturer, laboratory staff member, student and/or any other personnel who are not specified here, but who may engage in any activity inside a laboratory or a chemical storage. Therefore, individuals who work in a laboratory are expected to:

- be familiar with the content of this manual
- undergo suitable training on safe laboratory chemical handling and disposal
- wear suitable laboratory PPEs
- handle and dispose of waste materials in accordance with procedures given in this manual
- minimize usage and generation of hazardous material whenever possible
- seek advice from UHSS when necessary
- report any incidents (spills, small fires, injuries etc.) to relevant authorities

3. Guidelines for ordering, inventory, labeling and storage of chemicals and other materials

3.1 Ordering

In each department, an assigned technical officer is responsible for ordering chemicals and other materials for teaching and research studies, under the supervision of the Head of the Department. He/she should maintain accurate records of all purchases including expiry dates. Purchasing of materials for teaching or individual research should be conducted in accordance with the financial regulations of the University or the relevant funding agency.

When placing an order, it is necessary to:

- review existing stocks and make sure that there is a need to order fresh stocks
- consider whether there is a less hazardous alternative for the particular chemical
- order the smallest feasible quantity when ordering a biohazardous/ hygroscopic/ pyrophoric/ flammable/ explosive or highly reactive chemical
- reject damaged or leaking containers and stocks with an imminent expiry date upon delivery
- take all measures to order chemicals from registered laboratory chemical suppliers

3.2 Inventory

- An assigned technical officer in each department/laboratory is responsible for maintaining a compiled document of "Safety Data Sheets (SDS)" and current up to date, paper-based and online chemical inventory containing chemical name, CAS number, date of receipt, quantity (gram or mL), expiry date, lot number, location of storage, GRN number and unique chemical identification number.
- The unique chemical identification number should be generated as instructed in Appendix 3-I. This number should be clearly and securely marked on the chemical container.
- The inventory should be updated on a regular basis. Empty containers and expired items should be removed from the inventory and disposed according to the set guidelines.

3.3 Labeling

- All chemicals in every laboratory should be accurately labeled. Care should be taken to preserve the manufacturer's label. Diluted chemical solutions should be labeled with its contents and the associated hazard information.
- Each bottle/container should be dated when received, and when opened, to assist in determining viability and requirements for disposal.
- Incoming containers should be inspected to make sure that labels are attached, are in good condition and contain all the required information.

- When new chemicals and compounds are generated by laboratory operations, their storage containers must be labeled with the name, date and hazard information.
- Hazardous substances require additional labeling [Printable safety labels (Appendix 3-II) are available on the UHSS/University of Kelaniya website].
- Storage areas of the hazardous materials should be labeled appropriately.

3.4 Storage

When storing, the technical officer in-charge of the laboratory under the supervision of the Head of the Department is required to ensure that the following storage conditions are met.

- Store chemicals according to hazard class. Following are the general classes of common chemicals.
    - Flammables (including combustibles)
    - Acids (Need to separate oxidizing acids from other acids)
    - Bases
    - Oxidizers
    - Miscellaneous hazards (e.g. phosphorous oxychloride ($POCl_3$); perchloric acid; boron tribromide (BBr_3).
    - Bio hazardous

Note: For example, there should be physical separation between oxidizers and flammables. These chemicals should be segregated from less hazardous chemicals to help with proper access control and hazard identification.

- Use of properly labeled appropriate storage containers. Each label should contain the unique chemical identification number relevant to that chemical.
- Selection of storage locations according to manufacturer's instruction/s (temperature, humidity, light exposure etc.).
- Use of explosion resistant freezers/cabinets for flammable materials.
- Use of secondary containment trays when storing hazardous liquids.
- Keeping gas cylinders securely chained and away from heat sources. Use of specialized cabinets for toxic, corrosive and pyrophoric gases.
- Routine inspection of chemical storage areas and cabinets for hazardous conditions.
- Taking adequate measures to prevent unauthorized access and illicit use of chemicals.
- Keeping records of usage of chemical (date, purpose, quantity issued, name of the person issued, etc.).
- When a particular chemical is over, inventory should be updated and the empty container should be disposed according to the guidelines.

4. Safety in the Laboratory

4.1 Basic laboratory safety

The University of Kelaniya is bound to provide a safe working environment in its laboratories. All laboratories should be equipped with suitable first aid kits, spill kits and fire extinguishers, emergency eyewash, emergency showers, fire blankets and a clearly displayed emergency evacuation plan. All laboratories should be properly marked with labels according to the university health and safety regulations (safety equipment, working areas, storage areas, emergency exists cabinets, refrigerators etc.).

Individuals working in laboratories are expected to:

- wear suitable safety gear (suitable masks, gloves, goggles, lab coats etc.)
- write down the date of opening on the label of the newly opened chemical container
- use the minimum possible amount of each chemical
- conduct reactions which create hazardous airborne contaminants in a fume hood
- conduct experiments involving biohazardous materials under appropriate safety requirements
- use specifically designed carriers/carts to move liquids/compressed gas cylinders when necessary
- return the chemical containers to designated storage area after use
- turn off the gas supplies/ electric devices once the work is completed
- properly cap the compressed gas cylinders unless connected to regulators
- report any incidents (spills, fire, injuries etc.) to relevant authorities

4.2 Spill Management

Each laboratory must have an appropriate spill management procedure, spill kits and trained personnel to deal with adequate spill scenarios. Spills are categorized as follows:

- Spills inside Bio Safety Cabinets (BCSs)
- Spills outside BSCs that can be cleaned up by workers
- Spills outside BSCs with clean up performed by trained spills clean-up team
- Chemical spills
- Radioactive spills

All spills require immediate clean up actions

4.2.1 Spills inside Biological Safety Cabinets (BSC)

Spills inside a biological safety cabinet are generally considered to be a lower hazard. Clean-up may be conducted immediately by the workers themselves.
If the spill is,

Small (i.e. droplet-size spills or those up to 1 mL)

- clean by using disinfectant soaked absorbent material or by flooding with a suitable disinfectant solution.

Large

- Ensure that the cabinet remains operational throughout the cleaning procedures.
- Place absorbent material wetted with suitable disinfectant over the spill, disinfect and clean.
- Remove all contaminated articles (gloves, clothing, sharps, glassware etc.) and send for decontamination/disposal.
- Wipe the work floor, cabinet work zone and remaining items of equipment with fresh disinfectant solution. For Class II cabinets, disinfect both sides of the front grille and work floor within the cabinet.
- Check the sump for contamination and if contaminated, treat with disinfectant.
- Make sure the cabinet is safe prior to reuse.

4.2.2 Spills outside BSCs (low hazard and non-infectious)

- Wear appropriate protective clothing.
- Place absorbent material wetted with a suitable disinfectant over the spill, disinfect and clean.
- Remove all contaminated articles (gloves, clothing, sharps, glassware etc.) and send for decontamination/disposal.
- Wipe the work floor and remaining items of equipment with fresh disinfectant solution.

4.2.3 Spills outside BSCs (Hazardous and infectious)

In a situation where laboratory staff/workers are not competent to clean the spill;

- If safe to do so, contain the source of the spill.
- Move away from the spill.
- Remove contaminated articles (lab coats, cloths, shoes etc.) and place in a biohazard bag.
- Warn others to keep out of the spill area.
- If contamination of the worker is superficial, wash exposed skin. Use an eye wash station if the eyes or face have been exposed.
- If spilled material has soaked through the clothing, take a shower.
- If required, seek medical assistance immediately.
- Notify the relevant authorities seeking assistance for cleaning.

4.2.4 Chemical Spills

Irrespective of the type of the spill, all spills must be thoroughly cleaned under the guidance of the laboratory supervisor as per instructions given below.

- Appropriate protective attire should be worn in all spill clean ups.
- Dry waste can be brushed up using a dustpan and a brush and discarded into appropriate solid waste containers.

- Small liquid spills (less than 200 mL) can be cleaned using paper towels and/or special absorbent materials.
- Larger liquid spills can be cleaned using any absorbent retaining material such as commercial absorbents, vermiculite or small particles of kitty litter etc.
- Liquid acid spill should be neutralized using absorbent materials such as limestone or sodium carbonate.
- Bromine spills can be cleaned using sodium thiosulfate solution.
- In the case of flammable material spills, all the flames should be extinguished, sparks producing equipment should be turned off and the area should be evacuated prior to cleaning.
- Used spill absorbents should be handled as hazardous waste.
- After removing the spill, clean the contaminated area with soap and water, mop and dry.
- Mercury spills require special measures for cleaning. Immediately consult the laboratory supervisor.

4.2.5 Radioactive Spills

Evacuate the premises, restrict access and inform all relevant authorities (UHSS, Atomic Energy Authority etc.) immediately.

5. Guidelines for collection and disposal of hazardous waste

The University of Kelaniya is committed to reducing generation of hazardous waste in order to minimize their negative environmental impacts in accordance with its environment policy. All laboratory employees must comply with the applicable guidelines set by this manual in relation to hazardous waste disposal. Relevant departments are required to coordinate with UHSS for the disposal of hazardous waste.

5.1 Hazardous chemical waste management

Environment Protection Agency (EPA), USA defines hazardous waste as substances having one of the following hazardous characteristics;

- **Corrosive:** pH < 2 or >12.5*
- **Ignitable:** liquids with flash point below 60ºC or 140ºF [e.g. Methanol, Acetone]
- **Reactive:** unstable, explosive or reacts violently with air or water or produces a toxic gas when combined with water [e.g. Sodium metal]
- **Toxic:** Determined by toxicity testing [e.g. Mercury]

Generated hazardous chemical waste should be collected, labeled, stored and disposed of according to the waste management plan developed by the UHSS. Each department should contact UHSS for disposal of collected waste periodically or as needed.
Hazardous chemical waste management guidelines require;

- maintenance of an assigned waste storage area in the laboratory that is not accessible to unauthorized personnel
- collection of waste after segregating according to the criteria provided by UHSS. Hazardous waste streams should have compatible constituents (Appendix 5-I)and should be compatible with the containers that they are stored in
- use of containers in good condition with leak proof lids
- labeling waste containers using printable safety labels (Appendix 3-II) available on the University of Kelaniya website
- not exceeding 90% of the total volume of the container when storing liquid waste
- keeping all hazardous waste containers in use, closed properly
- storing liquid waste containers in secondary containment containers at all times.
- storing dry waste in double-bagged, clear plastic bags
- special measures when disposing mercury waste including broken equipment (thermometers, bulbs etc.)

5.2 Biohazardous/Clinical waste management

Biohazardous/clinical waste is any waste containing infectious materials or potentially infectious substances such as blood and blood products, human body fluids, laboratory waste and microbiology specimens, media. Correct biohazard waste handling is a must to prevent exposing laboratory staff, other personnel and the outside environment to potentially hazardous materials.

Types of biohazardous/clinical waste

Biohazardous/clinical waste can be categorized as;

- **Laboratory waste**
  - Laboratory equipment which is used to collect or test specimens, cultures etc. containing infectious pathogens
  - Contaminated disposable plastics (pipettes, pipette tips, culture plates, micro plates, test tubes etc.)
  - Contaminated disposable materials (bandage, gauze, cotton, gloves etc.)
  - Contaminated reusable glassware (cylinders, flasks, beakers etc.)

- **Sharps**
  - All implements used in the laboratory, which can break the skin (needles, syringes (with or without the attached needle), Pasteur pipettes, scalpel blades, collection tubes, needles with attached tubing, glass culture dishes, slides and cover slips etc.)

- **Residual sample material**
  - Whole blood, plasma, serum, urine, stools, sputum, aspirates, breast milk, etc.
  - Human or animal material typically originated from surgical procedures or research that involves removal of organs, tissues or body parts (eg: Amputated tissues, organs, tissue samples collected for analysis, animal tissues, organs, body parts or carcasses used in research)

Generated biohazardous/clinical waste should be collected, labeled, stored, disinfected (chemical disinfection or autoclaving) and disposed of or incinerated according to the waste management plan developed by the UHSS. Each department should contact UHSS to dispose collected biohazardous/clinical material on a regular basis or as needed.
Biohazardous/clinical waste management guidelines require the following.

- Personnel handling biohazardous/clinical waste should be attired with appropriate protective gear (lab coats, gloves, masks, goggles etc.).
- All biohazardous/clinical waste containers should be clearly labeled using printable labels (Appendix 3-II) available on the University of Kelaniya website.
- Biohazardous/clinical waste cannot be disposed with municipal waste.
- All Biohazardous/clinical waste should be enclosed in a puncture-resistant, properly labeled color-coded bags.
- Clinical waste specifically anatomical waste such as organs can be saturated or filled with bodily fluids. Special measures, such as double-bagging or use of absorbents, may need to be taken to prevent leakage. Refrigeration may slow down decomposition and may prevent odors. Some pathological waste may become infectious or potentially infectious if it was in contact with hazardous chemicals such as chemotherapy drugs. In such situations, it should be labeled and treated accordingly.

- Liquid Biohazardous/clinical waste such as cell culture media, blood and serum, can be deactivated (autoclaving or chemical disinfection with bleach) and poured down the drain with an excess of water. Rest of the Biohazardous/clinical waste should be either incinerated or disposed as landfill after autoclaving (Refer Appendix 5-II for selection of suitable disposal method).
- Alternatively, if the UHSS decide to outsource the disposal of biohazardous waste to licensed external vendor, all laboratories should follow the guidelines set by the vendor.

6. Laboratory Health and Safety (LHS) Training

Laboratory health and safety is necessary for the well-being of the staff, students and visitors of the laboratories. Thus, appropriate training is mandatory to all the laboratory staff and individuals working in laboratories.
The training can be in three categories:

- Generic LHS Training - knowledge and skills which are commonly required
- Risk-Specific LHS Training – training required for those persons conducting activities with a specific risk to health and safety e.g. first aid training, biosafety training, radioactive material handling training etc.
- Task-Specific LHS Training - skills which are required depending on the specific task e.g. local process, operating equipment, instrument or plant

The UHSS is responsible for the provision of centralized LHS training in collaboration with Centre for Sustainability Solutions (CSS), Staff Development Centre (SDC) and Faculties of Science, Medicine and Graduate Studies as needed. LHS training programmes should include identification of training needs, training plan and implementation, verification of competency and maintenance of records. UHSS steering committee is responsible for LHS curriculum development, selection of qualified resource persons, organizing training programmes and annual review of the LHS training curriculum in accordance with University requirements and national and international guidelines. Heads of Departments/Course Coordinators/Laboratory Supervisors are responsible for identifying training needs of staff/students under their supervision and for ensuring that the training is conducted, attended and implemented in a timely manner.
LHS training is needed when,

- recruiting new laboratory staff or a research assistant.
- inducting laboratory based graduate and undergraduate teaching/research.
- evaluating staff performance.
- equipment and or work practices have changed.

Appendices

Appendix 3-I: Unique Identification Number

Faculty Code		Department Code		Location Number		CAS Number									Bottle Number	
										-			-			

Following instructions should be use when filling:

Faculty Code

01 – Faculty of Medicine
02 – Faculty of Science

Department Codes

Faculty of Medicine

01 Department of Anatomy

02 Department of Biochemistry and Clinical Chemistry

03 Department of Disability Studies

04 Department of Family Medicine

05 Department of Forensic Medicine

06 Department of Medicine

07 Department of Medical Education

08 Department of Medical Microbiology

09 Department of Obstetrics & Gynaecology

10 Department of Paediatrics

11 Department of Parasitology

12 Department of Pathology

13 Department of Pharmacology

14 Department of Psychiatry

15 Department of Physiology

16 Department of Public Health

17 Department of Surgery

18 Molecular Medicine Unit

Faculty of Science

01 Botany

02 Chemistry

03 Industrial Management

04 Mathematics

05 Microbiology

06 Physics

07 Statistics & Computer Science

08 Zoology & Environmental Management

Location Number

Assign a two-digit number (01 to 99) to all laboratories and storage units in each department.

CAS Number

Refer to the manufactures label on the container.

Bottle Number

A running number should be allocated for each container of the same chemical, in a given department. This number should run from 01-99 and restart at 01. This will provide the possibility of having up to 99 containers of a given chemical at a given time, which is a very unlikely situation. Once the content of the container is over, the online inventory should be updated to prevent labeling two containers with the same number.

Appendix 3-II: Container Labeling

Labeling of unstable chemicals

Other than the manufacturers' label there should be a second label displaying the arrival date, date opened, and latest date tested for all peroxidizable and other chemicals that may become unstable over time (Expiration dates may be extended based on testing).

Name of the Chemical _____ (No chemical formula, symbols or abbreviations)
CAS # _____
Arrival date _____
Date opened _____
Latest date tested _____

Labeling of secondary containers

Secondary containers including diluted solutions (e: g. acids) should be labeled with the chemical name, CAS #, National Fire Protection Association, USA (NFPA) diamond, and concentration (if applicable).

Chemical name _____ (No chemical formula, symbols or abbreviations)
CAS # _____
Concentration (solvent)

- Health-Blue Flammability-Red Instability-Yellow Special Hazards*-White (e.g. OX Oxidizers)
- Number system 0-4 = 0-least hazardous , 4-most hazardous

Labeling of hazardous waste

Each hazardous waste container or unlabeled container or any container of which contents do not match the manufacturer's label should have a properly filled hazardous chemical surplus tag. Constituent of the waste container should be listed as instructed below.

- All labels should be filled in English.
- Percentage by volume (v/v %) or mass and Name [Chemical names or common names; Do not use chemical formulae, chemical symbols, chemical equations, or abbreviations] of all the constituent.

During waste collection within laboratories chemical compatibility for waste segregation guidelines in Appendix 5-I should be followed.

During waste collection within laboratories chemical compatibility for waste segregation guidelines in Appendix 5-I should be followed.

HAZARDOUS CHEMICAL SURPLUS TAG

Container Contents (No chemical formulae, chemical symbols, chemical equations, or abbreviations)

1._____ % _____
2._____ % _____
3._____ % _____
4._____ % _____

Bldg # _____
Room # _____
Dept _____

HAZARD (S)

- ○ Ignitable
- ○ Toxic
- ○ Carcinogen
- ○ Corrosive
- ○ Oxidizer
- ○ Reactive_____
- ○ Other_____

Name of the Authorized person _____

Labeling of biohazardous/clinical waste

- Biohazardous/clinical waste should be segregated into following categories and collected. Please note these segregation categories could be amended based on the vendor requirements if the University decide to outsource Biohazardous/clinical waste disposal to licensed vendor.

  Type I- gloves, swabs, cotton, surgical tissue samples, residual sample material

  Type II –Sharps (e.g.: syringes, needles, glass slides, etc)

  Type III – Pharmaceutical waste

- Each biohazardous/clinical waste container must be labelled with a “bag tag” shown below at the point of generation.

- All labels should be filled in English

All labels should include point of generation, type, content, department and authorized signature


Biohazardous Waste
Department : _____
Laboratory : _____
Date : _____
Content : _____
_____
_____
_____
_____
Authorized signature : _____

Appendix 5-I Chemical Compatibility for Waste Segregation

This contains a list of incompatible chemicals. The following chemicals listed in the left column should not be stored in the immediate area with the chemicals listed in the right column, except under specially controlled conditions. Incompatible chemicals should always be handled, stored or packed so that they cannot accidentally come into contact with one another. This list is representative of chemical incompatibilities and is not complete, nor are all incompatibilities shown.

Table 1: List of incompatible chemicals

Chemical	Keep Out of Contact with:
Alkaline metals, such as powderedaluminum, magnesium, sodium, potassium, etc.	Carbon tetrachloride or other chlorinated hydrocarbons, carbon dioxide and water
Acetic Acid	Chromic acid, nitric acid, hydroxyl compounds, ethylene glycol, perchloric acid, peroxides and permanganates
Acetylene	Chlorine, bromine, copper, fluorine, silver and mercury
Ammonia	Mercury, chlorine, calcium hypochlorite, iodine, bromine and hydrofluoric acid
Ammonium nitrate	Acids, metal powders, flammable liquids, chlorates, nitrites, sulfur, finely divided organic or combustible materials
Carbon, activated	Calcium hypochlorite
Copper	Acetylene and hydrogen peroxide
Chromic acid	Acetic acid, naphthalene, camphor, glycerin, turpentine, alcohol and flammable liquids
Chlorine	Ammonia, acetylene, butadiene, butane, methane, propane, hydrogen, sodium carbide, turpentine, benzene and finely divided metals
Cyanides	Acids-organic or inorganic
Hydrogen peroxide	Copper, chromium, iron, most metals, alcohols, acetone, organic materials, aniline, nitromethane, flammable liquids and combustible materials
Hydrogen sulfide	Fuming nitric acid and oxidizing gases
Hydrocarbons (butane, propane, benzene, gasoline, turpentine etc.)	Fluorine, chlorine, bromine, chromic acid and sodium peroxide
Iodine	Acetylene, ammonia and hydrogen
Nitric acid	Acetic acid, aniline, chromic acid, hydrocyanic acid, hydrogen sulfide, flammable liquids, flammable gases, copper, brass and any heavy metals
Perchloric acid	Acetic anhydride, bismuth and its alloys, alcohol, paper, wood, ether, oils and grease
Phosphorous	Oxidizing agents, oxygen, strong bases
Potassium chlorate	Sulfuric and other acids

Potassium permanganate	Glycerin, ethylene glycol, benzaldehyde and sulfuric acid
Sodium	Carbon tetrachloride, carbon dioxide and water
Sodium nitrite	Ammonium nitrate and other ammonium salts
Sodium peroxide	Ethyl or methyl alcohol, glacial acetic acid, acetic anhydride, benzaldehyde, carbon disulfide, glycerin, ethylene glycol, ethyl acetate, methyl acetate and furfural
Sulfides, inorganic	Acids Sulfuric acid Potassium chlorate, potassium perchlorate and potassium permanganate

In addition to the segregation noted in Table 1, dangerously incompatible substances, even in small quantities, should not be stored next to each other on shelves or in such a position that accidental rupture of containers may allow mixing. Table 2 contains examples of dangerously incompatible substances. Table 3 contains examples of incompatible oxidizing agents and reducing agents.

Table 2: List of dangerously incompatible substances

Chemical	Keep Out of Contact with:
Chlorine	Acetylene
Chromic acid	Ethyl alcohol
Oxygen (compressed, liquefied)	Propane
Sodium	Chloroform and aqueous solutions
Nitrocellulose (wet, dry)	Phosphorous
Potassium permanganate	Sulfuric acid
Perchloric acid	Acetic acid
Sodium chlorate	Sulfur in bulk

Table 3: List of incompatible oxidizing agents and reducing agents

Oxidizing Agents	Reducing Agents
Chlorates	Ammonia
Chromates	Carbon
Dichromates	Metals
Chromium trioxide	Metal hydrides
Halogens	Nitrates
Halogenating agents	Organic Compounds
Hydrogen peroxide	Phosphorus
Nitric acid	Silicon
Nitrates	Sulfur
Perchlorates	
Peroxides	
Permanganates	
persulfates	

Appendix 5-II Disposal methods for biohazardous waste

This table contains instructions to disinfect and dispose biohazardous waste.

Biohazardous Waste type	Disinfection method	Disposal method
Sharps (syringes, needles, glass slides, disposable pipettes, contaminated broken glass)	Autoclave*	Incineration
General laboratory waste (gloves, contaminated paper towels, gauze, plasters, pipette tips etc.)	Autoclave*	Incineration or disposed as landfill
Carcasses	-	Incineration (Keep immerse in formalin or chilled/frozen until incineration)
Microbial and cell-cultures	Autoclave*	Incineration
Limbs and organs - Includes recognizable portions of organs, limbs or tissue	-	Incineration (Keep immerse in formalin or chilled/frozen until incineration)
Blood and body fluids e.g. aspirates etc.	Deactivated by autoclaving or chemical disinfection with bleach	Pour down the drain with an excess of water
Feces and Urine	Autoclave	Sewer via sluice
Radioactive Clinical Waste	-	Requires specialized handling contact UHSS
Pharmaceutical waste	-	Incineration