



**THE UNIVERSITY OF HONG KONG**

**DEPARTMENT OF CHEMISTRY**

**Occupational Safety and Health Policy And Management System**

**Departmental Safety Handbook**

**2009 Edition**

## INTRODUCTION

Many chemical reactions are potentially hazardous or violent. In many cases, hazardous and violent reactions can be predicted and proper precautions should be taken. Past experience has shown that almost invariably, personal injuries have been directly or indirectly caused by carelessness or negligence. Thus it is important that all chemical workers are keenly aware of the potential hazards in the chemical laboratory and work in a safe and responsible manner.

The policy of the Department of Chemistry of the University of Hong Kong is to seek to attain and to maintain the highest standards of safety within the working environment, to protect you and those working around you. This safety handbook is published as a documentation of the Department's commitment.

Part I of this handbook comprises the Department's policy statement and management system. Part II deals with procedures in case of emergencies and fires. Part III covers the laboratory code of safety practice and specific procedures. The Appendices give details of the safety management system and responsibilities.

All Chemistry Department employees, including postgraduate students, research associates and assistants, and laboratory technicians and assistants are required to read this handbook before conducting any experiments. New staff will receive an induction briefing from a staff member of the Departmental Safety Committee as soon as possible after the commencement of their employment.

Academic members of staff will draw the attention of their undergraduate students to the relevant sections of this handbook at the beginning of each academic session and prior to any work in the laboratory.

Revised August, 2009

Head

Department of Chemistry

# CONTENTS

	Page
Introduction	i
Contents	ii
I Statement of Occupational Safety and Health Policy	1
II Actions in Emergency Situations	3
1. Fire Alarm and Evacuation Procedure	3
2. Emergency Alarm and Action-Chemical and Mercury Spills	5
3. Accident Reports	6
4. Safety Equipment and Procedures	6
III-A Laboratory Code Of Safe Practice	7
1. Food and drink	7
2. Smoking	7
3. Undergraduate Experiments	7
4. Eye Protection	7
5. Additional Protective Clothing and Gear	7
6. Eye Washes and Safety Showers	8
7. Laser Safety	8
8. Flammable Chemicals and Solvents	8
9. Fume Cupboards	9
10. Classical Column Chromatography	10
11. Disposal of Chemical and Other Wastes	10
12. Housekeeping	10
13. Returning of Chemicals to the Chemical Store	11
14. High Energy Radiation	11
15. Precautions for Handling Cryogenics	11
16. Working with Glass Apparatus	12
17. Roof Laboratories	12
18. Chemical Store, Mechanical/Electronics Workshop & Glassblowing Workshop	12
19. Project Completion	13
20. Visitors	13
21. Maintenance Workers	13
III-B Transport Of Chemicals	14
III-C Unattended Experiments	14
III-D Working Outside Normal Working Hours	15
III-E Chemical Hazards	15
III-F Gas Cylinders	19
III-G Electrical Power	20
Appendices	
A. Occupational Safety and Health Management System	22
B. Specific Responsibilities for Occupational Safety and Health within the Department	26
C. Reference Materials	31
D. Project Completion Form (Sample)	32
Safety Relevant and Emergency Telephone Numbers	33

## **I. STATEMENT OF OCCUPATIONAL SAFETY AND HEALTH POLICY**

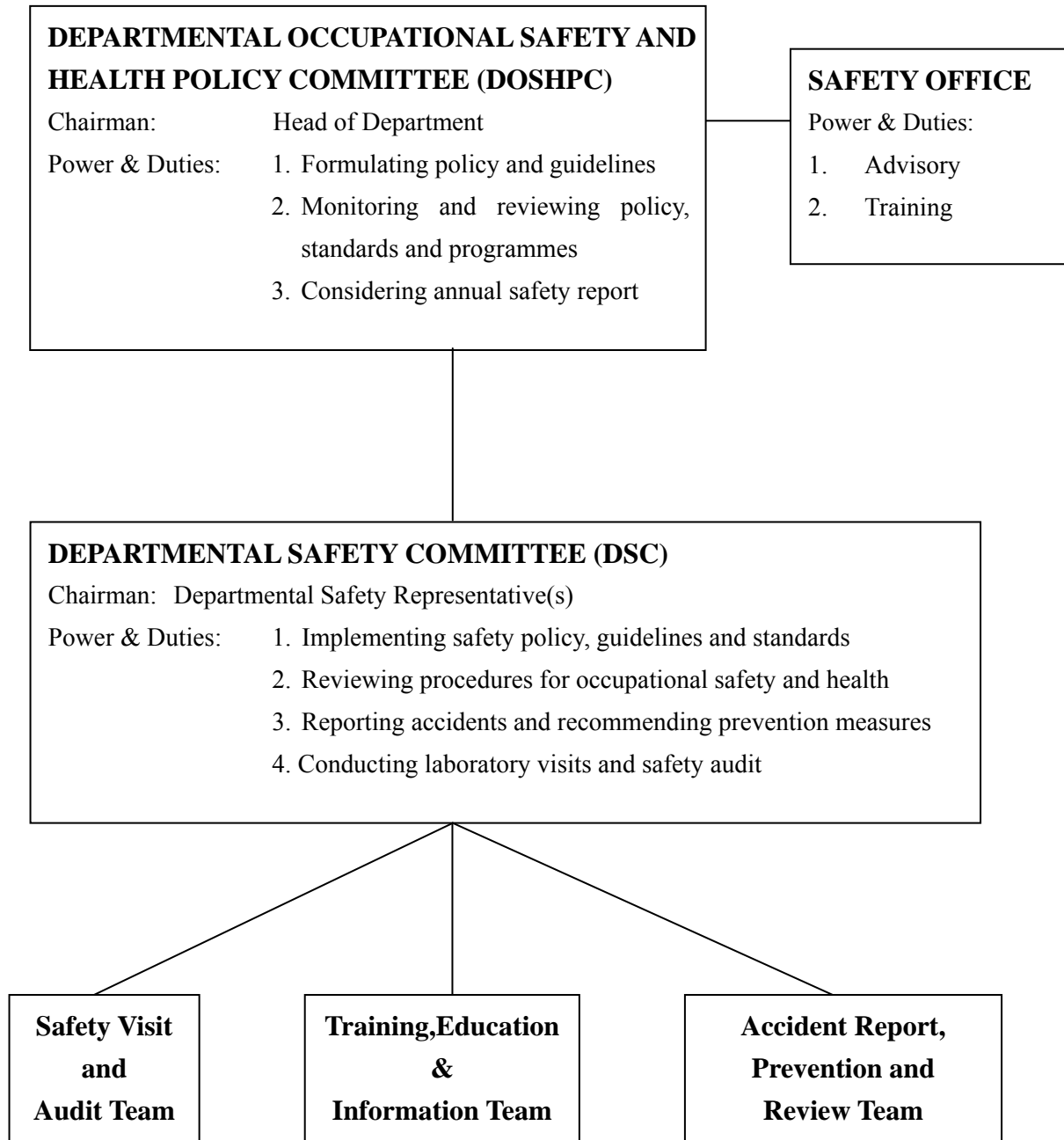
### General Policy and Responsibility

1. The Department of Chemistry at the University of Hong Kong is committed to ensuring the safety and health of all its employees, students and visitors.

In pursuit of this goal the Department will comply with all local laws and, as far as is reasonably practicable, provide accepted international standards of environmental and occupational safety and health.

2. The Department will take all reasonable steps within its power to meet this responsibility, paying particular attention to the provision of :-
  - a) A safe and health environment for work and study;
  - b) Safe arrangements for the use, handling, storage and transport of articles and substances; and information, supervision, instruction and training designed to enable all Chemistry Department staff and students to avoid hazards and contribute positively to their own safety and health at work.
3. Achievement of environmental/occupational safety and health requires a positive commitment from all Chemistry Department employees and students. Each individual has the responsibility to ensure that by his/her activities or behaviour he/she does not create risks for himself/herself and/or others. Each individual has the responsibility to take all reasonable steps to protect himself/herself and others from any foreseeable risks associated with their activities at work.
4. This statement will be brought to the attention of employees, postgraduate and undergraduate students. It will be reviewed periodically and may be supplemented in appropriate areas by further statements relating to the work of particular fields.

# **ORGANISATION CHART FOR OCCUPATIONAL SAFETY AND HEALTH MANAGEMENT SYSTEM**



## II. ACTIONS IN EMERGENCY SITUATIONS

### *FIRES, ACCIDENTS AND EMERGENCIES*

The signal of the **fire alarm** is a **continuous** ringing that can be heard over all parts of the building. You must evacuate the building on hearing the fire alarm.

#### 1. FIRE ALARM AND EVACUATION PROCEDURES

The fire alarm buttons are located adjacent to the fire-hose boxes at both ends of each floor near the staircases. To activate the alarm, **break** the small glass window. Breakage should be complete as only then will the activation button pop up and sound the alarm and activate the flashing lights.

The fire alarm is to be activated for all emergency situations requiring the evacuation of the building, including fires, toxic gas release, or other chemical accidents and **emergencies**. Activation of the alarm will **automatically** inform the Fire Services Department to send the fire brigade to our location.

When you hear a fire alarm and/or see the visible fire alarm (flashing lights), evacuate the building as follows:

- SWITCH OFF     gas and oxygen taps and electrical equipment that do not require continuous operation;
- PULL DOWN     the sash of the fume cupboard;
- WALK OUT       in a quick but orderly manner using the stairs via the nearest exit, and go to the assembly point at the Yuet Ming Fountain in front of the building at G-Level. Remain at the assembly point and obey instructions given by staff from the Chemistry Department and/or Safety Office;
- KEEP CLEAR     from the building until an “all clear” announcement to re-enter the building has been given.

***Do not go back to collect your belongings, and do not use the elevators.***

In the event of an evacuation, *Departmental Fire Wardens* of each building/floor will help direct the evacuation.

#### **IN CASE OF DISCOVERING A FIRE**

Attend to people-- **save lives first**.

If you see a person on fire, smother the flames with a fire blanket or get the person to a safety shower, whichever is easier and faster.

Alert those in the vicinity.

Activate the fire alarm.

Tackle the fire with the appropriate fire extinguisher or hose-reel.

Do not take personal risks.

Close doors/windows if possible.

Follow the evacuation procedure to leave the premises.

If you are a witness to the incident, identify yourself to the *Safety Officers* and/or firefighters, and give the location and any other pertinent information concerning the fire.

**In the very rare instance should the fire alarm fail to sound after activation, call the *Technical Manager*, and call Emergency at 66-999.**

### CLASSIFICATION OF FIRES

Class A - Fire involving ordinary combustible solid materials such as wood, paper and rubber.

Class B - Fires involving flammable liquids such as organic solvents and gasoline.

Class C - Fires involving electrical equipment

Class D - Fires involving metals.

### FIRE FIGHTING EQUIPMENT

- a) FOAM extinguisher (painted cream) – for classes A or B fires.
- b) CARBON DIOXIDE extinguisher (painted black) – for classes B or C fires.
- c) POWDER extinguisher (painted blue) – for **any** class of fires; in particular it is the only one suitable for class D fires.
- d) HOSE-REEL – for large class A fire.
- e) FIRE BLANKET and SAND are handy fire fighting materials to smother flames.

### FIRE PREVENTION

1. Obey the University's policy of **NO SMOKING** on all university premises. If you detect signs of people smoking, call HKU Security 2859-2882.
2. Use caution when using any open flames, considering the flammability of any adjacent apparatus and experiment.
3. Heat flammable solvents only on electrically heated water/oil baths or heating mantles and ensure that solvent vapours are well vented and not trapped around electrical appliances.
4. Check all electrical equipment before use. Watch for frayed cords and wrong Live and Neutral wiring.
5. Do not overload electrical sockets.
6. Do not keep an excess of flammable solvents and chemicals in the laboratory.
7. Experiments using flammable chemicals should be conducted inside the fumehood. The handling of all flammables should also be done as much as possible inside the fumehood.

8. Switch off all unnecessary electrical equipment before leaving the laboratory.
9. Dispose of waste solvents in the waste solvent container.
10. Keep corridors, fire exits, passageways, safety showers, eye wash stations and fire extinguishers easily accessible and free from obstruction.
11. Keep your work area clean and tidy.

## 2. EMERGENCY ALARM AND ACTION

The emergency alarm is to be activated in the event of a chemical spillage, traumatic injury, splash in eyes, and other emergencies. The signal of the emergency alarm is a local siren and sounds only in the location of the respective emergency buttons. It alerts research personnel in laboratories on that same floor to warn them against entering this vicinity. It does not yet signal a full building evacuation.

If you are involved in a localized accident/incident, or if you discover a localized emergency situation, raise the emergency alarm immediately. Do not try to rectify an emergency situation **unless** it is within your competence to do so and you do not put your life at risk.

The Emergency Alarm buttons are located in the doorway of each laboratory exit, outside the laboratory. To activate the emergency alarm, push the red button. To deactivate the alarm, turn the button in clockwise fashion (as indicated on the button).

In the event of fire or other major emergencies, or should the dangers of the localized incident grow, the fire alarm should be activated. The emergency alarm will act as an early warning and precursor to the fire alarm, and it will also serve as a location indicator for attending emergency service personnel.

### **IN CASE OF A CHEMICAL SPILL**

Alert people in the vicinity immediately. Vacate the immediate area.

If the spill is inside the fume cupboard, press the emergency button, switch off all electrical equipment, and pull down the sash.

If the spill is on the open ground, and if it is not large, confine it by covering the spill with adsorbent (obtained from the Chemical Spillage Kit) while wearing appropriate protective gear, if it is safe to do so. Turn off all nearby electrical equipment. The area should be ventilated by opening the windows and nearby fume cupboards. Collect the spent adsorbent in a polyethylene bag and attach a waste label to identify its contents. Call the Safety Office, Dangerous Good Management (2859-2402) to dispose of the spill waste.

If the spill is on the open ground, and if it is very large amount of flammables/or if it is a toxic, noxious, hazardous or highly volatile chemical, activate the emergency alarm. If it is safe to do so, confine the spill as above, turn off the electrical equipment and open windows. If it is not safe to treat the spill, evacuate the room immediately and close the door of the laboratory. Call to inform the *Technical Manager* and/or *Safety Office*.

When you hear an emergency alarm, note its location, do not enter that laboratory/room and make sure that the doors are closed. If necessary, prevent others from entering the room also.

If the spill poses a threat that cannot be contained in the one room, activate the fire alarm to evacuate the entire building.

If you are a witness to the incident, identify yourself to the *Safety Officers* and/or firefighters, and give the location and any other pertinent information concerning the spill.

If it is a mercury spill, such as from a broken thermometer, the Safety Office has published guidelines on how to deal with it: <http://www.hku.hk/safety/pdf/CSL.pdf>, Section 12.3. Mercury is toxic and volatile and such spills should be cleaned up immediately. Sprinkling sulfur on it only temporarily coats the surface, and the spill should never be left in this state. Instead, use a Hg Absorb Sponge to amalgamate mercury droplets onto the sponge, so that the resultant amalgam would not emit mercury vapors. The used sponges should be collected into a polyethylene bag, sealed, labelled, and the Safety Office should be informed (2859-2402) to collect the special waste. Hg Absorb Sponges are available from the Chemical Spillage Kit or the Safety Office.

Adsorbents which have been used for treating a chemical spill **must** be reported to the *Technical Manager* so that the Chemical Spillage Kit will be replenished.

### 3. ACCIDENT REPORTS

All accidents and incidents of dangerous occurrences (fires, chemical spills, injuries) **must** be reported to the *Technical Manager* and a *Departmental Safety Representative* at the **first** possible opportunity. The *Technical Manager* will direct you to complete the correct forms to document the incident. The *Departmental Safety Representative* will study the incident and make appropriate safety recommendations to prevent recurrence.

### 4. SAFETY EQUIPMENT AND PROCEDURES

All personnel working in the Department **must** familiarize themselves with the **locations** of:

- First aid boxes;
- Chemical spillage kit;
- All exit routes;
- Fire extinguishers: CO<sub>2</sub>, foam, powder, sand buckets, hose-reels;
- Fire blankets;
- Emergency showers;
- Eye wash stations;
- Emergency alarms;
- Fire alarms.

Fire extinguishers, and sand which have been used for fire-fighting **must** be reported to the *Technical Manager* so that they can be replenished or recharged immediately by the Safety Office.

### III A LABORATORY CODE OF SAFE PRACTICE

#### 1. Food and drink

Eating, drinking and the application of cosmetics in laboratories is potentially hazardous to health and are prohibited, as is the storage of food in laboratory refrigerators.

#### 2. Smoking

Smoking is strictly prohibited on all premises of the University of Hong Kong. Please refer to the University Smoking Policy (1995). If you detect signs of people smoking, call HKU Security 2859-2882.

#### 3. Undergraduate Experiments

Undergraduate students should only engage in authorized experiments within the scheduled laboratory period in the presence of supervisory staff. They are required to keep to the guidelines laid down in individual experiments (e.g. working in a fume cupboard) and not to deviate from these instructions unless the matter has been approved by an *Academic Staff Member* or a *Demonstrator* on duty. A student must inform his/her demonstrator when his/her experiment is temporarily unattended.

*Demonstrators* teaching undergraduate laboratory courses must themselves exemplify safe laboratory behaviour and practices and ensure the safety of students conducting experiments under their supervision.

#### 4. Eye protection

Undergraduate and postgraduate students, and staff members working in laboratories **MUST** wear safety goggles or safety glasses.

The lab goggles should be worn **at all times while you are inside the laboratory**, and not only while you are conducting experiments. If a new research student or worker does not have a pair of safety goggles/glasses, the Department/Store will supply him/her with a pair.

No contact lenses should be worn when working in the laboratory.

#### 5. Additional Protective Clothing and Gear

Lab coats provide protection against chemicals spills and fires and should be worn while doing experiments. In addition to lab coats, long pants and closed-toe shoes should be worn for protection while working in the laboratory. Long hair should be tied back.

Gloves made of the appropriate materials should be worn to protect against heat, corrosive chemicals, or solvents.

In order to not contaminate the outside premises, lab coats and gloves should not be worn outside the laboratory.

## 6. Eye Washes and Safety Showers

Eye washes and safety showers are installed in the laboratories of the Chong Yuet Ming Chemistry Building, and in the corridors of the Kadoorie Biological Sciences Building. Use these freely if needed, irrespective of local flooding. These equipment are regularly checked and maintained by the Department. Problems and malfunctions should be reported to the Department's *Technical Manager*.

## 7. Laser Safety

Laser goggles for the specific wavelength range and laser power must be **WORN** in laboratories with exposed laser beams.

Simple Perspex shields can be built around laser beams to reduce the hazard and obviate the need to wear laser goggles. However, the shields **must** be checked (with a laser power meter) to ensure that no laser light leaks from the walls or seams.

Any reflective object, such as a spatula, can be a potential hazard near laser beam. No apparatus except for the required optics should be placed on the laser table or in the laser beam.

## 8. Flammable Chemicals and Solvents

The allowable amounts of flammables and chemicals in each laboratory have been posted at the entrance to each laboratory. To reduce the fire risk from flammable liquids, the quantity of such solvents stored in individual laboratories should be kept as **LOW** as reasonably practicable. Place orders for flammable solvents more frequently and in quantities appropriate for the laboratory. Solvent bottles must be **KEPT OFF THE FLOOR**. Only spark-free refrigerators are to be used for storing low flash point flammable liquids.

Never use open beakers or dishes for holding or storing flammable solvents, except temporarily for controlled small-scale experiments. Transfer of solvent from bulk container to solvent bottle/apparatus must be carried out inside a fume cupboard. All solvents must be returned to the **designated yellow fire-resistant and vented cupboards** in laboratories after use.

Many flammable solvents are now dried and dispensed from the drying column apparatus in Room of the Chemistry building. If additional solvent or gas drying is needed, the research worker must consider modern, and in particular, physical methods of removing moisture. The use of sodium metal for large-scale drying of solvents is prohibited.

Procedures of chemical methods for drying of solvents **must** be approved by your *Research Supervisor*. A list of solvent drying methods is also kept with the *Technical Manager* for reference.

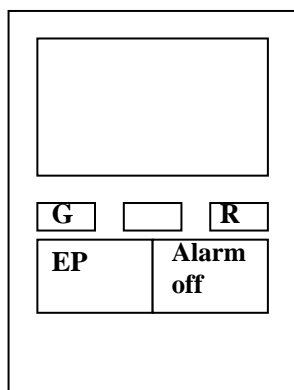
Flammables should not be stored in the corridors.

## 9. Fume Cupboards (FC)

All experiments involving reactive and flammable chemicals should be performed inside the fume cupboards (FC). When not being used, the sash of the FC should be pulled down. If you are working in the FC, the maximum working sash height is marked on each fume cupboard. Do not use the FC with the sash opening above this mark. If you are carrying out a prolonged reaction in the FC, you should lower the sash to about 50mm.

You should consult the separate description by the Safety Office on the “Use of the Secutromb auxiliary air fume cupboard”, a copy of which is kept with the *Technical Manager*. The following is a summary on the indication and signal of the control system.

### FC Indicator Panel



Fume cupboards installed in the chemistry building are of the energy-saving type. Under normal operation, air through the hood is not drawn from the laboratory but directly from outside the building.

The normal status of the FC is indicated by the **GREEN (G)** light. This indicates that both exhaust and supply air systems are functioning.

When the Exhaust fan fails, the green (G) light goes off, the **RED (R)** light will be illuminated and the **alarm (beeping)** will be activated.

The illumination of the **RED (R)** light indicates that the FC is running in the emergency mode or there is something wrong with the exhaust or supply system.

Stop the use of the FC when the green (G) light goes off and report the situation to the *Technical Manager*.

When there is a spillage of reagents or if you are handling a particularly toxic chemical inside of the FC, you should manually press the **Emergency Purge (EP)** to initiate emergency operation. In this mode, there is still exhaust air but no supply air, thus there is **maximum** evacuation of air out of the FC. In the mean time, you should clean up the spill inside the FC or finish using then contain the toxic chemical

The **Alarm off** key is used to temporarily turn off the alarm, such as when you are working in the hood and need to have the sash above the maximum sash height.

In order to check that the FC is operating correctly, adhere a thin strip of tissue paper to the lower edge of the sash. If the FC is functioning normally, the tissue will be drawn into the FC. If not, it is not functioning properly and you **MUST** report this to the relevant *Laboratory Technician* or *Technical Manager* who will begin the process of having the fault repaired by Estates Office. All malfunctioning FC's **must** have an “Out of Action” label clearly displayed over the window and should not be used.

The FC should be regularly maintained by cleaning the side screens every 4-6 months. It is the responsibility of all research workers to keep the FC's clean and free of unnecessary chemicals and debris. Before repairs, the FC's should be clean and cleared of chemicals so that FC Maintenance Staff are not subjected to unnecessary risks when fixing and working on the FC.

#### 10. Classical Column Chromatography

Research workers are requested to use the fume cupboard for column chromatographic separations and not to perform this operation on the bench. If one is compelled to do the separation on the bench, all effort must be made to contain the solvents and cover the collection flasks.

#### 11. Disposal of Chemical and Other Wastes

Hong Kong Government regulations **prohibit** the following from being poured down the drain: organic solvents, mineral oil, heavy metals, strong acids and alkalis.

These materials must be disposed of by placing them in the appropriate waste containers supplied by the Safety Office. The waste containers are stored in the designated cabinets in the laboratory for collection. Halogenated solvent wastes must not be placed in the non-halogenated solvents wastes. Some alkalis and acids can be properly diluted and disposed of via the drain.

Filter paper containing residues of catalysts must **NOT** be discarded in the waste bin. The catalyst must be properly destroyed or deactivated before disposal.

All hazardous chemicals and residues should be safely rendered innocuous before merging with the regular chemical wastes for disposal. For example, it is the responsibility of research workers emptying bottles of sodium-dried solvents to quench the residual sodium wire by reacting it with 2-propanol.

If you are uncertain of how to dispose of certain toxic chemicals or how to safely quench particular reactive chemicals, you should consult your *Research Supervisor* for recommendations and proper procedures.

Insoluble solids, filter paper, etc. must not be washed down the sinks; they must be disposed of in waste bins.

However, broken glass and sharp objects such as syringe needles should be placed inside an alternative waste labelled for "glass and sharps", and should not be discarded into the usual waste bins.

#### 12. Housekeeping

A hiatus from experimental work should be regularly scheduled, in order to take time to perform lab maintenance and housekeeping.

All desks, bench tops, fume cupboards and working areas should be kept neat and tidy.

All reagent bottles must be sealed with **parafilm** and stored in their proper places. All chemicals should be clearly labelled. The conditions of chemical labels should be regularly inspected. Old and fading labels should be replaced. Toxic chemicals should carry special warning labels. Unused chemicals should be considered for returning to the Chemical Stores.

As a habit, the stopper or lid of a bottle must be replaced immediately after use, and not left open. No glass rod or other foreign object should be introduced into any reagent bottle.

Inactive equipment should be arranged to be stored at the Aberdeen storage facility. Broken or obsolete equipment should be reported to the *Technical Manager* for arrangement for disposal.

Fume cupboards, bench and table tops should be cleaned and wiped down regularly to maintain good hygiene.

All corridors are to be kept clear at all times. Permission to temporarily keep items in the corridor should be obtained from the *Technical Manager*. Such items should be clearly labelled as to the ownership and the date of removal.

### 13. Returning of Chemicals to the Chemical Store

To prevent the storage of excess amounts of chemicals and flammables in the laboratory, the return of excess chemicals to the Chemical Store is encouraged.

However, chemicals must be returned in tightly capped bottles and must be clearly labelled as to their exact contents as well as the researcher handling the return. The Chemical Store provides a form for this purpose. Improperly packaged chemicals, mixtures, wastes, or unidentified chemicals will not be accepted.

### 14. High Energy Radiation

Only authorized persons are allowed to enter the rooms containing X-ray diffraction equipment, and to use such equipment. Further details are available in the University Radiation Policy pamphlet.

### 15. Precautions for Handling Cryogenics (dry ice, dry ice/solvent mixtures, liquid nitrogen)

Information on Precautions for Cryogenic Gases published by the Safety Office should also be consulted: <http://www.hku.hk/safety/pdf/CSL.pdf>

Avoid direct contact with cryogenics, especially with wet hands. Do not touch un-insulated piping.

When handling cryogenics, wear loose-fitting thermal gloves (leather or CRYOGLOVES), but **NEVER** cotton gloves. Also wear goggles and /or face shield, and closed shoes to guard against splashing.

Work in a well ventilated area because liquefied gas can rapidly expand, e.g. nitrogen expands almost 700-fold.

Never attempt to prevent vapours from escaping from cylinders of liquefied, cryogenic gases. Since they are not at thermal equilibrium, vapour is produced as the liquid boils and, if not vented to the atmosphere, could produce excessive pressures resulting in explosions.

Use only the special (usually metal) tubing designed for use with these gases. Do not improvise with plastic or rubber tubing.

Be aware that oxygen enrichment and a fire hazard can result from the condensation of oxygen (boiling pt  $-183^{\circ}\text{C}$ ) from the air onto liquid nitrogen (boiling pt  $-196^{\circ}\text{C}$ ).

If a glass dewar flask is used as a container of small quantities of liquid nitrogen, the exposed glass part of the flask should be taped to minimize the flying glass hazards in case of implosion or explosion. If a domestic thermos flask is used, the integrity of the plastic sealing ring of the thermos should be checked regularly to ensure that no liquid nitrogen can get into the space between the thermos and the outside container. In addition, holes should be drilled into the base plate to allow any trapped liquid nitrogen to escape.

When charging a warm container or when inserting objects into the cryogenics, perform the operation slowly to minimize boiling and splashing.

If skin contacts liquefied cryogenic gases, thaw the burned area slowly in cold water. Do not rub.

#### 16. Working with Glass Apparatus

When attaching rubber hoses to glass tubes or rods, care must be taken not to apply lateral pressure on the glass tubes to avoid breakage. Pressure should be applied gently, close to the connection point.

When picking up glass, take care that you do not burn yourself—hot glass and cold glass looks exactly the same.

#### 17. Roof laboratories

When conducting chemical experiments with possible explosion hazards or working with pressure generating equipment, such work is best done in the roof laboratories. If these laboratories are used, at least two persons must be present.

#### 18. Chemical Store, Mechanical/Electronics Workshop and Glassblowing Workshop

The designated members of the technical staff in charge of these workshops will ensure that so far as is reasonable and practical, the following code is adhered to by all persons using the facilities.

The stores, workshops associated areas, and machines are kept in a tidy state and that good workshop practices are kept by all persons using these machine tools.

Protective goggles and machine tool guards are supplied and must be used by staff at times whilst the relevant equipment is being operated.

No student or untrained person will be permitted to use any machine tool except under the strict supervision of a competent person.

Before dismantling any power driven machine or equipment, it will be isolated from the source of power (be it electrical, pneumatic or hydraulic).

#### 19. Project Completion

Before research students or research / academic staff leave the Chemistry Department, they should ensure that their working area has been left in a clean and organized state. All reactive chemicals should either be labelled and stored properly, or quenched and disposed of.

All research students and staff must submit a Project Completion Form (Appendix D) duly signed by the corresponding *Research Supervisor* to the Department prior to their departure, indicating that they have cleaned up their work area and have properly dealt with all of their chemicals. Failure to submit this form to the Chemistry General Office would result in the Department withholding the submission of the Leaving Form to the University, and consequently the holding up of the payment of the final month salary.

#### 20. Visitors

Chemically-competent persons who are Honorary Research Associates carrying out collaborative work in the chemistry Department must be fully informed on all pertinent safety matters by the staff member responsible for their visit.

Socialising with non-chemically-qualified people within any risk areas of the Chemistry Department is **strictly forbidden**. Every person must leave the laboratory to communicate with a friend. Undergraduate students who are not assigned to a specific laboratory class **may not** enter the laboratory in order to talk to a person inside. Postgraduate students may not use a friend to assist in their work unless written authority has been obtained from the Head of Department.

To ensure the safety of children, persons under the age of 18 are not permitted to visit the Chemistry Department. Staff members who have to bring children to the Department for social purposes or brief visits should accompany them at all times, place their children under close supervision, and should not allow them to enter laboratories.

#### 21. Maintenance Workers

All maintenance workers from outside the Department intending to carry out any servicing or repair work must report to the *Technical Manager* to receive special instructions and precautions before any work can commence.

### III-B TRANSPORT OF CHEMICALS

Chemicals will be issued by the Chemical Store only if you are properly equipped to transport them back to your workplace.

General-purpose chemicals or glass must be carried in red baskets, and dangerous chemicals must be carried in white winchester polyethylene bottle container with a cover. Carriers must be used for transporting Winchester bottles.

The Store will supply the requested amount of chemicals. In the case of air-sensitive, corrosive or chemicals with a stench, the user is required to take the whole bottle to the workplace. Any excess amount must be returned to the store as soon as possible to minimize the over-storage of these chemicals in the laboratories.

An appropriate trolley with heavy-duty storage compartments should be used to transport three or more Winchester bottles at one time. The number of Winchester bottles is limited to eight in any single transportation by researchers.

Transporting of chemicals should be done only in the freight lift. Transporting flammable solvents in the freight lift is especially dangerous and for this reason passengers are discouraged to take the freight lift while solvents are being delivered by the Chemical Store personnel.

There is a bucket of sand, a packet of absorbent material, a packet of active carbon and an emergency spillage kit on each floor at the exit of the freight lift to deal with any spills occurring in the lift and in the lift lobby.

### III-C UNATTENDED EXPERIMENTS

In the academic year except Public Holidays, the Chemistry Building will be closed after 18:00, Mondays to Fridays, and 12:00 on Saturdays.

Any experiments left running outside these office hours (eg. overnight experiments) which are either (1) reactions using flammable/reactive chemicals >10 mL total and heating/cooling; or (2) reactions using flammable/reactive chemicals  $\geq$ 500 mL should be clearly labelled by completing an Unattended Experiments Form. This form should be completed on-line at the following site: <http://147.8.148.141:8080/UnattendedExpt/>

After completion, press "PRINT". This action will automatically send the information to the Chemistry General Office and print out one hard copy which you should file at the door of your laboratory. The light in the fume cupboard and the laboratory in which this unattended experiment is running should be kept on. Apparatus to be left on permanently, such as thermostats and vacuum systems, should be labelled, with the authority of a member of staff attached.

Particular attention should be paid to hazards of flooding. Cooling water connections for apparatus running overnight or over the weekend should be duly secured (e.g. hose clamp or copper wire tied over flexible tubing). The use of chillers instead of running water for

such experiments are highly recommended.

### III-D WORKING OUTSIDE NORMAL WORKING HOURS

Refer to the University Safety Office guidelines on this issue for students, researchers and supervisors: <http://www.hku.hk/safety/pdf/WONWH.pdf>

While working after office hours is a personal risk which must be accepted if the facilities of the building are to be sensibly utilised, everyone should minimize this risk by limiting their experimental work to 'relatively safe' operations and by taking sensible precautions. Other experimental work must be carried out only if there are at least one other person working in the vicinity. In any case, any 'wet chemistry' experiments may only be undertaken if at least one other person is present. The University Safety Office particularly names RPG students as a high risk group and their laboratory safety must be duly monitored.

### III-E CHEMICAL HAZARDS

Information on Chemical Safety published by the Safety Office should also be consulted: <http://www.hku.hk/safety/pdf/CSL.pdf>

Many chemicals are toxic and hazardous and it is important to know the potential risks when handling chemicals. For this reason, it is essential to read the Materials Safety Data Sheets (MSDS) on all reagents and solvents used and be familiar with this information prior to handling these chemicals. MSDS on chemicals are freely available from the internet or from the MSDS database in the University Library.

In conducting experiments, you should take every precaution to plan ahead, think carefully and to work defensively. Before beginning any experiment, you should think and be aware of the worst that **could** happen to this experimental setup, how to deal with such a situation should it arise, and how you should work to prevent this worst case scenario.

If you are unsure of how to conduct a particular experiment safely, or how to handle a particular toxic or reactive chemical, you should consult with and receive proper training from senior members of your laboratory and/or your Supervisor before commencing your experiments.

#### 1. Toxic and Obnoxious Chemicals

All operations (eg. weighing, handling and reactions) with these compounds must be carried out in a fume cupboard; and every attempt must be made to reduce the amount of material escaping from the fume cupboard by the use of chemical or physical traps, etc.

Supervisors and research workers must familiarize themselves with the toxic properties of, and the antidotes for, the compounds with which they and their staff are working. It is advised that the University Health Service should be notified before work on very toxic materials (e.g. HCN, concentrated HF) commences so that appropriate medical treatment

could be on hand and quickly provided in case of emergency.

The University Safety Office has published a list of chemicals with toxic hazards:

<http://www.hku.hk/safety/pdf/CSL.pdf>, Table 2. A non-exhaustive list of particularly hazardous substances (including carcinogens) is available at the following site:

<http://web.princeton.edu/sites/ehs/labsafetymanual/appa.htm>.

## 2. **Carcinogenic Chemicals**

The following list of chemicals are regarded by the British Drug House as either carcinogenic or suspected carcinogens for man, and all of these chemicals are available in our Chemical Store. Bottles containing carcinogenic chemicals should carry a special warning label. These chemicals should be handled with special care.

Information on these chemicals are found in “Information on Chemical Carcinogens”

<http://www.hku.hk/safety/pdf/CarInf.pdf>, published by the Safety Office.

Guidelines for users of such substances are found in the University’s code of practice, “Carcinogens”, <http://www.hku.hk/safety/pdf/Car.pdf>, published by the Safety Office.

### A. Carcinogenic Chemicals

Acrylonitrile  
Benzene  
Benzidine  
2,3-Diaminotoluene(Toluene-2,3-diamine)  
*o*-Dianisidine  
Diazomethane  
1,2-Dibromoethane  
Dimethyl sulphate  
Dimethyl yellow (Methyl yellow)  
2,4-Dinitro-1-fluorobenzene  
Ethyl carbamate (Urethane)  
Ethyleneimine  
Formaldehyde  
Hexamethyl phosphoramide (HMPA)  
Methyl chloromethyl ether (MOMCl)  
2-Naphthylamine  
1- Naphthylamine  
Propyleneimine  
Sudan IV  
*o*-tolidine  
Vinyl bromide  
Vinyl chloride

B. Chemicals suspected of having carcinogenic potential for man

Antimony trioxide  
Cadmium oxide  
Cadmium  
Tetrachloromethane (Carbon tetrachloride)  
Trichloromethane (Chloroform)  
Chromates of lead and zinc  
Dichloromethane  
Diethylsulphate  
1,1-Dimethylhydrazine  
1-Chloro-2,3-Epoxypropane (Epichlorhydrin)  
Ethylene oxide  
Hexachloro-1,3-butadiene  
Hydrazine  
Iodomethane (methyl iodide)  
Monomethyl hydrazine  
2-Nitropropane  
Oxides of Arsenic – acids and salts  
N-Phenyl-2-naphthylamine  
Phenacetin  
Orange “G”  
Rhodamine “B”

3. **Perchloric Acid**

The explosion hazards associated with perchloric acid is well-known. Supervisors and research students involved in projects using perchloric acid and its salts should be familiar with the hazards associated with these compounds. Synthesis of inorganic and organic perchlorates should only be undertaken when safer alternatives do not exist, and by an experienced investigator or under close supervision.

Fume cupboards and exhaust fans should be labelled to warn maintenance personnel of the use of handling perchloric acid or its salts. Before any maintenance/repair work of these appliances is to be carried out, the accumulation of perchlorates should be checked by the person in charge of the laboratory; and maintenance workers are to commence work only after the person-in-charge has given a clearance.

4. **Hydrofluoric Acid**

This acid causes wounds on the skin which do not heal easily. Experiments with HF may only be conducted in the fume cupboard. When working with this acid, protective gear made from polyvinyl chloride (PVC) must be worn. Full length PVC coveralls with sleeves to the wrist or a full-length PVC apron with sleeve protectors, a face shield, rubber boots, and safety goggles should be worn. When small amounts of HF are handled in the fume cupboard, mid-arm length PVC gloves must be worn.

## 5. **Dimethyl Mercury**

Dimethyl mercury is extremely poisonous and must be handled in the fume cupboard. When working with this compound or related organomercury compounds, NEOPRENE gloves with long cuffs must be worn during the experiments and frequent blood and urine tests should be conducted.

## 6. ***Tert*-Butyllithium**

*Tert*-butyllithium is itself pyrophoric and typically supplied as a solution in pentane which is also highly flammable. You must be properly instructed before you handle this chemical. The solution should be transferred using good syringe techniques and preferably a gas-tight syringe or a syringe with a luer lock. Large quantities should not be transferred by syringes but by the use of cannula techniques.

## 7. **Unstable and Peroxide-forming chemicals**

Special precautions should be paid in the handling of unstable chemicals such as metal acetylides, azo and diazo compounds, organic peroxides which can explode if heated or subjected to mechanical shock.

In particular, peroxides can be formed by peroxidizable compounds stored in the presence of oxygen over long periods of time. Such compounds that have developed peroxides can also explode unexpectedly. These peroxide-forming compounds include: sodium amide, isopropyl ether, diethyl ether, tetrahydrofuran, furan, dioxane, cyclohexene, cyclopentene, dicyclopentadiene.

If there is suspicion of peroxide present, do not open the container or disturb its contents. Call the Safety Office, Dangerous Good Management (2859-2402) for special disposal. For chemicals that are peroxide-formers, peroxides should be detected using KI or peroxide test strips and removed prior to use. Refer to the University Safety Office guidelines, <http://www.hku.hk/safety/pdf/CSL.pdf>, Section 8.3.1 and 8.3.2, for the Detection and Removal of Peroxides.

## 8. **Corrosive chemicals**

Concentrated mineral acids, including phosphoric, hydrochloric, nitric, sulfuric, and perchloric acid should be handled carefully wearing proper gloves and chemically resistant clothing. Beware and prevent the hazards of dropping or breaking a Winchester of such corrosives. Skin contact results in serious burns. Concentrated mineral acids can be very reactive, even with each other. Concentrated acids can even react vigorously with dilute solutions of the same acid, if mixed together rapidly. For example: concentrated sulfuric acid mixed quickly with 1 M sulfuric acid will generate a lot of heat. Always add concentrated acid slowly **TO** water to make up a dilute acid, never mix them the other way around.

Corrosive and concentrated acids must be stored in a cabinet designed for corrosive acids, made of non-metallic parts and containing bins to contain any accidental spillage.

Bottles should be stored below eye level.

Corrosive bases (eg. NaOH, KOH) causes burns to the skin and should be handled with gloves. Beware of the dust from these bases. Acids and bases should be stored segregated.

Beware of chemicals and solutions that generate corrosive gases and vapors such as ammonia, hydrogen chloride, sulfur dioxide.

#### 9. **Incompatible Chemicals**

Some chemicals are incompatible and react with great generation of heat and violence.

Refer to a **List of Incompatible Chemicals**, Appendix I, Table 1 of the University Safety Office Guidelines: <http://www.hku.hk/safety/pdf/CSL.pdf>;

and a **Chemical Incompatibility Chart**:

<http://web.princeton.edu/sites/ehs/labsafetymanual/sec7a.htm#incompatible>

You are strongly encouraged to study these lists to see if you are working with any of these reactive chemicals and take the necessary precautions. One particular mixture to highlight here that should be avoided is acetone (which we use so much of) and oxidizers such as bromine, nitric acid, or hydrogen peroxide.

### **III-F GAS CYLINDERS**

Information on handling compressed gases, published by the Safety Office should also be consulted: <http://www.hku.hk/safety/pdf/CSL.pdf>

Compressed gas cylinders may constitute one of the most serious hazards in the laboratory. The gas cylinder itself is highly pressurized is capable of becoming a torpedo if damaged. The following precautions should be taken:

#### 1. Transporting:

All gas cylinders should be transported on a trolley. The pressure regulator must be **REMOVED** before moving the cylinder.

#### 2. Securing:

Gas cylinders in the laboratory should be SINGLY and TIGHTLY secured to a wall or other solid objects with a metal chain. No cylinder should be left freely standing.

#### 3. Pressure Regulator:

Gases must not be let out from a cylinder unless an appropriate pressure regulator is in place. When not in use, the cylinder valve must be turned off and the applied pressure knob at the pressure regulator released.

The fitting between the pressure regulator and the cylinder has a CGA number and the corresponding specification. Gas cylinders supplied by Hong Kong Oxygen Co. Ltd. sometimes have old, non-CGA specifications. Generally right hand screw fittings are

used for non-combustible gas cylinders and left hand screw fittings are for combustible gases. The regulator must be the correct one for the type of gas in the cylinder.

4. Storage:

Gas cylinders stored in any area must be properly secured by metal chains and marked empty or full as the case may be. Caps covering the main valve, if available, must always be in place during storage and transportation.

All lecture bottles and cylinders of corrosive gases not in use must be returned to the Store and must not be stored in laboratories.

5. Corrosion of the container:

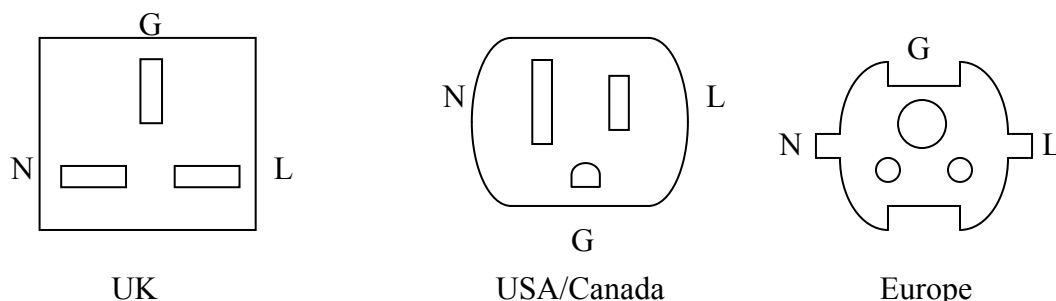
A number of gases can be very corrosive to their containers, and such gases are particularly dangerous if they are toxic or explosive. Caution should be exercised to ensure that containers do not become corroded to the extent of causing a leakage of the gas. Manufacturer's instructions as to storage time should be strictly followed. Cylinders which have developed stiff or locked valves should be returned to the Store with a note of the fault attached.

### III-G ELECTRICAL POWER

#### Sockets Pins and Wire Colour

Power delivered to the bench top socket is 50 Hz single phase ac at 220V rms. UK standard sockets are used in this building. However, instruments and apparatus used in the Department may come from various countries. It is important to know what each pin of the socket delivers in order to ensure that the chassis of the instrument or apparatus is at most at neutral potential.

The following are schematics of UK, US/Canada and European sockets most commonly encountered. It is important to note that the US/Canada ground pin is the lowest one.



\*G: Ground; N: Neutral; L: Live

The following table gives the characteristic of each pin and the colour code of the wire that is connected to it:

	Live	Neutral	Ground
Voltage	~220 V rms	~0 V	~0 V
Current Europe	Brown	Blue	Green-yellow
Old UK	Red	Black	Green
US/Canada	Black	White	Green-yellow
Japan/Korea	White	Black	Green

Where practical, all plugs should be 5, 13 or 15 Amp plugs with 3 pins and made to British Standard BS546 or BS1363.

### Phase

Power delivered to the building is in 3 phases, 120° apart and coded red, blue and yellow, and distributed to laboratories in single phases. In larger laboratories, more than one phase is supplied. Most of the time during a cycle, there is a potential difference between the Live wires of 2 different phases. It is important that two or more pieces of connected instrument or apparatus (e.g. a chromatograph and a potentiometric recorder) should be supplied from the same phase.

## **APPENDIX A**

### **OCCUPATIONAL SAFETY AND HEALTH MANAGEMENT SYSTEM**

1. Safety Policy: As described in Safety Handbook
2. Management structure
  - 2.1 Departmental Occupational Safety and Health Policy Committee (DOSHPC)
    - 2.1.1 Powers and Duties
      - i. To formulate and determine policy and guidelines on the administration of occupational safety and health in the Department of Chemistry.
      - ii. To monitor and review safety policy, standards and programme implemented by the Department Safety Committee.
      - iii. To consider the annual report from the Department Safety Committee.
      - iv. To appoint Departmental Safety Representative(s) within the department and to define his/her duties.
    - 2.1.2 Membership
      - i. Chairman: Head of Chemistry Department.
      - ii. *Departmental Safety Representative(s)*
      - iii. Member(s) of the University Safety Office
      - iv. Additional co-opted Member(s).
  - 2.2 Departmental Safety Committee (DSC)
    - 2.2.1 Powers and Duties
      - i. To establish, promote and implement the safety policy, guidelines, procedures and standards formulated by the Departmental Occupational Safety and Health Policy Committee.
      - ii. To regular review procedures for environmental health and safety at work and issue amendments to, or revisions of statement when necessary.
      - iii. To conduct regular safety visits and audit of laboratories, following by a report with recommendations and to implement follow-up actions.
      - iv. To make provisions for and arrange for all levels of staff to receive adequate and appropriate training on safety and health matters.
      - v. To report accidents and non-compliance of safety procedures and practices, to recommend and implement follow-up actions, and to propose accident

prevention measures to the DOSHPC.

vi. To appoint the following team leaders and safety personnel:

- a. Safety Visit and Audit Team
- b. Training, Education and Information Team.
- c. Accident Report, Prevention and Review Team
- d. The Departmental Fire Wardens.

#### 2.2.2 Membership

- i. Chairman: *Departmental Safety Representative(s)*
- ii. *Head* of the Department of Chemistry
- iii. Two to three academic members of staff on two year terms.
- iv. *Technical Manager*
- v. One postgraduate representative.

### 3. Training, Education and Information

#### 3.1 Staff members and postgraduate students

- i. Safety talks are given periodically.
- ii. Alerts are given to staff and students for accidents occurred in the Department and in other university laboratories; and procedures for handling hazardous chemicals.
- iii. Reading and understanding the information and practicing the code as written in Safety Handbook is mandatory and expected.

#### 3.2 Undergraduate students

- i. Safety talk and demonstration for fighting fires are given by the Safety Office to first year students.
- ii. Reading and understanding the information in Safety Handbook is encouraged.

#### 3.3 Safety Information

- i. Basic safety information is given in the Safety Handbook
- ii. A list of solvent drying methods and procedures for operation of the fume cupboards is available from the *Technical Manager*.
- iii. Safety related documents and reference materials are available from the University Safety Office website: <http://hku.hk/safety/>

Safety Office Safety Manual: <http://hku.hk/safety/manual.htm>

- iv. Safety related information on specific chemicals (MSDS) is available from the internet from chemical suppliers; and from the University of Hong Kong library.

#### 3.4 Training record

A training record will be submitted annually to the DSC by the Training, Education and Information Team.

#### 4. Preventive Safety Measures

- i. Wearing eye-protection in all teaching and research laboratories
- ii. Carrying solvents in specified container.
- iii. Reading, understanding and practising the departmental safety policy, standards and procedures.
- iv. Involvement of students and front-line staff members in matters related to safety concern, such as the appointment of a postgraduate student as a member of the DSC and appointment of Laboratory Safety Representatives from each lab from postgraduate students/research personnel.
- v. Signs for mandatory measures are posted in teaching laboratories, chemical stores, laboratories and lifts.

#### 5. Chemical and Safety Hazard Control Programme

Procedures for emergency procedures, chemical safety and control, and laboratory code of safe practice are given in the Safety Handbook.

#### 6. Laboratory Visit and Safety Audit

- i. The Safety Visit and Audit Team will conduct laboratory visit periodically.
- ii. The Safety Visit and Audit Team will issue a Visit Report and make recommendations for improvement to the laboratories after each visit.
- iii. Follow-up action will be undertaken by the DSC.

#### 7. Report of Accident and Potential Hazards.

- i. Accident, potential hazards and other matters of concern related to occupational safety and health should be reported to the *Technical Manager* and *Departmental Safety Representative*.
- ii. Accident investigation will be carried out by the Accident Report, Prevention and Review Team. The accident report together with the recommendations will be submitted to the DSC for discussion and action.

#### 8. Recommendations and Actions

- i. General recommendations will be issued by DSC after yearly review on matters related to occupational safety and health.
- ii. Recommendations after specific accidents will be given by the DSC after submission of Accident Report and discussion in the DSC meeting.
- iii. Follow-up action by *Departmental Safety Representative*.

9. Drills for Fire and Chemical Spillage

With the assistance of the Safety Office, drills for fire and chemical spillage will be carried out periodically to check system performance in case of accidents.

10. Control of Contractors and Visitors

- i. Contractors qualified by the University for their safety record will be used preferentially for work done in the Department.
- ii. Contractors will only be working in designated areas in the department under supervision of qualified staff members. Before a contract work is carried out, departmental personnel working at the proposed site of work will be informed in advance about the time and nature of work to be carried out.
- iii. Only staff members, students and official visitors will be allowed to work in the department. Other visitors are only allowed to enter laboratories and the chemical store under supervision of qualified academic staff members.

11. Review of Safety Documents and Measures

The safety measures, information and related documents will be reviewed every year by the DSC.

12. Suggestions and Complaints

Suggestions and complaints can be directed to the DOSHPC by writing to the *Head* of the Department.

## **APPENDIX B**

### **SPECIFIC RESPONSIBILITIES FOR OCCUPATIONAL SAFETY AND HEALTH WITHIN THE DEPARTMENT**

#### *1. Responsibilities of the Head of Department:*

- (a) To draw up a detailed statement of policy reflecting and amplifying the University's statement of policy as it pertains to the department, and to establish, promote and administer safety procedures and standards. The statement of procedures and standards shall be submitted through the Environmental Health and Safety Committee to the University Council for approval.
- (b) To regularly review procedures for environmental health and safety at work and issue amendments to, or revisions of statements when necessary.
- (c) To provide and maintain:-
  - i. Machinery, equipment, appliances and other plant; and
  - ii. Systems of work
- (d) Make provisions for and arrange for all levels of staff to receive adequate and appropriate training on safety and health matters.
- (e) To maintain safety programme pertinent to the personnel and facilities under his/her direction.
- (f) To appoint from senior full-time appointees within the department, *Departmental Safety Representative(s)* and to define his/her duties.

#### *2. Responsibilities of the Departmental Safety Representative(s):*

- (a) To inform the *Head* of Department and the *Safety Office* of any special hazards in, or new hazards about to be introduced into, the department.
- (b) To inform new members of the department, including students of the University's safety policy, as well as departmental safety policy, standards and procedures.
- (c) To conduct activities for stimulating and maintaining interest in the safety of personnel in the department.
- (d) To ensure that means exist for all machinery and equipment to be maintained and used in a safe condition.
- (e) To ensure with assistance of the Safety Officer that the first aid and safety facilities are properly maintained.
- (f) In consultation with the Safety Officer, to promote, plan, and direct a regular programme of safety inspections.

- (g) To ensure that accidents are reported promptly in accordance with University procedures and to investigate and report any case of non-compliance to the Head of Department.
- (h) To maintain liaison with the *Safety Office* and the Director of University Health Service.
- (i) To recommend accident prevention measures to the *Head* of Department as and when necessary.

3. *Responsibilities of the Technical Manager:*

- (a) To inform *the Department Safety Representative* of any hazards in, or new hazards about to be introduced into, the department.
- (b) To ensure that means exist for all machinery and equipment to be maintained and used in a safe condition.
- (c) To ensure with assistance of the Safety Office that the safety facilities are properly maintained.
- (d) In consultation with the Safety Office, to promote, plan, and direct a regular programme of safety inspections.
- (e) To recommend accident prevention measures to the *Departmental Safety Representative* as and when necessary
- (f) To conduct regular checks on eye wash stations, safety showers, emergency alarm system, and chemical spillage kits and to maintain these safety installations.

4. *Responsibilities of the Departmental Fire Wardens*

- (a) To leave his/her place of work immediately and encourage others to evacuate upon hearing the fire alarm.
- (b) To check rooms within previously agreed area to ensure that all people have left.
- (c) To spur people on to leave their place of work and to direct them to the appropriate exit; if in case some people are unwilling or unable to leave, do not delay but continue to evacuate other rooms.
- (d) To note which rooms were not checked due to smoke/fires, and inform fire services personnel.
- (e) To encourage people to move quickly down the stairwell and out of the building.
- (f) To move people away from building exits to the assembly point.
- (g) To report any problems (missing persons, non-evacuated staff, etc.) to the Fire Services Department Fire Officer in charge of the operation directly and without delay.

- (h) To identify key holders should the Fire Services wish to enter locked rooms.
  - (i) To complete and submit an Evacuation Report to a *Departmental Safety Representative* after every evacuation incident
5. *Responsibilities of Faculty, Administrative and Technical Staff:*
- (a) Each level of supervisory staff has responsibilities for the health and safety of their own particular workers, co-workers and students. This responsibility applies equally to academic, administrative and technical staff.
  - (b) Staff cannot delegate out of this responsibility and should endeavour to encourage and foster safe working practices in those over whom they have charge.
6. *Responsibilities of all Faculty, Administrative and Technical Staff, and Students in the Department:*
- (a) To make themselves familiar with, and conform to, University and Departmental safety policies at all times.
  - (b) To observe all safety rules at all times.
  - (c) To wear appropriate safety equipment and use appropriate safety devices in accordance with rules and procedures.
  - (d) To conform to all instructions issued by the appropriate authorities.
  - (e) To refrain from working alone in the laboratory.
  - (f) To report all incidents of accidents and damage of property to their Supervisor and/or *Technical Manager* and *Departmental Safety Representative*.
  - (g) To make appropriate suggestions to improve health and safety to their Supervisor and/or *Departmental Safety Representative*.
  - (h) To inform their Supervisor and/or *Departmental Safety Representative* of any hazard that may be introduced as a result of their work.
  - (i) To seek additional instruction or consultation should there be any question about how to execute an experiment or how to handle a toxic or reactive chemical safely.
  - (j) To be responsible for their personal safety.
  - (k) To inform the Head or the *Departmental Safety Representative* if they feel they are unable to conform to or carry out any part of the Departmental safety policy or code.
7. *Responsibilities of Laboratory Technicians (Technicians Responsible for Laboratories):*
- (a) To ensure that each fume cupboard is functioning efficiently at all times; and if not they should immediately inform the *Technical Manager* or the Safety Office and

place a clearly visible “Out of Action” sign on the sash-window.

- (b) To check that all the safety equipment in the laboratories are functioning properly and to report to the *Technical Managers* of any malfunctions or need for repairs.
- (c) To remove waste solvents by placing them in the waste containers, the transferring to be done in a fume cupboard.
- (d) To clean the fume cupboard side-screens when necessary.
- (e) To ensure fume cupboards are not over cluttered with reagents/chemicals.
- (f) To report any hazardous practices to the *Lab Course Coordinator*, or *Supervisor* in-charge.

8. *Responsibilities of Research Supervisors and Lab Course Coordinators*

- (a) To provide adequate education and training to the students and researchers under his/her supervision to perform experiments safely.
- (b) To enforce the laboratory code of safe practice as detailed in the Departmental Safety Handbook in their laboratories.
- (c) To be fully aware of the safety practices and status of their laboratories.

9. *Responsibilities of Lab Safety Representatives*

- (a) To inform occupants of their Labs of proper safety practices
- (b) To maintain good safety practices and housekeeping inside the laboratory
- (c) To report all incidents of accidents and damage of property to their Supervisor, *Technical Manager* and *Departmental Safety Representative*.
- (d) To make appropriate suggestions to improve health and safety to their Supervisor and/or *Departmental Safety Representative*.
- (e) To inform their Supervisor and *Departmental Safety Representative* of any new hazards in the laboratory.
- (f) To initiate repairs of failed equipment, safety equipment or lab infrastructure to the *Technical Manager* or University Estates directly.
- (g) To maintain an up-to-date chemical list for the lab to submit to the *Technical Manager* regularly
- (h) To ensure that the first aid kit(s) inside the laboratory are properly stocked.

10. *Responsibilities of Lab Demonstrators:*

- (a) To observe all safety rules during the teaching laboratory

- (b) To wear appropriate safety equipment and use appropriate safety devices in accordance with rules and procedures.
- (c) To teach and enforce the laboratory code of safe practice as detailed in the Departmental Safety Handbook in the teaching laboratories
- (d) To report all incidents of accidents and damage of property to their *Lab Course Coordinator* and/or *Technical Manager* and *Departmental Safety Representative*.
- (e) To make appropriate suggestions to improve health and safety to their *Lab Course Coordinator* and/or *Departmental Safety Representative*.

## **APPENDIX C**

### **REFERENCE MATERIALS**

The University Safety Office has posted information relating to environmental health, safety including Government Ordinances and Regulations on their website, and all researchers are encouraged to consult and refer to these materials for reference.

**University Safety Office Website:** <http://hku.hk/safety/>

**Safety Office Safety Manual:** <http://hku.hk/safety/manual.htm>

**APPENDIX D. PROJECT COMPLETION FORM (Sample)**

I write to confirm that the work area(s) assigned to me for the purposes of my project has been cleaned out. All chemicals have been labelled, catalogued and stored. Wastes have been disposed of. All experiments have been stopped and quenched. All flasks have been cleaned out and equipment have been restored to their proper places. I have not left anything which may be of a dangerous or unknown nature behind in the lab for others to deal with.

All my personal belongings have been cleaned out of the benches, desks or lockers that I have occupied.

Name: \_\_\_\_\_

Staff/Student No.: \_\_\_\_\_

Supervisor's Name: \_\_\_\_\_

Projected final work day: \_\_\_\_\_

Email address reachable after departure: \_\_\_\_\_

Contact details after departure  
(Address, phone number): \_\_\_\_\_

Student/RA's Signature: \_\_\_\_\_

Supervisor's signature: \_\_\_\_\_

\*\*\*\*\*

For office use:

Locker \_\_\_\_\_ assigned to the above RPg/RA has been emptied.

**SAFETY RELEVANT & EMERGENCY TELEPHONE NUMBERS**

**DEPARTMENTAL TECHNICAL MANAGER:** Mr. Donald Mak

Office hours: 2859-2151

Out of office hours: 6150-1247

\*\*\*\*\*

**SAFETY OFFICE (UNIVERSITY)**

Office hours: Mon-Fri. 9 am. – 1 pm; 2 pm – 5 pm; closed Saturday and Sundays

Emergencies and Enquiries (office hours): 2859-2400

(Out of office hours): 2859-2882

**Responsibilities**

**Safety Officer**

Director of Safety

Dr. Edmund Hau

Fire and general industrial safety

Mr. Rheo Lam

Biological Safety

Dr. Mike Mackett

Chemical Safety/Hazardous Wastes

Mr. Peter Yeung

Environmental and Occupational Hygiene

Ms. Winnie Tam

\*\*\*\*\*

**EMERGENCY TELEPHONE NUMBERS:**

UNIVERSITY HEALTH SERVICE, EMERGENCY (Office hours): 2859-1999.

(Out of office hrs): call 66-999

UNIVERSITY SECURITY (24 hours): 2859-2882

ESTATES OFFICE, EMERGENCY: Office hours: 2816-8211 or 2859-2883

Out of office hours: 9032-4142 or 2858-0538

FIRE, AMBULANCE, POLICE: 66-999 or 9-999.