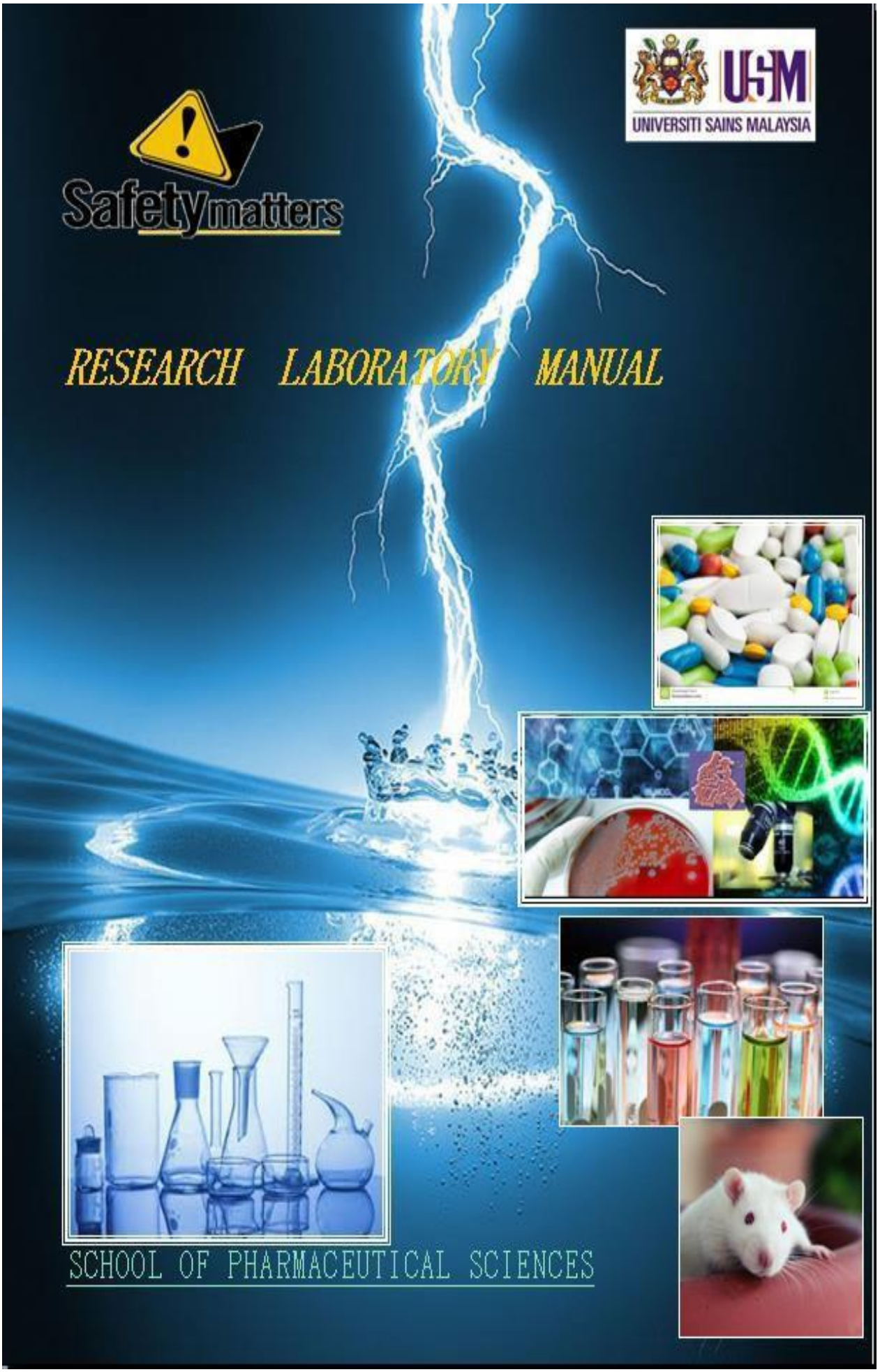

UNIVERSITI SAINS MALAYSIA
Safetymatters
RESEARCH LABORATORY MANUAL
SCHOOL OF PHARMACEUTICAL SCIENCES

CONTENT **PAGE**

1.0 SAFETY

1.1 GENERAL SAFETY AND OPERATIONAL RULES
1.2 SAFETY FACILITIES
1.3 SHARPS AND LABORATORY GLASS
1.4 GUIDELINES FOR HANDLING ACCIDENTS
1.5 WORKING AFTER OFFICE HOURS
1.6 RULES FOR UNATTENDED EXPERIMENTS
1.7 CHEMICAL WASTE DISPOSAL
1.8 BIOLOGICAL AND CLINICAL WASTE DISPOSAL

Policy Statement

It is the policy of the School of Pharmaceutical Sciences (SPSUSM) to provide a safe working and learning environment.

The School of Pharmaceutical Sciences (SPSUSM) Laboratory Safety Committee has developed this manual as a guidance document to familiarize staff, students and visitors with the policies and procedures for the safe use of hazardous chemical and other material at the University and its affiliates. When these policies and procedures are followed, the risk of occupational exposures to chemicals and physical hazards as well as the risk of accidental environmental release of hazardous materials is minimized.

Introduction

The School of Pharmaceutical Sciences (SPSUSM) Health and Safety Committee has developed this manual to assist in the recognition, evaluation and control of chemical, biological and physical hazards associated with University laboratory operations. This manual is intended to establish the basic safe operating practices so that laboratory staff and students may carry out effective teaching and research programs in a safe environment.

This safety manual provides specific information on hazard assessment, training requirements, exposure monitoring procedures and accident record keeping and reporting. A laboratory specific safety manual must be available in each laboratory. The safety manual will require laboratory specific procedures to be developed and trained to staff and students. This manual is not intended to be a complete listing of laboratory hazards or safe practices.

1.1 General Safety and Operational Rules

1. SAFETY FIRST - USE COMMON SENSE to avoid accidents.

2. No student is allowed to work in a laboratory unless Laboratory Supervisory Personnel (Assistant) is present. DO NOT ENTER LABORATORY unless your assistant is present in the lab.

3. Any student who endangers the safety of others, or his or her own safety, will be dismissed from the laboratory.

4. All students must wear goggles when necessary.

5. Shoes (no sandals) must be worn at all times. Bare feet or open shoes (front or back) are not permitted in the laboratory.

6. All students must wear lab coats at all times.

7. No eating, drinking, or smoking is permitted in the laboratory.

8. Only authorized experiments may be performed. Equipment should be used only for its intended purpose.

9. No chemicals or equipment may be removed from the laboratory.

10. Do not bring or permit unauthorized individual into the laboratory.

11. Any student who is pregnant should not perform laboratory experiments.

12. If you are or a student near you is injured or if any type of accident occurs, IMMEDIATELY call the laboratory staff in-charge for assistance. If accident happens after office hours, the student can refer to the Security Department (direct line +604- 653 4999, or extension 4333/4999).

13. Place jackets, coats, bags, pocketbooks, etc. in or on the designated area. Ask your laboratory assistant for help if needed.

14. Keep your work space clean and tidy. The work space, desk drawers, cabinets, instruments must be kept neat and clean at all times.

15. When lab work is completed, all materials must be returned to their proper places and used benches, instruments and glassware must be cleaned up.

16. Switch off lightings, fans, instruments, electrical equipment, check the taps, secure the windows and doors when leaving the laboratory.

17. Label all chemicals, including waste chemicals clearly and properly. Follow the instruction of waste disposals. Never discard chemicals down the sink or into regular trash and follow the proper waste disposal procedure of the University Occupational Safety & Health Unit (UKKPU).

18. All accidents must be reported and investigated. Any injury must be treated immediately.

19. When a fire alarm is sounded, place the chemical and equipment safely to the nearest possible table/bench, exit the building calmly and go to the designated area outside. When the "all clear" signal is received, return to the laboratory.

1.2 Safety Facilities

The laboratory is equipped with various safety facilities. Students working in the lab must familiarize themselves with the location and proper use of these facilities.

Eye wash

How to use emergency eye wash:

- Immediately flush eyes for at least 15 minutes. Keep the eyes open and rotate the eyeballs in all directions to remove contamination from around the eyes. An injured person may need help to hold the eyelids open.

Emergency Shower

How to use emergency shower:

- Immediately flush the affected area with copious quantities of water for at least 15 minutes. Protect the eyes from inadvertent contamination.
- Remove contaminated clothing, jewellery, and shoes. Don't let modesty slow you down. Every second counts. Use a clean lab coat to provide the victim with privacy and warmth.

First aid boxes

- Use when necessary. Do not misuse the items in the first-aid box.

Fire Extinguisher

- Use CO_2 fire extinguisher to put out small fires resulting from chemical incidents. Halo hydrocarbons extinguishers should be used only when no chemicals are involved in the fire.
- An "A-B-C" fire extinguisher can be used on all fires. Other types of extinguishers work only on a certain class of fire. Check the chart below to match extinguishers to a particular class of fire.

Class of fire	Types of extinguishers to use
Class A: Ordinary combustible materials, such as wood, cloth, paper, etc.	• "A-B-C" • Pressurized water
Class B: Flammable liquids, such as oil, gasoline, kerosene, etc.	• "A-B-C" • "B-C" dry chemical • Carbon dioxide
Class C: Presence of energized electrical circuits (e.g., Electronic motors, electrical wiring, etc.)	• "A-B-C" • "B-C" dry chemical • Carbon dioxide

1.3 Sharps And Laboratory Glass

Definitions

Sharp:
Any device/item having corners, edges, or projections capable of cutting or piercing the skin.

Infectious Waste Sharps:
Sharps, including hypodermic needles, syringes (with or without the attached needle), Pasteur pipettes, scalpel blades, blood vials, needles with attached tubing, culture dishes, suture needles, slides, cover slips and other broken or unbroken glass or plastic ware that have been in contact with infectious agents or that have been used in animal or human patient care or treatment, in medical, research or industrial laboratories, (please refer to 1.8 to dispose).

Laboratory Glass
Any item that could potentially pose a hazard to waste handlers must be handled properly. This includes non-infectious slides, cover slips, vials, Pasteur pipettes, empty chemical reagent bottles and broken or fragile glass or plastic.

Broken or contaminated glass should be discarded in special glass disposal bins (please refer to 1.8 to dispose).

1.4 Storage of chemicals

Extra chemicals must not be placed on the floor of your laboratory. Store them in the Chemical Store at J13-030.

Procedure for Storage at Chemical Store J13
Form for Chemical Storage

APPENDIX

LABORATORY SAFETY NOTICE

1. ALL students, prior to commencing work must ensure that they have read the Safety Manual and signed the acceptance form.

2. ALL students MUST familiarize themselves with the emergency procedures in the laboratory. If in doubt ASK a Lab Officer or your Supervisor.

3. ALL students, prior to commencing work, must ensure that they obtain a long sleeved laboratory coat. This MUST be worn at ALL times when working in the laboratory.

4. ALL students must wear protective eyewear, gloves, aprons, etc when handling solvents, acids and other harmful chemicals. ALL such chemicals should be handled in the fume cupboard. Protective eyewear must also be worn when working with glassware under vacuum or pressure.

5. ALL chemicals when transported around the laboratory MUST be adequately supported and contained. All chemicals must be transported in closed containers.

6. No food and/or drink are allowed in the laboratory.

7. No wearing of sandals or uncovered shoes.

8. DO NOT obstruct common passage ways (with stools, equipment, etc.). They must be kept clear at ALL times.

9. Students are responsible for the cleanliness of the lab. Make sure that you have removed and cleaned ALL glassware at the end of the day – leave the work place TIDY.

Additional Note:
These rules will be enforced on a DAILY basis by Lab Officers and staff. Non-conformance **WILL** result in penalties to the student and, if necessary, more serious disciplinary procedures.

Signed/Date:

Supervisor:

1.4 Guidelines For Handling Accidents

During Office Hours (8.10am-5.10pm)

- The students or lab partner(s) should first lodge a report to the lecturer/lab assistant present in the laboratory.
- If the accident is not serious, the lecturer/lab assistant should then provide first aid treatment.
- If necessary, the lecturer/lab assistant should send the student to the clinic.
- If the accident is serious, an ambulance should be called through the emergency line (USM CLINIC 3999 or 2381).
- A lecturer/lab assistant /the lab partner is required to accompany the injured student in the ambulance to the clinic, in case that the injured is referred to a hospital, the accompanying person should also follow to provide further assistance.

After Office Hours

- Students are advised to work with another person around in the laboratory.
- Please contact the security department at extension 4333 or 4999 if an accident occurs or if you require transportation to the USM Clinic.
- If the accident occurs after office hours, then this should be referred to a hospital or a panel doctor. Please contact security department through extension number 4333 or 4999 if you require transportation.
- The student or the accompanying person should contact and report the incident to the student's supervisor whose contact number is found in the list displayed in every laboratory for students working after office hours.

1.5 Working After Office Hours

There are special risks from working in a laboratory in the School outside normal working hours (8.10 am-5.10 pm, Monday to Friday) as help may not be available in the event of an accident. It is the duty of all Research Supervisors to be aware of the work being undertaken by their students and to ensure that out of hours work is properly regulated. The following rules apply out of office hours:-

- Permission is required for working after office hours. Fill form WPF2014v3 in triplicate (also available from the laboratory staff-in-charge or the office). Pass up two copies to the laboratory staff-in-charge.
- A copy of the permission must be shown to the USM Security Personnel when requested when working after office hours.
- Record in the log-book (located in front of the Physiology/Neuroscience/Clinical Research Laboratory.
- Working alone is forbidden. Make sure there is always someone within calling distance.
- Experiments that involve any measure of risk must be carried out during normal working hours. No work involving autoclaves, cyanides or HF may be carried out outside of office hours.

Procedure For Working After Office Hours In The Laboratory

Flow Chart of Procedure

Forms For Working After Office Hours In The Laboratory
Borang Bekerja di Makmal Selepas Waktu Pejabat

1.6 Rules for Unattended Experiments

Experimental work left running unattended poses special risks in terms of fires and flood and must be carefully controlled. The following rules apply:

- Unattended running of experiments may be carried out only when it is absolutely necessary.
- Experiments involving overnight refluxing of solvents must be done inside a ducted fume hood. The plug of the heating mantle or hot plate must be within reach to be switched off in case the water flow fails. All water lines must be fixed securely and free from leakage.
- All experiments left on must have a notice on yellow card (available from the laboratory staff-in-charge) saying **Experiment in Progress. Please Leave On;**

- and indicating **potential hazards in plain English**, e.g. “Flammable solvent”, “Contains Toxic Material” – this is for the benefit of the night security staff who are not chemists.
- and the **name and telephone number** of the person who is responsible for it. This must be **a realistic telephone number where you can be contacted at all times** because **you** may be called out at any time to deal with **your** experiment.

- If at all possible, this information should be posted in a prominent position external to the laboratory.
- If an unattended experiment is set up in a fume hood, the lighting for that fume hood should be switched on.
- Not all fume hoods may be appropriate for unattended work. Approval of the fume hood must be obtained from the laboratory staff-in-charge before any such work is carried out.
- Electrical equipment left on should carry a **Do Not Switch Off** notice in yellow card giving the name of the person leaving the equipment and a contact phone number.

1.7 Chemical Waste Disposal

Waste Chemicals

At the end of research projects it is necessary to dispose of all unwanted products or other chemicals and researchers are required to follow the instructions for laboratory clearance. The disposal of waste chemicals is controlled by strict regulations regarding identification, segregation, packaging and transport of waste. The Occupational Safety & Health Unit, USM has a Code of Practice on the Chemical Waste Management and Disposal Procedure (refer to https://ukkp.usm.my), and the following guidelines indicate how this Code is interpreted within the School of Pharmaceutical Sciences. If you are in doubt as to whether a substance needs to be treated as a waste chemical, refer to Chemical Waste Disposal Committee or please contact Mr. Mohd Fadzli Ghazali at 04-6536006 or email at mohdfadzli@usm.my for advice.

Waste Classification Code

A	**MINERAL OIL WASTE** Waste containing lubricating oil, hydraulic oil, oil contaminated soil etc
B	**ORGANIC CHEMICAL WASTE CONTAINING HALOGEN AND/OR > SULPHUR 1%** Freon, PVC wastes, chloroform, solvents, capacitors and transformers containing PCB etc
C	**WASTE SOLVENTS CONTAINING HALOGENS AND/OR SULPHUR <1%** Acetone, alcohol (e.g. ethanol, methanol), benzene, turpentine, xylene etc. Waste should be pumpable, containing <50% water and 18J/kg calorific value
H	**ORGANIC CHEMICAL WASTE CONTAINING HALOGENS AND /OR SULPHUR < 1%** Glue, latex, panit, phenol, printing ink, synthetic oil, soap, epoxy etc
K	**WASTE CONTAINING MERCURY** Mercury, vapour lamps, COD-Fluids, mercury batteries etc
T	**PESTICIDE WASTE** Insecticides, fungus and weed killers, rat poison etc
X	**INORGANIC WASTE** Acid, alkaline, sodium hypochlorite, inorganic salt, metal hydroxide sludge, chromate, and cyanide waste etc
Z	**MISCELLANEOUS** Medicine waste, lab-packs, asbestos waste, mineral sludge, isocyanate (MDI,TDI), batteries etc

Procedure within the School

If you need to dispose waste chemicals, please refer to Mr. Mohd Fadzli Ghazali (ext. 6006) or the lab staff-in charge of your lab.

All substances need to be disposed, if possible, be identified by chemical name and molecular formula. If this is very difficult because there is mixed chemical waste, then the character of the mixture must be reasonably accurately defined before it can be accepted. Incompatible chemical waste must not be mixed or combined in the same container.

The term "incompatible chemicals" refers to chemicals that can react with each other violently; with evolution of heat; or to produce flammable products or toxic products. Incompatible chemical must not be placed in the same lab pack for transport or landfill disposal and must always be handled, stored and packed so that they cannot accidentally come in to contact with each other. Guidelines for the segregation of common laboratory chemicals that are incompatible are presented in Tables E.1 and E.2. Table E.1 contains general classes of compounds that should be kept separated; Table E.2 lists specific compounds that can pose reactivity hazards. Chemicals in each grouping in columns A and B of each table should be kept separate.

List of Incompatible Chemicals

Table E.1 General Classes of Incompatible Chemicals	
Column A **Acids and oxidizing agents[a]**	**Column B** **Bases, metals and reducing agents[a]**
Chlorates(VI)	Ammonia, anhydrous and aqueous
Chromates(VI)	Carbon
Chromium(VI) oxide	Metals
Halogens/Halogenating agents	Metal Hydrides
Hydrogen Peroxide	Nitrates(III)
Manganates(VII)	Organic compounds in general
Nitric(V)acid/Nitrates(V)	Phosphorus
Peroxides	Silicon
Sulfates(VII)	Sulfur

[a]The examples of oxidizing and reducing agents are illustrative of common laboratory chemicals. The listings are not intended to be exhaustive.

Table E.2 Specific Chemicals Incompatibilities	
Column A	**Column B**
Acetylene, monosubstituted acetylenes	Group IB and IIB metal and the their salts
	Halogens/Halogenating agents
Ammonia, anhydrous and aqueous	Halogens/Halogenating agents
	Mercury
	Silver
Alkali and alkaline earth Carbides Hydrides Hydroxides Metal Oxides/peroxides	Water
	Acids
	Halogenated organic compounds
	Halogenating agents
	Oxidizing agents[a]
Azides, inorganic	Acids
	Heavy metals and their salts
	Oxidizing agents[a]
Cyanides, inorganic	Acids/Strong bases
Mercury and its amalgams	Acetylene
	Ammonia, anhydrous and aqueous
	Nitric(V) acid
	Sodium azide
Nitrates(V), inorganic	Acids
	Reducing agents[a]
Nitric(V) acid	Bases
	Chromic(VI) acid
	Chromates(VI)
	Metals
	Manganates(VII)
	Reducing agents[a]
	Sulfides
	Sulfuric acid
Nitrates(III), inorganic	Acids
	Oxidizing agents[a]
Organic compounds	Oxidizing agents[a]
Organic acyl halides	Bases
	Organic hydro and amino compounds
Organic anhydrides	Bases
	Organic hydroxyl and amino compounds

Table E.2 Specific Chemicals Incompatibilities	
Column A	**Column B**
Organic halogen compounds	Group IA and IIA metals
	Aluminium
Organic nitro compounds	Strong bases
Oxalic acid	Mercury and its salts
	Silver and its salts
Phosphorus	Oxidizing agents[a]
	Oxygen
	Strong bases
Phosphorus(V) pentoxide	Alcohols
	Strong bases
	Water
Sulfides, inorganic	Acids
Sulfuric acid (concentrated)	Bases
	Potassium manganate (VII)
	Water

[a]See list of the example in Table E.1

It is very important if there are known hazards associated with the waste; these should be stated on the label (see below).

All substances to be disposed of must be put into leak-proof containers that are clearly labelled with the identity or categorization of the contents, any known hazards, some indication of boiling point range and the number of the lab of origin (suitable labels are available from Laboratory staff-in-charge). Substances identified only by a trade name will also not be accepted – there has to be some indication of the chemical nature.

The same information as on the labels, together with an indication of the quantity of waste, must be written legibly on the waste disposal form, copies of which can be obtained from Laboratory staff-in-charge. The form must accompany the waste.

General

If material is packed into used boxes, ensure that old labels are obliterated and the container is marked “this way up”. The total weight should not exceed 5 kg and the dimensions should be about 30 cm^3. Organic or aqueous liquids should be in glass or plastic containers, solids in metal drums or plastic tubs. If large amounts of material have to be packed, approved containers may be obtained from the Chemical Waste Disposal Committee.

Waste Solvents

The University is able to dispose of some common organic solvents by a mechanism that is less cumbersome and costly than for other waste chemicals. A list of solvents that can be accepted is given below (some other solvents may be acceptable but check with the Chemical Waste Disposal Committee first). Waste solvent containers are not dumps and may contain only approved waste organic solvents with limited amounts of solute. Reaction mixtures, oxidants or solutions of oxidants must never be put into the waste solvent containers.

No substances that are category 1 or 2 carcinogens may be put in the waste solvents in any form. Organic liquids acceptable as Waste Solvents (from Code of Practice on the Chemical Waste Management and Disposal Procedure)

Non-chlorinated

- Hydrocarbons: alkanes C5-C12,cyclohexane,toluene, xylene
- C1-C3 alcohols, ethylene glycol
- Diethyl ether and tetrahydrofuran
- Acetone, ethyl and n-butyl acetate

Chlorinated

- C1: dichloromethane, chloroform, carbon tetrachloride
- C2: trichloroethylene, tetrachloroethylene, 1,2-dichloroethane, 1,1,1-trichloroethane
- C3: 1-chlorobutane plus small amounts of non-chlorinated materials but no water

Other solvents may be acceptable, please check with Chemical Waste Disposal Committee staff first.

Containers-The accepted container for transfer of waste solvent to the Waste Store is a square section screw-capped 25 litre polythene carboy. No other containers are acceptable. The containers must be filled only to the 80% level with approved solvents, sealed with their original caps, not leaking vapour or liquid or contaminated on the outside. The Waste Store staff is not allowed to accept over-full, leaking or externally contaminated containers.

Labelling-The container must be labelled with the name, laboratory, type of chemical, date and accurately labelled.

Storage-Separate containers for Chlorinated and non-Chlorinated solvents should ideally be kept in the Waste Store. Large polythene containers of flammable solvents are extremely vulnerable in case of fire and must be kept away from all sources of heat, ignition and flame when not being used to receive waste solvent.

Collection-Waste solvent is accepted by Waste Stores during the hours set for solvent dispensing. Waste Stores are not allowed to accept containers which do meet the criteria described under "Containers" above.

Empty Winchesters-Residues of drying agents, sodium wire and diethyl ether are particularly dangerous and must be emptied and treated. The empty bottles should be taken on a trolley or in a carrier to the Waste Store and NOT left by waste bins.

Procedure for Chemical Waste Disposal

Tatacara Pelupusan Sisa Kimia

Borang Pelupusan Sisa Kimia (Chemical Waste Disposal Form – Bahasa Malaysia)

1.8 Biological and Clinical Waste Disposal

1.8.1 DEFINITION

Biological Hazard refer to biological substances that post a threat to the health of living organisms, primarily that of humans. This can include medical waste or samples of a microorganism, virus or toxin (from a biological source that can affect human health). It can also include substances harmful to animals.

Clinical Waste refer to any waste which consists of human or animal tissues, blood or other body fluids, excretions, drug or other pharmaceutical products, swabs or dressings, syringes, needles or other sharp instruments, being waste which unless rendered safe may prove hazardous to any person coming into contact with it.

Other waste arising from medical, nursing, dental, veterinary, pharmaceutical or similar practices, investigation, treatment, care, teaching or research, or the collection of blood for transfusion, being waste which may cause infection to any person coming into contact with it.

To get better understanding of waste management, there is a need to have a common and internationally accepted definition for the waste generated in university facilities. The following are adapted definitions:

1. Hazardous research laboratories wastes

- Biological (recognizable anatomical waste) and pathological waste, chemical, toxic or pharmaceutical waste including cytotoxic drugs (anti-neoplastics agents), sharps and radioactive waste.

2. Infectious research laboratories wastes

- Waste that has been classified to have the potential of transmitting infectious agents to humans or animals;
- Discarded materials or equipments contaminated with blood and its derivatives, other body fluids or excreta from isolated infected animals or materials.
- Laboratory waste (cultures and stocks with any viable biological agents artificially cultivated to significantly elevated numbers and infected animals from laboratories).

3. Sharps

- All waste with sharps or parts able to cause an injury or an invasion of the skin barrier in the human body. Sharps from isolated infected animals are categorized as infectious waste.

1.8.2 IDENTIFICATION, CLASSIFICATION AND WASTE GROUP

1. Wastes from laboratories can be categorized into the following types:-
   i. Clinical waste
   ii. Radioactive waste
   iii. Chemical waste
   iv. Pressure containers and
   v. General waste

2. Clinical wastes are wastes containing:
   i. Human or animal tissue
   ii. Blood or body fluids
   iii. Excretions
   iv. Drugs
   v. Pharmaceutical products
   vi. Soiled swabs or dressings
   vii. Syringes, needles, sharps
   viii. Any waste that has come into contact or been mixed with any of the above types of wastes.
   ix. Waste unless rendered safe may prove hazardous to any person coming into contact with it.

3. In Malaysia, clinical waste is classified as scheduled waste under the Environment Quality (Scheduled Wastes) Regulations, 2005 which includes:

SW 403	Discarded drugs containing psychotropic substances or containing substances that are toxic, harmful, carcinogenic, mutagenic or teratogenic
SW 404	Pathogenic and clinical wastes and quarantined materials
SW 421	A mixture of scheduled wastes
SW 422	A mixture of scheduled and non scheduled wastes

Presently, the following wastes have been included as scheduled wastes in the above regulations:

- Discarded drugs containing psychotropic substances or dangerous drugs;
- Waste from the preparation and production of pharmaceutical product and discarded drugs containing substances that are toxic, harmful, carcinogenic, mutagenic or teratogenic; and

- Waste containing one or more hazardous substances or products that are explosive, oxidizing, flammable, toxic, harmful, corrosive, irritant, carcinogenic, teratogenic or mutagenic.

4. The following classification is based on the major classification of clinical waste, but specified for practical use in healthcare centre. The classification can be adopted in teaching or research purposes.

   Table 1: Major classification of clinical waste and its recommended management guidance in School of Pharmaceutical Sciences, USM

Description	Waste management guidance	Collection Disposal Container
1. **Blood and body fluid waste**		
i) Soiled surgical dressings e.g. cotton wool, gloves, swabs. All contaminated waste from treatment area. Plasters, bandages, gloves which have come into contact with blood or wounds, cloths and wiping materials used to clear up body fluids and spills of blood.	Special requirement on the management from the viewpoint of infection prevention. These categories of waste must always be incinerated completely in an appropriate incinerator.	Yellow plastic bag biohazard.
ii) Material other than reusable linen, from cases of infectious diseases (e.g. human biopsy materials, blood, urine, stools)		Yellow plastic bag biohazard.
iii) Pathological waste including all human tissues (whether infected or not), organs, limbs, body parts, placenta and human foetus, animal carcasses		Yellow plastic bag biohazard.

and tissues from laboratories and all related swabs and dressings.		
2. **Waste posing the risk of injury (''sharp")** All objects and materials which are closely linked with teaching or research activities and pose a potential risk of injury and/ infection, e.g. needles, scalpel blades, blades and saw, any other instruments that could cause a cut or puncture.	Collected and managed separately from other waste. The collection container; must be puncture resistant and leak tight. This category of waste has to be disposed/ destroyed completely as to prevent potential risk of injury/infection.	Yellow sharp bin biohazard container.
3. **Infectious wastes** Clinical waste arising from laboratories (e.g. pathology, hematology, blood transfusion, microbiology, histology) and post mortem rooms, other than waste included in category 1 waste.	Special requirement on the management from the view point of infection prevention. This category of waste must always be incinerated completely in an appropriate incinerator.	Autoclavable plastic bags (need to autoclave before disposal).
4. **Pharmaceutical and cytotoxic pharmaceutical wastes** i) Pharmaceuticals which have become unusable for the following reasons :- ● Expiry date exceeded ; ● Expiry date exceeded after the packaging has been opened or the ready-to-use	**Class I** – Pharmaceuticals such as chamomile tea, cough syrup, and the like which pose no hazard during collection, intermediate storage and waste management: Managed jointly with municipal wastes (into drain). **Class II** – Pharmaceuticals which pose a potential hazard when used improperly by unauthorized persons: managed in an	

preparation prepared by the user; or ● Use is not possible for other reasons (e.g. call-back campaign) ii) Wastes arising in the use, manufacture and preparation of and in the oncological treatment of patients with, pharmaceuticals with a cyctotoxic effect (mutagenic, carcinogenic and teratogenic properties).	appropriate waste disposal facility. **Class III** – Heavy metal which containing unidentifiable pharmaceuticals: managed in an appropriate waste disposal facility. Intermediate storage of these wastes takes place under controlled and locked conditions. For reasons of occupational safety, cytotoxic pharmaceutical wastes must be collected separately from pharmaceutical waste and disposed of in a hazardous waste incineration plant.	
5. **Other infectious wastes** All wastes that have potential of transmitting infectious agents to humans or animals. Used disposable bed-pan liners, urine containers, incontinence pads and stoma bags.	Dispose in hazardous waste.	Yellow plastic bag biohazard.

1.8.3 WASTE SEGREGATION

1. It is the responsibility of the student to ensure that segregation of clinical waste is carried out at source and that all clinical waste are deposited only in yellow bags and sharps in sharp bins only.

2. All students shall follow standard colour coding which is widely accepted:
   (a) Black : General wastes
   (b) Yellow : Clinical wastes for incineration only
   (c) Light blue : Waste for autoclaving or equivalent treatment

3. Clinical waste requiring autoclaving, or other equivalent treatment, before disposal shall be stored in the light blue autoclave bags before such treatment but should be placed in the yellow plastic bags after treatment.

1.8.4 LABELLING AND MARKING

1. All bags and drum containers must be identified at the point of production and should be indelibly and clearly marked with biohazard symbol.

2. For storing of waste in container, appropriate label should be attached on the container. The date when the scheduled wastes are first generated, name, address and telephone number of the waste generator shall be included in the label.

3. Labelling can be done in a number of ways:
   - Writing the information on the bag or container.
   - Using pre printed tape.
   - Using pre printed self-adhesive address labels supplied on a peel-off roll.
   - Tie-on tag label, with information written on them.
   - Self-locking plastic tags, pre-printed with all the required information.

1.8.5 HANDLING, STORAGE AND INTERNAL TRANSPORTATION

1. At all times where manual handling of yellow clinical waste bags is required, the necks of the bags should be positioned to allow access for further movement of the bags when necessary. Manual handling of waste bags should be minimized wherever possible.

2. All clinical waste bags should be handled by the neck only.

3. Specific areas for the initial storage of clinical wastes, in the lab shall be made available and located adjacent to the sources of the waste. The bag and containers containing clinical wastes from the initial storage area shall be removed regularly.

4. Double yellow bags shall be used for clinical waste from high risk areas such as infectious diseases and isolation lab units and for heavy clinical wastes such as animal tissue.

5. Syringes with attached needles shall be discarded into sharps container as one unit.

6. Internal transports routes from lab to central storage (biohazard cabin) shall be designed to minimize the passage of waste through other clean areas.

7. Dedicated wheeled containers, trolley or carts shall be used to transport the waste containers to the main storage areas. These vehicles shall be reserved only for the transportation of clinical waste. They should be thoroughly cleaned and disinfected immediately following any spillage or accidental discharge.

Figure 1: Dedicated bin can be used in labs which generate large quantity of biohazard waste for temporary use. Please label the bin accordingly.

8. Wheeled containers, trolleys for transferring clinical wastes within lab shall be designed as such that ;
    - The surfaces of wheeled containers are smooth and impermeable.
    - Particles of waste are not easily trapped on the edges or crevices.
    - They shouldn't contain any leakage from damage containers.
    - Easily be cleaned, disinfected and drained.
    - Waste may be easily loaded, secured and unloaded.

9. All clinical waste bags shall only be handled by its neck and the movement of the clinical waste bags shall be kept to the minimum.

10. For waste that has high potential to spread infection, it must be put into two layers of yellow bags and tie it tightly.

11. Syringes with attached needles shall not be dismantled and recapped before discarding into sharp bins.

12. Dedicated trolleys or carts shall be used to transport the clinical waste bags to the collection point. They shall not be used for other purposes except for transporting clinical waste bags.

1.8.6 TEMPORARY STORAGE OF WASTE IN THE LABORATORY

1. All wastes shall be stored in containers which are compatible with the scheduled wastes to be stored, durable and which are able to prevent spillage or leakage of the scheduled wastes into the environment.

2. Containers containing scheduled wastes shall always be closed during storage except when it is necessary to add or remove the scheduled wastes.

3. Maximum time for storing waste in the laboratories must not exceed two weeks.

Figure 2: Biohazard waste bin.

1.8.7 SPILL OR ACCIDENTAL DISCHARGE

1. Spills of clinical wastes or materials are probably the most common emergencies related to hazardous materials. Basically the same response procedures are applied, regardless of whether the spills are from material or waste. The response to emergencies should ensure the following:
   i) Inform laboratory staff-in-charge as soon as possible.
   ii) The waste management plan should be followed.
   iii) Contaminated areas should be cleared and if necessary disinfected.
   iv) The exposure of workers should be limited as much as possible during the operation.
   v) The impact on the environment should be limited to the best extent possible.
   vi) The person in charge should be prepared for emergency response and required equipment should be easily available at all points in time and within reasonable distance to ensure that adequate response can carried out safely and routinely. For dangerous spills, clean up should be carried out by designated, specially trained personnel. Please refer to laboratory staff in-charge.

2. All spills shall be cleared and disinfected immediately. The laboratory management is responsible to arrange for cleaning and disinfecting spills done to the waste generated by their own laboratory. Please report any spills immediately.

1.8.8 DISPOSAL OF BIOHAZARD WASTE

1. To dispose biohazard waste from the lab, please send it to the temporary collection point at biohazard cabin (near the PPSF store, block J13).

2. Waste collection are scheduled on Tuesday, every two weeks at 3.00 to 4,00 pm. Users or researchers are required to make an appointment with staff-on-duty in advance. Biohazard waste shall be treated and packed properly in designated containers prior to send for disposal.

3. The Biohazard Collection schedule (and duty roster) can be referred at biohazard cabin or accessed through the school website or through the following link: BIOHAZARD

4. Any enquiries or clarifications regarding biohazard waste, kindly refer to Biohazard Committee as listed below:

Name	**Ext. number**
Mrs. Che Gayah Omar	5497/4735
Mr. Faizal Muhaimin	4735
Mrs. Nuridah Ahamed	4735
Mrs. Salida Ibrahim	2252
Mr. Selvamani a/l Narayan Nair	2429

2.0 LABORATORY FACILITIES

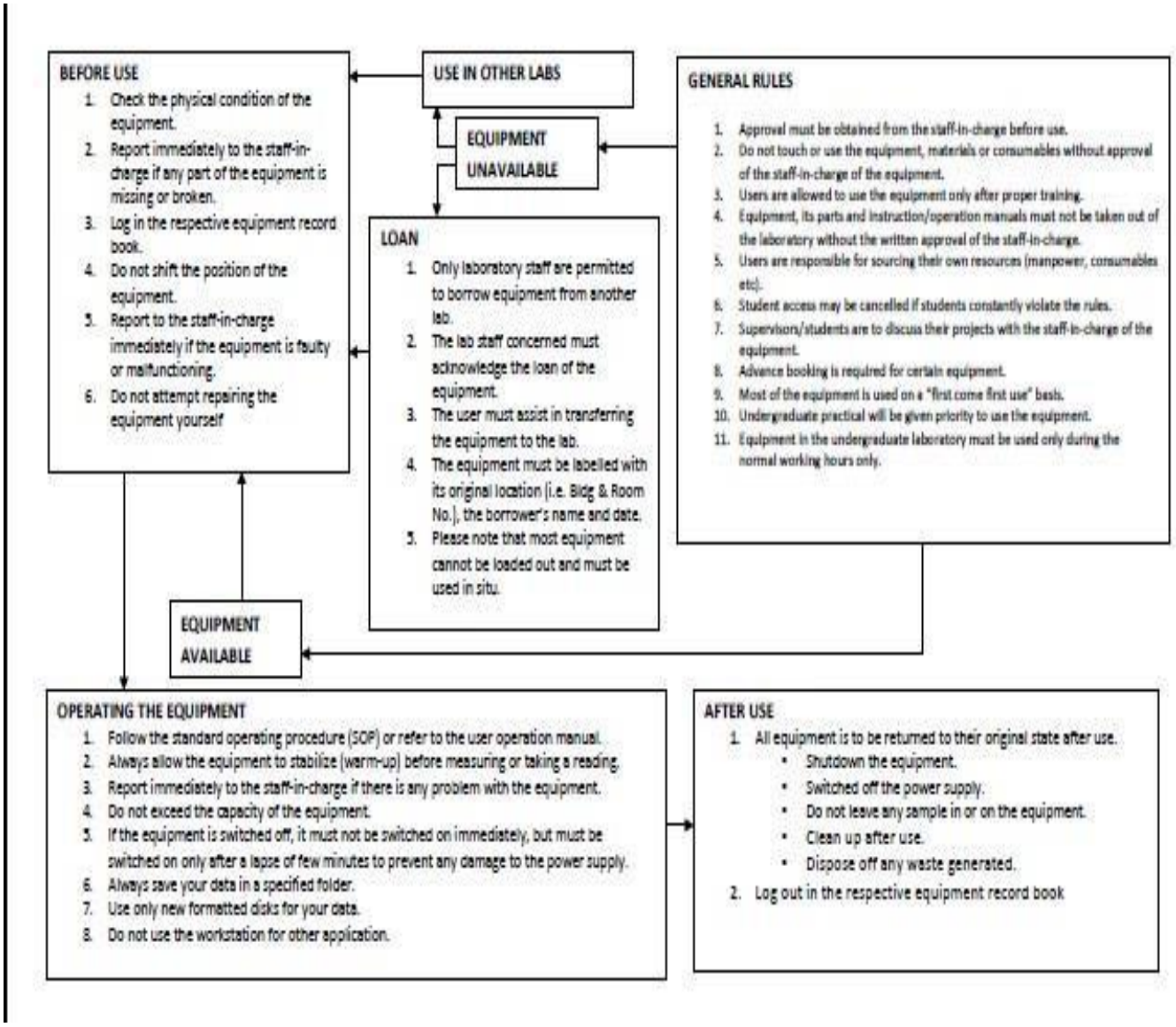
2.1 PROCEDURES FOR LABORATORY SUPPLIES REQUEST
2.2 PROCEDURES FOR USE OF EQUIPMENT

2.1 Procedure for Laboratory Supplies Request

1. A student should obtain 3 different quotations for a laboratory supply.
2. A Goods Request Form (GRF) must be filled out and endorsed by the supervisor / grant holder.
3. The GRF must be submitted together with the quotations, to the respective Science Officer / Pharmacist of the Discipline for checking.
4. The GRF should then be handed over to Mr. Jazmi Danial at the Main Office for issuance of Purchase Order (PO).
5. When the goods have been received, the student must check that all items are in the correct quantity and good working order. If not, the student must report it to the supervisor.
6. The student, together with the supervisor, shall be responsible for transporting the goods from the Store/Main Office to their respective lab.
7. If all items are correct, sign and date the Invoice/Delivery Note that has been sent with the goods.
8. Give the Invoice and Delivery Note to Mr. Khairul Azly at the Store immediately, to proceed with payment to the suppliers.
9. The student shall be responsible for the follow-up with the supplier in the event of late delivery or unsatisfactory condition of the goods.

Goods Request Form

2.2 Procedures For Use Of Equipment



If you need to move an equipment or instrument out of the lab, **your supervisor** must e-mail the lab staff-in charge to inform the School of this movement.

3.0 GRADUATING AND LEAVING THE LABORATORY

Clearance Procedure

The School of Pharmaceutical Sciences requires that when postgraduate students or researchers leave, all chemicals, glassware, animal house supplies or other potentially hazardous material or equipment, must be cleaned and returned or disposed of properly by them. Later users of a laboratory should never be left with a legacy of abandoned and potentially hazardous material or equipment.

The Dean will not allow a thesis to be processed to *viva* without a completed and fully signed copy of the Laboratory Clearance Form.

The following procedures are to be followed by **everyone** performing laboratory research work in the School of Pharmaceutical Sciences.

1. Chemicals & Natural Products

- Ensure that all containers of chemicals are labelled with their chemical name (not just a sample code) and are securely closed.
- Extracts or purified products are labelled with sample code/name, researcher's and supervisor's name, date and are securely closed. Extracts or purified products must be stored in bottles or vials and not in flasks, beakers, evaporating dishes or crucibles.
- Empty and clean and, if necessary, return to Laboratory staff in-charge/Store all beakers, flasks and other glassware.
- Check refrigerators, freezers, fume hoods and bench tops as well as cupboards for chemicals and natural products. Give particular attention to shared storage areas.
- If chemicals, extracts or natural products are useful, then responsibility for them can be transferred to another person who is willing to accept the responsibility and who has indicated such willingness in writing. If no such person can be found, dispose of the material in the proper way.
- Prepare for disposal all chemicals that are not to be removed or that are not accepted by another person. Detailed instructions for this are given here and in Chemical Waste Management & Disposal Procedure which is included in the code of Practice of the University Safety Office. Approved containers are available from the Laboratory staff in-charge and if the quantity of chemicals, extracts or natural products to be cleared is large, contact Mr. Mohd Fadzli Ghazali (ext. 6006) at an earlier stage. The process of disposal can take some time so begin the procedure some weeks before departure from the laboratory. Complete the actual removal of the chemicals before the laboratory is vacated.
- Clean and tidy up your work area.
- Complete the Clearance Check List including the appropriate signatures.
- Inform your Research Supervisor and/or the Head of Section when the laboratory has been cleared and record his/her approval.

2. **Microorganisms, Cultures and Blood Products**

- Ensure that all containers of microorganisms are properly labelled and secured.
- Decontaminate waste material by autoclaving and dispose of properly. Refer to the University Code of Practice "Biological Safety and Genetic Modification".
- Clean glassware, incubators, drying or curing ovens, refrigerators and freezers.
- If samples are to be kept, then responsibility for them can be transferred to another person who is willing to accept the responsibility and who has indicated such willingness in writing. If no such person can be found, dispose the material in the proper way.
- Clean and tidy up your work area including the removal of any redundant biohazard signs.
- Complete the Clearance Check List including the appropriate signatures.
- Inform your Research Supervisor and/or Head of Section when the laboratory has been cleared and record his/her approval.

3. **Radioactive Material**

- In normal operation, radioactive materials are carefully recorded and disposed of regularly. Carefully label and make secure any remaining material e.g. stock vials, sealed sources etc. Ensure that each item has an associated Stock Card. If it does not have, start one.
- Dispose of waste material according to the procedures outlined in the University Code of Practice "Work with Ionizing Radiation". Advice and assistance can be obtained from the University Occupational Safety & Health Unit. As radioactive materials are disposed, the Stock Cards must be signed off and sent to the University Occupational Safety & Health Unit.
- If samples are to be kept, then responsible person must be stated clearly in written document. If no such person can be found, please dispose the material in the proper way. Record such transfers and disposals on the appropriate Stock Card.
- It is essentially important that radioactive material is not abandoned by departing research groups. This can have serious and costly consequences. If material is to be left, inform the University Occupational Safety & Health Unit in writing and obtain their permission to do so also in writing.
- Check contamination and if necessary decontaminate, clean and tidy up the work area. Where significant activities have been held and used and the laboratory is to revert to non-radioactive use, the University Radiation Protection Adviser must confirm in the writing that the laboratory has been adequately cleared and decontaminated.
- Complete the Clearance Check List including the appropriate signatures.
- Inform your Research Supervisor and/or Head of Section when the laboratory has been cleared and record his/her approval.

4. **Mixed Hazard**
   - For mixed hazard i.e. involving more than one of chemical, radioactive or biological materials apply all of the appropriate signatures.
   - Complete the Clearance Check List including the appropriate signatures.
   - Inform your Research Supervisor and/or Head of Section when the laboratory has been cleared and record his/her approval.

Laboratory Clearance Form

4.0 HUMAN ETHICS & ANIMAL ETHICS

❖ **Human Ethics**

Research involving human subjects requires prior ethics review and approval by Ethics Committee.

- A human subject (in the context of research) is a living individual about whom an investigator obtains either data through
  - intervention (e.g. Clinical trial) or
  - interaction (e.g. Questionnaire in health survey) with the individual, or
  - identifiable private information.

For students from the School of Pharmaceutical Sciences, Universiti Sains Malaysia (USM);

1. Approval from JEPeM USM (Jawatan Kuasa Etika Penyelidikan Malaysia) has to be obtained prior to commencement of study:
http://www.jepem.kk.usm.my/

2. If the study involves Ministry Of Health Malaysia, approval from MREC (Medical Research Ethics Committee) has to be obtained prior to commencement of study, and the approval submitted to JEPeM USM: http://nih.gov.my/web/mrec/

For further information regarding Clinical Research In Malaysia (CRM), you may browse this website:
http://www.clinicalresearch.my/

❖ **Animal Ethics**

Any research involving animal subject requires prior ethics review and approval by the ethics committee. Please refer this website:

Institutional Animal Care and Use Committee (USM IACUC)
http://www.kk.usm.my/usmiacuc/index.php/en/