School of Physical Science

Safety Manual

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1.0 Emergency Contacts

For posting prominently in laboratory

ROOM NUMBER . . . . . DATE . . . . . .

CONTACT Name and Number . . . . . .

. . . . . .

SECURITY - DCU Dial**: 5999**

FIRE Dial**: 5999**

AMBULANCE / FIRE SERVICE Dial**: 5999 – DCU security**
Ask for Emergency Services

FIRST AID PERSONNEL

Henry Barry	**5271**	**N102**
Lisa Peyton	**5306**	**N144**
Pat Wogan	**5275**	**N221**
AN OTHER	**5520**	**NG23**

CAMPUS NURSE / DOCTOR **Dial: 5143**
Contact **D-Doc** service **1850 22 44 77**

NEAREST HOSPITALS Non-Emergency medical injury care
Mater Smithfield Rapid Injury Clinic
Mon/ Fri 8-5.30 **Taxi** - if needed
Mater Hospital
Phone: **01 8301122 / 8032000**
Beaumont Hospital
Phone: **01 8377755**

POISON INFORMATION SERVICE **Beaumont Hospital**
Phone: **(01) 809 2166 / 809 2566**

TAXI: **DCU Reception** ext. 5181 / 5000
Phone:**01 8553333**

SCHOOL SAFETY ADVISOR **Henry Barry Dial: 5271**
or any member of Physics Safety Cttee.

UNIVERSITY SAFETY OFFICER: **Paula Kierans Dial 8896**

BUILDINGS / ESTATES OFFICE: **Dial 5362**

OTHER SERVICES [please add here] . . . . . .

[E.g. Supervisor, service engineer contact numbers] . . . . . .

2.0 Health and Safety Training

The provision of appropriate training and instruction is an important element in the management of safety and the implementation of the School of Physical Sciences safety statement. Such training is also a legal requirement in controlling many of the risks identified in Training and instruction also serve to improve safety awareness and attitudes that are essential for effective safety management.

In addition to our statutory duty to employees, the School of Physical Sciences also has a common law duty to all undergraduate and postgraduate students to provide such training as is necessary to enable the students to undertake their studies in a manner which, in so far as it is reasonably practicable, is safe and does not give rise to risks to health or expose the individual student or other persons to unacceptable levels of risk. The provision and extent of any necessary training is dependent upon the nature of the academic discipline being pursued, the experience and disposition of the students involved, their familiarity with any equipment/substances to be utilised, the environment/conditions where the activities may be discharged, and the extent to which supervision is necessary and available.

2.1 Postgraduate Training

The Faculty of Science and Health runs two health and safety courses for postgraduates in the Faculty of Science and Health.

SAFELAB 1 covers the areas of Out of Hours, Security, Manual Handling and Health and Safety Office. SAFELAB 2 covers more specialised areas such as biological, chemical, electrical, laser and radiation safety. All new DCU postgraduates must attend SAFELAB 1 and all laboratory-based postgraduates must attend SAFELAB 2.

On top of this, the School is runs a yearly session on health and safety for all new postgraduates as part of their induction to the School.

2.2 Principal Investigator Responsibilities

It is the responsibility of the Principle Investigator of a research group to

1. Maintain an up to date chemical inventory for their research group
2. Provide risk assessments for hazardous equipment in their laboratories
3. Ensure that bi-monthly inspections are carried out to ensure

- That fire exits are kept clear.
- House-keeping standards are maintained
- Chemical inventory is updated

Every Research Supervisor is responsible for ensuring the safety of their research workers, both students and staff. All supervisors are advised to read the guidelines on *Out of hours working* [http://www.dcu.ie/safety/out_of_hours.shtml]

2.3 Safety Arrangements School of Physical Sciences

The Safety Person Associated with each room in Block II is given in the following table.

Name	Rooms
Dr Bert Ellingboe	114, 116, 116 A, 116 B, 116 C, 116 D, 217, G14C, G13
Dr Jenifer Gaughran	226, 226A, 226B, 226C, 226D, 226E, 226F, 127, 128, 227, 227A, 227B, 227C, 227D, 227E, 227F
Dr Enda McGlynn	G05,G15, G06, 129, 130, 130A, 131, 132
Dr Rob O'Connor	125, 125A, 117, 211(+C), 211A, 211B, 124
Prof John Costello	121, 121A, 122A, 122B, 122C, 122D
Dr Karsten Fleischer	215, A,B,
Dr Jean-Paul Mosnier	121B, 122, 123
Dr Lampros Nikolopoulo	213
Prof Miles Turner	224

3.0 Personal Safety in the laboratory

3.1 General principles

1. Think Before You Start An Experiment
2. Read And Complete The Required Assessment Forms
3. If A Problem Occurs Save Yourself Not The Apparatus
4. Never Work Alone In A Laboratory (Category A and B, See "Late Working And Overnight Experiments" Section Of This Safety Statement)
5. Keep Your Workplace Tidy
6. Wear Safety Glasses If Necessary

3.2 Equipment

A standard operating procedure (SOP) manual is provided for laboratory equipment (where appropriate). The SOP's contain clear and concise instructions on how to use the equipment, and are located in a folder in the laboratory where the equipment is located.

3.3 Risk Assessments

There are a number of risk assessments for the most common activities undertaken and equipment/materials used in the School of Physical Sciences.

Risk assessment forms must be completed by each researcher prior to commencing work detailing the specifics of the work and the control measure required to carry out the work safely.

The Risk Assessments must be approved by the Principal investigator and must be available for inspection on request.

3.4 Ordering chemicals

Students/researchers/staff should be familiar with the Material Safety Data Sheet (MSDS). Appendix 4 of this document includes a guide on how to obtain MSDS for chemicals. All chemicals ordered should comply with the HSAF process - https://www.dcu.ie/physics/about-safety-school-of-physical-sciences

https://www.nj.gov/health/eoh/rtkweb/documents/fs/1866.pdf
This site is a good introduction to the main safety considerations for common chemicals
Useful, plain English, chemical information.

https://www.merckmillipore.com/IE/en/product/msds
You may need to refine your search from a number of possible results
e.g. Toluene will return a large number. Select one and click on the SDS link on the right hand side.

- The **M**aterial **S**afety **D**ata **S**heet (MSDS) is a valuable document regarding the health and safety when handling chemicals, reagents…

- The best source for MSDS is the internet at at www.sigmaaldrich.com. Click on the MSDS link . On this page you may enter the name of your chemical reagent into the displayed 'SEARCH MSDS' or, better still, enter the CAS number for the reagent (obtainable from an Aldrich or any chemical reagent sales catalogue) and select GO. Click on any of the subsequent search results for your chosen reagent (bearing in mind there are different grades of the same reagent, but the MSDS will be the same for all) and click on the MSDS link to display the safety information.
- You can now read/print/save the MSDS for your reagent/chemical.
- Remember, if you have any concerns about using a reagent, contact your project supervisor initially.

3.5 Storing Chemicals

Chemical Storage Groups

Storage Groups are groups of chemicals that will not react violently if mixed together.

Storage Group identifiers (A-X) are assigned to each chemical.
Storage Group identifiers are used for:

- storing solids, liquids and gases;
- grouping hazardous chemicals in the same secondary containment tray, including hazardous waste; and determining the appropriate re-use of empty chemical containers.

NEVER store chemicals from different storage groups in the same secondary container.

A Compatible Organic Bases, Flammables, and Poisons.

B Pyrophoric and Water Reactive Materials.

C Compatible Inorganic Bases, Oxidizers, and Poisons.

D Compatible Organic Acids, Flammables, and Poisons.

E Compatible Oxidizers, Organic Peroxides, and Acids.

F Inorganic Acids not including Oxidizing or Organic Acids.

G Non-Reactive Materials and Non-Hazardous Materials.

H Flammable or Pyrophoric Compressed Gases.

I Compatible Corrosive and Oxidizing Gases and Inert Gases.

J Poison Compressed Gases.

K Explosive or other unstable material.

L Solvents, Flammables, and Combustible Materials.

X Needs secondary containment separate from ALL groups and from each other individually.

Storage Groups that can be stored on the same shelf, or within the same storage cabinet, if each group is segregated by secondary containment:

Shelf Group	Storage
1	A, B, D, G, L
2	C, E, F, G

3	X [store separately]

Incompatible Chemicals

Violent reactions may occur when the following chemicals from different storage groups are mixed:

Corrosives + Flammables = Explosion/Fire

Corrosives + Poisons = Poison Gas

Flammables + Oxidizers = Explosion/Fire

Acids + Bases = Corrosive Fumes/Heat

Secondary Containment

Use secondary containment to separate incompatible chemicals.
Secondary containers:

- must be used for ALL liquid chemicals;
- for a single container, must be sized to contain 110% of the single containers capacity;
- for multiple containers stored in the same secondary container: the secondary container must be able to contain 150% of the largest container or 10% of the aggregate quantity stored, which ever is greater;
- must be capable of holding any spilled material until the spill can be cleaned up; must not be degraded by the spilled material (i.e.: the secondary container must be compatible with the hazardous material).

3.6 Eating, Drinking or Smoking

Eating and drinking are forbidden in laboratories and workshops except where it forms part of the experimental procedure. Smoking is forbidden in all parts of the School of Physical Sciences.

3.7 Hazardous material

Body fluids (e.g. blood, urine and saliva) must be regarded as potentially hazardous materials and treated accordingly. Laboratory white coats should be worn when working with hazardous material. Disposable equipment should be placed in the appropriate receptacles provided following use. Particular attention should be given to personal hygiene, and any skin abrasion should be carefully covered with waterproof plaster before commencing any laboratory activity involving the use of hazardous material.

3.8 Protective Clothing

Protective Gloves

Gloves must be used when hand contact may occur with any potentially infectious material. Gloves may also give short-term protection against most chemicals. Appropriate gloves should be worn

when handling some solvents. Nitrile gloves, which offer protection against a broad range of chemicals agents.

- Since gloves can be torn or punctured, any skin abrasion or cut should be carefully covered with waterproof plaster prior to putting gloves on your hands
- Use the appropriate size glove (should fit properly)
- Replace gloves if contaminated, torn or punctured. Never wash or re-use gloves
- Do not use petroleum products on the skin prior to putting gloves on your hands (degrades the integrity of the glove)

Procedure for Glove Removal

Soiled gloves should not come in contact with the hands

- Using both gloved hands, peel one glove off from top to bottom and hold it in the gloved hand
- With the exposed hand, peel the second glove from the inside, tucking the first glove inside the second glove
- Remove gloves when they become contaminated, damaged or before leaving the work area

Even if you have been wearing gloves, wash your hands when you finish the experiment and before leaving the laboratory

Gloves worn in laboratories must not be worn in "clean areas" (corridors, offices, computer laboratories, etc.).

Laboratory Coats

Wearing a laboratory coat can give considerable protection against splashed chemicals and flash burns. Staff and students working in labs in the School of Physical Sciences are REQUIRED TO WEAR a laboratory coat. The coat should be fastened and kept clean.

Safety Glasses

Safety glasses should be worn in all designated and when handling chemicals, glass vacuum or pressure apparatus, and equipment with moving parts. The campus shop stocks safety glasses which can be worn over prescription glasses.

3.9 Fire

Students should acquaint themselves with the locations of the fire exits. Exits are clearly marked with green signs. In the event of the fire alarm sounding during a practical class you should cease all activity and, under the direction of the staff member in charge, vacate the building in an orderly fashion, and assemble at the appropriate meeting point.

Fire wardens

Fire wardens for Block 2 are as follows

Second floor West	2nd Floor East
Ray Murphy	Pat Wogan
First Floor West	**First Floor East**
Henry Barry	Lisa Peyton
Ground Floor West	**Ground Floor East**
Henry Barry	Des Lavelle

3.10 Accidents

The care of the injured party must be paramount at all times. You must ensure that the subject is safely seated, or lying down before initiating any procedure. The subject should be monitored at all times for any change in his/her physical condition.

Bags and coats should be placed neatly on vacant benches or under benches. They must not be left lying about the floor where they constitute a hazard.

Any accident involving a student/research subject or an experimenter must be immediately reported to a staff member. An incident/accident report form must be filled in on the Health and Safety Website.

A staff may exclude any student from the laboratory if they consider their conduct liable to cause a breach of safety regulations.

3.11 Electrical Safety

Notice the danger signs. On all electrical equipment you use, look for signs of wear on the cable and insulation problems where it connects to the plug or equipment. If it looks less than perfect, contact the technical staff. Do not bring old equipment into use without first having it checked for safety.

3.12 Mechanical Safety –

Mechanical Workshop

Controls: There are a number of serious mechanical hazards in the mechanical workshop situated in NG 14 & NG 15

No visitor or member of the School of Physical Sciences is permitted to use any equipment in this area with out first getting permission from the principal workshop Technical Officer Mr. Des Lavelle
The principal Workshop Technical Officer has the right to refuse permission to any one (s)he deems not sufficiently competent to use such machinery
Oxy-acetylene and TIG welding create further hazards such as hot surfaces, fire and ultraviolet light. These procedures can only take place in the designated area within the workshop and only by operators deemed competent by the principal workshop Technical Officer. Operators must use the appropriate protective equipment.

Rotary equipment: Make sure equipment with rotating parts, e.g. stirrers, rotary evaporators, rotary pumps cannot catch your hair, clothing or any trailing wires or tubing.

Carrying solvents: Winchester bottles of solvents may only be transported in the corridors or lifts in carriers (maximum load of 2 carriers/person), or on sturdy trolleys with wheels at least 3" in diameter with raised sides to restrain bottles.

Gas cylinders: Large cylinders of compressed gases can only be transported in appropriate trolleys (which are designed to be pushed, not pulled) and transferred carefully to positions where they should be securely strapped. Seek advice from a technical officer if a cylinder trolley is showing signs of wear, or is not functioning properly. Different types of regulators are used with different pressure scales. ANY PROBLEMS WITH REGULATORS SHOULD BE IMMEDIATELY BROUGHT TO THE ATTENTION OF THE TECHNICAL STAFF.

Graduate students who intend using gas cylinders as part of their research should inform the CTO of their intentions, and must be trained in the safe use of it. Undergraduate students must never attempt to move or fit compressed gas cylinders.

3.13 Noise and Safety

A change in sound is often the first indication of a problem with equipment or machinery. Make every effort to keep background noises from pumps, shakers, compressed air jets, etc. at as low a level as possible.

3.14 Glassware Safety

Broken glass and broken used disposable pipettes MUST BE placed in the container labelled BROKEN GLASS located in the laboratory (NG23). Empty bottles for disposal that have not been cleaned should be placed in a dedicated bucket labelled “empty bottles” (available from the technical staff office at ext 5271)

Labelling of Glassware/Sample Bottles

All glassware and sample bottles used for storing compounds which are intended for further use, must be labelled as follows :

NAME:

DATE:

COMPOUND:

SOLVENT:

If there are known hazards associated with the compound, the appropriate warning symbol should also be displayed. A labelling machine ('p-Touch') is available from the technical staff office (NG23) for making custom labels for safety purposes.

Cleaning and Recycling of Glass Winchester Bottles

Completely empty the bottle of all chemicals.Remove all labels other than those that came with the bottle Manufacturer's labels may be left on the bottle I.e. remove information labels stuck on by the user.

For solvent bottles:
Rinse with acetone and leave to evaporate inside a fume cupboard overnight.

For bottles that that contain water soluble chemicals e.g. acids & bases:
Rinse thoroughly with water only then triple wash each bottle with hot water

Clearly mark each bottle as having been cleaned by either removing the manufacturers Label.
Drawing a clear line with a marker through the label and other hazardous information

Bring the cleaned bottles to the departmental Safety Advisor who will verify that the container has been correctly cleaned, washed and labels defaced.

He/She will then arrange to have it placed in the recycling bin in N132.

VERY IMPORTANT
All waste chemicals must first be disposed of appropriately
This is NOT a waste chemical disposal service

This service does NOT apply to plastic chemical containers

Only cleaned glass bottles will be disposed of
Contaminated / dirty bottles will not be entertained

4.0 Emergency Procedures

4.1 Dealing with an Emergency

First Aid and defibrillator trained personnel:

Pat Wogan	Physics	5275	N221
Lisa Peyton	Physics	5306	N144
Henry Barry	Physics	5520	NG23

Where Ambulance/Cardiac Ambulance/Fire Service is required:

Firstly, dial the emergency services at 7999 and request them to enter DCU through the Collins Avenue entrance and report to the Main Reception

Where Non-Emergency Injury Care is required security to meet emergency services at the Main Reception and inform them of your location. If possible have someone wait at the entrance to the building to take the ambulance personnel directly to the casualty

Where Non-Emergency Injury Care is required

Where, in the opinion of the First Aider, the injured party does not require ambulance assistance, they should be advised to attend the Charter Medical Clinic (Opening Hours Mon – Fri 8am – 6pm).

DCU Security			01 700 5999
Student Health Centre Emergencies			01 700 6999
Student Health Centre Semester 9:00-12:45, 14:00-17:00 Mon-Fri Summer: Closed			01 700 5143/5766
Beaumont Hospital			01 8093000 01 8377755
Poison Information Service Beaumont Hospital			01 8092566
Taxis		9.00-17:15 Dial 9 After 17:15	(DCU reception) Dial 5999
Finglas Cabs			01 8343333
School Safety Adviser	Mr Javier Monedero		01 700 8471
Assistant School Safety Adviser	Mr Paul O'Connor		01 700 8474

Normal Working Hours - 9:00 to 17:15 - Monday to Friday.

4.2 Fire Safety Precautions

Familiarise yourself with at least two routes from your laboratory to a fire exit

Familiarise yourself with the location of:

- Telephones
- First aid boxes
- Fire extinguishers
- Fire alarm points and how to switch off gas, water etc. in your laboratory
- Evacuation Procedure and assembly points

Routine testing of the fire alarm and fire drill will be notified in advance.

Any other time, EVACUATE THE BUILDING THROUGH THE NEAREST EXIT IF THE FIRE ALARM IS ACTIVATED, and follow the fire warden's instructions.

Never use a lift.

Assemble away from danger and clear of the building at the designated assembly point.

On Discovering a Fire

If the fire is clearly minor, attempt to extinguish with a carbon dioxide extinguisher (or a powder extinguisher if reactive metals are alight), BUT DO NOT ENDANGER YOURSELF.

Otherwise, OPERATE THE NEAREST FIRE ALARM POINT, AND INFORM SECURITY (5999). Most likely, any fire will be detected by the strategically placed sensors, and the alarm will be activated automatically

4.3 Escape of Toxic Material

Vacate the area immediately. Lock the laboratory door where possible and display a sign DO NOT ENTER on the laboratory door. Close all doors on exit. OPERATE NEAREST FIRE ALARM POINT. Warn people to avoid the affected area. PHONE SECURITY (5999) if this occurs outside normal working hours, or call the technical officers at 5520 or 5271 during normal working hours. INFORM THEM OF THE NATURE OF THE MATERIAL INVOLVED.

4.4 Safety Stations

There is a SAFETY STATION marked by a green sign and white lettering located in most research and teaching areas. This station has a first aid cabinet.

4.5 Safety Equipment Requests

Requests for additional safety equipment for a particular work area should be submitted to the Chief Technical Officer in writing.

4.6 Dealing with an Injury/Medical Emergency

Aiding an Injured Person

KEEP CALM. Phone for a First Aid person as indicated on the "Emergency Contact Numbers" posted on the wall (all laboratories).

A first aid station with all the relevant contact information is located on the ground floor of the atrium. If more serious, call emergency services immediately to request an ambulance (01 700 7999).

DCU security should also be contacted (01 700 5999) as detailed on the "Emergency Contact Numbers". In the event of an alarm activating, do not attempt to move injured persons from the building unless there is imminent danger.

Stay with the injured person until help arrives.

In any situation where a first aider is required but is unavailable (Out of Hours) Security should be contacted immediately.

Medical Emergencies

Never approach an injured or unconscious person without first checking that it is safe to do so. There may be extreme danger to you if, for example, there are live exposed wires close to an unconscious casualty on a wet floor.

All injuries should be reported as soon as possible by completing an Injury/Incident Report Form available from the SHHP technical support office (XB28) or the SHHP secretary's office.

Dealing with Accidents and Injuries where the Casualty is Conscious

KEEP CALM. Phone for a First Aider as indicated on the "Emergency Contact Numbers" posted on the wall and, if more serious follow the procedure posted on the wall beside the phone.

Dial 01 700 7999, request an ambulance and direct them to the Collins avenues entrance and to the University reception.

Call security at 01 700 5999 and request them to meet the ambulance at reception.

In the event of an alarm activating do not attempt to move the injured person from the building unless there is imminent danger. Stay with the injured person until help arrives.

The first aider will decide if the casualty needs to attend the campus nurse or VHI clinic, and will make arrangements for transport to the nurse's station/VHI clinic. This may require some assistance with walking. If transport is required, phone security at 01 700 5999.

Any injured person going to a hospital must either go by ambulance (arranged by calling security (ext. 01 700 5999) or accompanied by a DCU first aider in a taxi. An injured person MUST NOT go to hospital unaccompanied in a private car.

4.7 On Discovering a Flood

If it is obvious, stop the leak, phone the Estates Office at 5142. Report the leak to technical staff at 5520 or 5271. Call security at 5999 if the leak is discovered during OUT OF HOURS. DO NOT ATTEMPT TO MOVE WET ELECTRICAL EQUIPMENT UNTIL IT IS DISCONNECTED FROM THE MAINS.

4.8 Failure of Mains Services

If there is a failure of water, electricity or lift services during working hours, phone the Buildings Office (5142) and the technical staff (5520 or 5271). Call security at 5999 if the failure is discovered during OUT OF HOURS.

4.9 Preventing Fires And Floods

Apart from the obvious dangers of horrendous injury and even death, fires are enormously destructive.

The Fire Detection System

All parts of the School are fitted with detectors in or near the ceiling labelled OPTICAL HEAT (for flame detection) or HEAT (for heat alone) or SMOKE (for smoke alone). Note the type of detector that is fitted in your laboratory. The detectors are On Alert at all times. A red light appears and an alarm sound is emitted when a detector is activated. Do not re-enter the building until you are told it is safe to do so by security or a fire warden.

PLEASE TAKE GREAT CARE TO AVOID CAUSING FALSE ALARMS
WILLFUL TAMPERING WITH FIRE ALARMS IS A SERIOUS OFFENCE

Solvents in Laboratories

Store only a working minimum of flammable solvents in laboratories, since in the event of fire, excess amounts of solvent could endanger lives and the fabric of the building. Solvents should be stored in solvents cabinets. Solvents in Winchesters bottles must not be stored on the bench.

Leaving a Laboratory or Workshop

Serious damage often occurs in unoccupied areas due to human error. When you leave your workplace in the evening (or during the day if you are to be away for a prolonged period) always check to ensure that:

a) There are no obvious problems with any reactions or equipment left running (these should have an overnight running notice)

b) Flammable solvents are properly stowed in appropriate closed storage units

c) Unnecessary electrical equipment, e.g. hot plate, are turned off and NO NAKED FLAME OR FLAMMABLE GAS IS LEFT ON

d) If water has to be left running, the tubing is anchored down a drain so there is no splashing or any risk of overflowing if the water pressure increased

e) Equipment is covered where appropriate

f) Lights are turned off

g) Fire doors and other doors are closed

Floods

Apart from the damage to equipment and paperwork, and the considerable inconvenience to all affected, floods can be dangerous. For example, live electrical equipment can be soaked. Great care must be taken to avoid floods. In the event of a flood, notify the Estates Office by calling 5142 and the technical staff at 5520 or 5271, or outside normal working hours contact security at 5999.

4.10 Emergency Evacuation Routes

When the fire alarm is activated, or in an emergency, the School should be evacuated via the nearest fire exit. Green running man symbols have been posted around the building to clarify the emergency escape routes.

4.11 Waste

Biohazard Plastic Bags

These bags are used at the bench top and when full, they should be placed inside the pedal operated bins

Normal Bin

These are regular garbage bags and are used to dispose of non-contaminated paper, plastic, etc.

Broken Glass Container

A special container for broken glassware is located in the biochemistry laboratory (XB21a). Broken glass and broken used disposable pipettes and similar items must only be place in this bin

4.12 Needles

- Do not bend, recap, shear or break contaminated needles and other sharps
- Recap or remove contaminated needles from disposable syringes only necessary
- To recap needles, use a one-handed technique
- Place contaminated sharps in the sharp container (yellow bin) immediately after use
- Ensure that the sharp containers are easily accessible
- Do not place your hand in the sharps container when depositing any item into it
- Do not use a Sharps Container that is already full. Report it to the technical staff office at ext 8474 or 8471

4.13 Hand washing

- Wash your hands regularly
- If infected material gets on your hands, the sooner you wash it off, the less chance you have of becoming infected
- Every time you remove your gloves you must wash your hands with soap in the nearest sink
- If skin or mucous comes in direct contact with blood, wash or flush with water as soon as possible

4.14 Personal Hygiene

- Do not eat, drink, smoke, apply cosmetics or lip balms, or handle contact lenses where you may be exposed to blood or other potentially infectious material
- Avoid petroleum based lubricants that may eat through latex gloves
- Do not keep food and drinks in refrigerators, freezers, cabinets or on shelves, countertops or bench tops where blood or other potentially infectious materials may be present.

4.15 Personal Protective Equipment

Equipment that protects you from contact with potentially infectious materials includes protective gloves, safety glasses and laboratory coats. See section on Protective clothing above (page 15)

4.16 Housekeeping

- Clean all equipment and work surfaces immediately after contact with potentially infectious materials.
- Clean and decontaminate the work area with the disinfectant solution supplied at the end of each practical/testing session using a piece of paper roll.
- Do not pick up broken glass (which may be contaminated with infectious agents) with gloved or bare hands. Use tongs or a brush and a dustpan pick up broken glass.

- Place contaminated sharps and infectious waste in designated sharps containers. Containers should be labelled/colour-coded, leak-proof, closable and easily accessible. Do not fill containers to more than ¾ of their capacity
- Handle contaminated laundry as little as possible and with minimal agitation. Place soiled laundry in labelled/colour-coded leak-proof bags or containers without sorting or rinsing
- Never reach into trash to retrieve an object. Empty the contents onto a newspaper, and search with your eyes
- Report full sharps and waste containers to technical officers. Ensure that waste receptacles are covered, removed and replaced
- Do not put your hand into the sharps container when depositing any item into it
- Do not use a sharps container that is already full. Report it to the technical staff office at ext 8474 or 8471.

5.0 Laboratory Safety Audit

- This sheet is intended as an aid in producing a list of possible risks. It is not meant to be a comprehensive or complete listing of all risks in your area. Each laboratory is unique.
- Walk around your research area and itemise all the safety or potential safety issues that you can come up with. Even those that you are not sure of. At this stage make NO ATTEMPT to look for solutions. Simply brain storm and take notes. At a later stage, YOU will be the best judge for assessing risks
- Let me know if you come up with other items that should be added to this list.

Room number ---------- **Date** ---------- **Name** ----------

Physical	
Darkness power failure tripping, bang head	
Manual handling issues	
Safe access to all equipment,	
Safe storage on shelves, Heavy items high up!	
Wires trailing (trip)	
Sharps / glass etc	
How are sharps disposed of?	

Pressure or vacuum systems, failure hazards	
If doing repairs or servicing, any hazards, easy access, heights, sharp edges etc	

Fire	
Is there an easy exit route from all parts of the laboratory / room, Locked doors?	
Are all emergency exits clearly marked	
In the event of power /light failure could you find your way to an exit	
Is there suitable and sufficient fire equipment e.g. extinguishers / blankets	
What fire sensors are in your laboratory? smoke / heat [may be an issue with bake out of vacuum chamber]	
Any heat sources, potential sources of ignition	
Is there significant quantity of combustible material stored? Paper, books, wood, cardboard boxes	

Electrical	
All equipment suitably earthed and fused correctly	
High voltage issues	
Water and electrical safety	
Trailing or frayed leads	
Are there safety trip switches on the wall (red mushroom switches)	
Equipment leads secure and intact	
Waste Electrical Equipment	

Chemical	
Protection, glasses, clothing	
Suitable glassware and containers	
Appropriate work area	
Suitable storage of chemical	
Fume cupboards	
Suitable storage & separation of chemical waste	
Safe disposal of waste	
Effect on others nearby or after chemical work completed	
Sharps / glass	
Where do you keep information on chemical used? MSDS sheets,	
Are you aware of dangers & handling procedure for chemical used in your area	
Spills, splashes and emergency awareness for chemicals used	

Gases	
Un-restrained gas cylinders	
Unused or unnecessary cylinders	
Transporting cylinders to / from labs	
Flammable risks	
Poisoning / asphyxiation by gas	
Piped gas system potential dangers	

Radiation	
Sources box, shielded , store safely	
Danger of inhalation	
Disposal system	
Individuals registered & trained with Barry Byrne	
Licensed to have all sources used?	

Laser / "light"	
Interlocks on doors and equipment	
Stray reflections	
Clearly marked safe / danger areas	
Protective glasses	
Sources of UV, protection	
Sources of IR, protection	
X ray source	
Strobe lights – seizures [epilepsy]	

OTHER MISCELLANEOUS RISKS / TASKS	
Suitable desk & chair	
Computer is set up with good ergonomics	
Height of computer monitor	
Suitable chair	
Cleaners/stranger may walk in, not aware of experimental set up and dangers	
Use of lift -- Fire, Chemicals, gasses, LN2	
Liquid nitrogen/Helium, Cryogenic dangers	
Liquid nitrogen/Helium, Asphyxiation dangers	
Any lab users or visitors with disabilities	
Hot surfaces, burns	
Micro wave	
RF	
Have all laboratory users been trained in the safe operation of equipment	
Water cooling systems, Secure pipe work and hoses	
Floor water sensors	
Is there regular maintenance of equipment and in particular safety devices	
Any particular risk for a person with a disability Wheel chair, blind, epilepsy	
Exhaust from oil filled backing pumps	

A4 General safety notice on Door	
MSDS sheets stored in Perspex holders for easy access	

6.0 Lab Clearance Departure Checklist for Staff, Researchers and Post Graduates

Appendix 3

School of Physical Sciences

Departing Checklist
Staff, Researchers & Post Graduates

Name of Person Departing _____ **Date**_____
Group Name / Laboratory _____

Tick if task has been completed

1. Keys returned:
   Office ☐
   Laboratory ☐
   Lift ☐
   Action [if any] for door codes _____ ☐
2. Borrowed equipment/manuals/books/library books/ papers returned ☐
3. Responsibility for Equipment, Chemicals or other Group Function transferred to *(state name)*_____ ☐
4. All chemicals and chemical waste have been safely disposed of ☐
5. Ensure name is removed from all Committees & Dept. functions E.g. Safety committee, list of First Aiders, Fire wardens _____ ☐
6. Procedure/protocol of any new program or piece of equipment documented *(state location)*_____ ☐
7. Data and software relevant or necessary to project, stored *(state location)*_____ ☐
8. List of equipment necessary to project, stored @ *(state location)* _____ ☐
9. Un-subscribed from all journals (or changed mailing address) ☐
10. E-mail address removed from ***Group Name*** and Physics mailing lists ☐
11. ***Group Name*** web page up-dated ☐
12. Contact number/address left with (*state name)* _____ ☐

If any of the above tasks have not been completed state reason(s) why not
_____
_____
_____

Supervisor signature _____

7.0 Safe Systems of Work: Guidance

In establishing a safe system of work the Responsible Person in Charge (Supervisor) should take into account the following:

- Is the worker competent to carry out the work required and has he/she received all relevant information, instruction and training necessary to ensure, so far as is reasonably practicable, his/her health and safety while the work is in progress.

- Has the work area been inspected to ensure, so far as is reasonably practicable, that it is in a safe condition and without risks to health?

- Have safe means of access to and egress from the work area provided?

- Has the equipment to be used been inspected to ensure that it is (a) suitable for the intended use (b) free from defect(s) and (c) (in the case of prescribed dangerous machines) guarded?

- Are the materials to be used (a) suitable for the intended use and (b) safe and without risks to health if used in accordance with instructions given?

- So far as is reasonably practicable, is the working environment safe, without risks to health and adequate as regards facilities and arrangements for the welfare of the worker?

- In relation to the work to be carried out, have all reasonably foreseeable hazards been identified, risks assessed and, so far as is reasonably practicable, arrangements made to eliminate or minimise them?

- Has the worker been provided with protective clothing and personal protective equipment (e.g. eye protection, footwear etc.) as necessary and been instructed in its use?

- Have appropriate arrangements been made for the transportation of equipment and materials to and removal of waste materials from the work site (if necessary)?

- Have arrangements been made to inspect the work site on completion of the work to ensure, so far as is reasonably practicable that it is safe and without risks to health?

- Has an emergency action plan been prepared and have all necessary arrangements been made to put it into effect should an incident occur?

8.0 Safety in the Research Laboratories

The Health and Safety policy of the School of Physical Sciences applies to all personnel within the areas covered by the School. This includes staff, students and visitors. The following guidelines apply specifically to all personnel (including staff, post doctoral and postgraduate students, visiting researchers and undergraduate project students) who are *authorised* to enter and work within the School's research laboratories.

Responsibility
Executive responsibility for health and safety within the School rests with the Head of School. Within each research area responsibility for ensuring a safe working environment rests mainly within the research supervisor or the person in charge of the laboratory. However *all research workers have a responsibility not to endanger themselves and others by their actions or omissions.*

Authorised access to Research Laboratories
Access to each individual research laboratories is *strictly limited at all times to those individuals authorised by the appropriate research supervisor or person in charge.* In the case of visiting researchers or new staff the research supervisor is responsible for ensuring that the appropriate safety training is provided before laboratory access is authorised. This training must include emergency procedures such as fire or accidents/spillages. It will also include training in the use of personal protective equipment, risk assessments of laboratory procedures and safe systems for working on the appropriate laboratory equipment.

Laboratories which contain specific hazards (e.g. lasers, radioactive materials, chemical hazards etc.) must be clearly marked with identifying notices, which strictly limit access to designated personnel with appropriate training and expertise.

Working in Isolation
Working in isolation (i.e. in the absence of close supervision or nearby colleagues) is always potentially hazardous. Please refer to DCU's Policy on "Out of hours working"

Laboratory Environment and Practice
All researchers have a responsibility to maintain a tidy, well-organised and safe laboratory environment with a safe means of rapid access and egress from all working areas.

All experimental systems should be designed to be inherently fail-safe.

All researchers should carry out detailed routine assessments of the likely hazards and risks associated with their experimental systems and procedures. Research supervisors have a responsibility for ensuring that such assessments are documented and that systems and procedures meet the appropriate safety standards. Research supervisors must keep written records of risk assessments carried out and provide, where necessary, appropriate written work instructions including emergency procedures and additional written local safety rules. If in doubt contact the School Safety advisor

All researchers have a personal responsibility to make correct and full use of all protective clothing, personal protective equipment and safety aids provided in order to minimise risk.

Researchers must not attempt new procedures or tasks without carrying out a risk assessment; consulting their supervisor and receiving appropriate safety training.

All researchers within a laboratory must be kept fully aware of day-to-day modifications carried out by any researcher or support staff on experimental systems or operating procedures and clearly visible warning notices of any resulting potential hazard must be provided.

All systems, which operate beyond normal hours, must have a shut down procedure, which includes a contact number for emergencies. This procedure must be clearly displayed beside the experimental system.

Undergraduate Project Risk Assessment

1. This project risk assessment must be completed by the student and approved by their Supervisor before any work can commence. Once completed, the risk assessment form must be handed in to the Departmental Safety Officer, Alan Hughes, room N102 for record keeping.
2. One copy of the project risk assessment should be kept by the student, in their Laboratory Log book and one copy by the Supervisor.
3. The document must be completed for all projects, whether the project is desk based, laboratory based or off site.
4. Risk assessments should be reviewed, and where necessary revised, at least once every 12 months, and whenever there is a significant change - even if this is a continuation of the project.

Section 1. How to complete the risk assessment form

This Risk Assessment Form consists three parts and is to be completed (legibly) as follows:

i) The student is to complete all the boxes in early part of **Section 2**[page 3 of 5], including:

Title of project, Description of project, Supervisor details.

ii) The student must then complete **hazard identification** with help from the Supervisor.

This will identify any hazards associated with the project;

Those doing software projects may think it is unnecessary to do a risk assessment for a software project but (a) there are hazards associated with use of VDUs and injuries such as RSI and (b) it is part of your professional training because you may in future need to look after your own and other people's safety.

The student must then complete the risk assessment with the help of the Supervisor. The purpose of this task is to identify control measures and codes of practice that will reduce the hazard risk that may be present;

Additional information and factors to be considered when filling in this form and may be found at the following web sites:

Physics Department http://www.dcu.ie/physics/safety/safetystatement.pdf

In particular the sections on ***Safe systems of work: Guidance*** and ***Safety in the research laboratories*** should be read carefully.

iii) The student and Supervisor both sign the Declaration at the end of the risk assessment.

Give the signed original to the Department Safety Officer N102.

The student and supervisor should each keep a copy of this form

iv) The final section is for use by the Department Safety Officer only once the risk assessment is completed and submitted.

Section 2 The Risk Assessment form

This is to be researched and completed by the project student with the help of the Supervisor

Section 3 For Department Safety Officer & records

This is to be completed and signed by the Department safety office

School of Physical Sciences Risk Assessment Form

1. Laboratory and Personnel Details.

Building / Room Location	
Academic Supervisor / PI	
Lab Supervisor	
Other Personnel	

2. Brief Description of Work/Activity.

3. Brief Description of Equipment used (if applicable).

Equipment Name	
Manufacturer	
Model	
Serial Number	

4. Hazards / Risk. (List hazards / risks associated with Equipment / Procedure**)**

Description of Hazard	Description of Control Measures

5. Risk Assessment.

Comments:	Low	Medium	High
	☐	☐	☐

6. Are existing control measure adequate **Yes** ☐ **No** ☐

7. If NO then list Additional Control Measures Requires.

Description of Hazard	Additional Action / Control Measures	Action By

8. Additional Comments

9. Emergency Contact Details

	1st contact	2nd Contact
Name		
Office Number		
Ph: (daytime)		
Ph: (out of Hours)		
Mobile		

10. Signatures

	Name:	**Signature**	**Date**
Form Completed by			
Academic /PI			

9.0 Health & Safety Policies & procedures in place in the school

9.1 Changing bottled gas in gas stores

OVERVIEW

Changes to the piped gas system should always be done by trained technical staff unless.

You must be appropriately trained in gas cylinder safety, gas cylinder handling and gas regulators.

You must be familiar with the piped gas system for Block II. You may only change valves and cylinders on those manifolds marked BLOCK II and must not interfere with the piped gas system for the Research and Engineering Building, or anywhere else, which may be housed in the same caged gas area.

If you feel uncomfortable with any part of this operation, then you should not attempt to make any cylinder or piped gas system change. For example, if you feel nervous, unsure or are worried that you would not be physically strong enough to safely carry out a cylinder change then STOP. Do not attempt any changes.

PROCEDURE

1 Sign out the key from: Physics Room N102 N102

2 Leave the empty cylinder connected. All the manifold connections have non return valves.
If there is a full cylinder on standby, it should be put on line by turning the cylinder valve on. If the new cylinder is on the other side of the manifold / piped gas regulator, then it will also be necessary to turn on the valve at this manifold.
No more than two turns are required from the fully closed position to open a valve.

3 Do not to change cylinders, except in the case where there is NOT a full cylinder already attached to the piped system. In this case

- Store the empty cylinder safely
- Secure the full cylinder to the piped system and put it on line.

4 Send an e-mail to all the following people who are responsible for maintaining piped gas.
Henry.barry@dcu.ie
Include the following information in this e-mail

- A record of what you did
- The current status of cylinders
  - No. full
  - No. empty
  - No. full & connected

This information is needed for stock control so that cylinders can be re-ordered when necessary.
If you cannot send an e-mail, then please pass a written note with this information to the technical member of staff who looks after gas cylinders.

9.2 Using Gas Cylinders in Block II

What we do

- All cylinders are ordered through the Senior Technician [ST] using a single Physics account number
- Research groups requiring cylinders in Block II also use this account number, and are charged for the cost of the gas and every 3 months for cylinder rental.
- Undergraduate and technical workshop gas use in Block II is charged to Physics
- The ST keeps an accurate record of all cylinder deliveries and returns.
- The ST regularly verifies cylinder record in cages by a physical audit.
- The ST regularly updates cylinder type/size/location inside building by a physical audit. This inventory is kept in an Excel sheet and is posted on the Physics WEB site

Dos & Don'ts for ALL users

- Only trained competent people may use gas cylinders in Block II
- Do not travel in a lift with cylinders
- Cylinders are heavy and dangerous when moving them. Use a proper trolley and only if you are comfortable and competent doing so. Ask for help
- If there are location changes to any cylinders or cylinders are brought in from other sources then the ST must be informed immediately so that an up-to-date inventory can be maintained
- There should be no unnecessary gas cylinders in the building. Use the piped system where possible and remove unused cylinders to the cage storage area

9.3 Safe use of Piped gas

Ver 1.1 November 2015

- Only trained & competent persons may use the piped gas system.
  If unsure, you must stop and ask for training & advice from your supervisor, manager or P.I.

- The user must be aware of the chemical, physical & other risks associated with the gas being used.

- The user must be aware of the hazards & risks associated with a pressurized gas supply

- The user must be fully aware of any hazards that their use of gas may accidently or directly impose other laboratory users

- When not in use, the gas must be closed off using the small knob on the supply pipe
  It is NOT sufficient to adjust the regulator to near zero

- The outlet gas pressure is adjusted by turning the large knob on the front
  - clockwise increases the supply pressure
  - Anti-clockwise decreases the gas pressure

9.4 SOP Physics Recycling of Winchester Bottles SOP

Cleaning and Recycling of Glass Winchester Bottles

Completely empty the bottle of all chemicals

Remove all labels other than those that came with the bottle
Manufacturer's labels may be left on the bottle
I.e. remove information labels stuck on by the user

For solvent bottles:
Rinse with acetone and leave to evaporate inside a fume cupboard overnight

For bottles that that contain water soluble chemicals e.g. acids & bases:
Rinse thoroughly with water only

Then triple wash each bottle with hot water

Clearly mark each bottle as having been cleaned by either
Removing the manufacturers Label
Drawing a clear line with a marker through the label and other hazardous information

Bring the cleaned bottles to the departmental Safety Advisor who will verify that the container has been correctly cleaned, washed and labels defaced.

He/She will then arrange to have it placed in the recycling bin

VERY IMPORTANT

All waste chemicals must first be disposed of appropriately
This is NOT a waste chemical disposal service

This service does NOT apply to plastic chemical containers

Only cleaned glass bottles will be disposed of
Contaminated / dirty bottles will not be entertained

9.5 DCU Chemical Glass Disposal Policy

Thorntons Recycling can collect and dispose of glass bottles which have been used for the storage of solvents/ acids or alkalis, once the bottles have been made safe. Lockable bins will be provided to schools and research centers in the following areas:

- Science Building Service Yard (3 x 1,100ltr bin) - ICNT/ H&HP, Biotechnology and Chemical Sciences
- NRF Service Yard (1 x 1,100ltr bin) - NRF/ NICB/ NCSR/ BDI
- Physics -1 x 240ltr bin

Any school/ research center which wish to dispose of their glass bottles must first furnish the Estates Office with a letter to guarantee that all such bottles will be made safe and will be free of harmful solvents/ acids/ alkalis, i.e. after they are thoroughly treated to eliminate traces of the liquid stored within. The SOP detailing the process for making the bottles safe should also be attached. This letter will then be passed on to Thorntons.

Once this is in order, Thorthon's can then accept the bottles in the glass stream. The labels do not have to be removed. However, the treated and safe glass bottles must then be marked with a marker through the hazardous labelling before placing in the glass bin. Schools and research centers should have a designated person/s charged with placing the bottles in the bin assigned to their unit.

These bins must never be used for the disposal of pasteur pipettes or other sharps.

Physics Clean Certification & SOP Letter

4th December 2023

From:
Henry Barry
Safety Advisor
School of Physical Sciences
Dublin City University

To:
The Estates Office
Dublin City University

Re: Recycling Waste Glass Chemical Bottles

Dear Sir/Madam,

The School of Physical Sciences, Dublin City University would like to take advantage of the disposal service for Waste Glass Chemical Bottles provided by Thornton's Recycling, organised in conjunction with the Estates Office, DCU.

In doing so we guarantee that all bottles placed in our assigned bin will be made safe and free from any harmful chemical reagents. We have a strict cleaning policy within our School and a Safe Operating Procedure [SOP], detailing our cleaning procedure for bottles has been put in place, a copy of which is attached to this letter.
Furthermore, all empty bottles will either have their labels removed or be clearly marked through with a marker to indicate that they have been made safe for disposal.

To ensure compliance, there will be only one designated person, the School Safety Advisor, who will be in charge of placing empty bottles into this locked container

Yours Sincerely,

Mr Henry Barry
School Safety Advisor

Dr Jean Paul Mosnier
Faculty Occupational Health and Safety Committee

Prof. Eilish McLoughlin
Head of School of Physical Sciences

9.6 Cryogenic Liquid Handling

Examples of Cryogenic Liquids in use in the School of Physical Sciences are Liquid Nitrogen and Liquid Helium. Both have similar cryogenic properties and expand from liquid to gas with a volume increase of ~ 700
Liquid Nitrogen is a colourless, odourless liquid similar in appearance to water. It has a boiling point of -195.8°C.
Liquid Helium is a colourless, odourless liquid. It has a boiling point of ~4°K or ~ - 270°C. When it evaporates it is much lighter than air and may collect in ceiling voids

Hazards

- The extremely low temperature of these liquids can cause severe burn-like damage to the skin either through contact with the liquid, surfaces cooled by the liquid or the evolving gases. The hazard level is comparable to that of handling boiling water.
- The low temperature of the vapour can cause damage to softer tissues e.g. Eyes and lungs but may not affect the skin through short exposure.
- Skin can freeze and adhere to surfaces, which have been cooled by cryogenic liquids. This may lead to tearing of skin on removal.
- Soft materials such as rubber or plastics become brittle when cooled by such liquids and may shatter unexpectedly.
- Large volumes of gas are evolved from small quantities of liquid nitrogen or helium.
- This is a serious potential hazard in poorly ventilated areas where such evaporation can easily lower the concentration of Oxygen in the air. Asphyxiation can occur and unfortunately lethargy is a sign of lack of oxygen.
- Thermal stress damage can occur in vessels because of the large, rapid changes of temperature
- Oxygen may condense in containers, which are leaky or open to air, and where a higher than normal concentration of Oxygen has been generated there is the real danger of explosion or accelerated combustion of normally inert material
- Additionally, such external chambers can then explode on heating up due to rapid generation of gas in a contained volume.
- Pay particular attention to locations where ice builds up.

Handling of cryogenic liquids

- Only use containers, fittings and such which have been designed for use with cryogenic materials. Never use food type vacuum flasks as they may implode or explode.
- Always use personal protective equipment when handling such liquids
- Avoid skin contact with either liquid nitrogen/helium or items cooled by liquid nitrogen as serious burns may occur
- Always use cryogenic liquids in a well ventilated area especially when filling a warm container
- Never travel in the lift with a Cryogenic liquid dewar

Storage of Cryogenic Liquids nitrogen

Liquid nitrogen is routinely stored in 25 litre Dewar in research laboratories

Occasionally Liquid helium is used in research laboratories. It is imported in its own container and is stored in the laboratory suite in which it will be used

Training

Undergraduate laboratories: Students must be instructed in the correct procedures by an appropriate member of staff before using liquid nitrogen in any practical or project.
Research laboratories: New users of liquid nitrogen should receive instruction in its use from experienced members of the academic, postgraduate or technical staff.

9.7 Fire evacuation of Physics

The evacuation procedure is as follows

- Fire wardens should check all rooms; it is assumed that if a door is locked, then the room is unoccupied.
- It is not always possible to check rooms that have magnetic locks & key-pads. In a serious case [where there has been a double knock fire alarm system], all magnetic doors will open automatically.
- Where possible, deputy fire wardens will be appointed in each area who automatically take over if the principle fire warden is absent.
- When the building has been evacuated fire wardens should communicate with each other to ensure that all areas have indeed been checked & cleared.
- Public areas such as toilets & lift should be checked
- Laboratories will normally be cleared by the academic in charge of the practical
- The fire assembly point is ***Fire Assembly point #5*** All those evacuated from the building should go to this assembly area away from the main foyer doors.

General notes / comments

The lift must not be used in the event of a fire.
Stairwells are temporary fire safe areas [Wheel chairs]
Department safety advisor should be informed of new department members with fire safety implications or evacuation requirements. Wardens should be made aware of these needs

Fire Wardens should be competent and confident in handling an evacuation

- Insist on immediate and unconditional evacuation
- Show leadership
- Wear yellow bibs
- When everyone is outside, they should ensure that crowds are kept clear of the doors and building
- The fire assembly point [number #5] is to the right when exiting Block II from the main Foyer

For farther information, visit the following DCU sites

http://www.dcu.ie/safety/index.shtml
http://www.dcu.ie/safety/pdfs/evacuation.pdf
http://www.dcu.ie/safety/wardens.shtml

In the event of a fire staff should . . . .
Fire warden duties
Old list of Fire Wardens

Guidelines

9.8 Guidelines for use of Hydrofluoric Acid

Hydrofluoric acid is an extremely hazardous chemical, which has a boiling point of 19.5 C and therefore fumes at room temperature. It is labelled with risk phases:

- R26/27/28: very toxic by inhalation, by contact with skin and if swallowed
- R35: causes severe burns

Hydrofluoric acid has a number of properties, which make handling and usage particularly difficult.

- HF attacks glass, concrete, some metals and organic compounds
- HF is rapidly absorbed through mucous membranes and through the skin. Contact of anhydrous HF and concentrated solutions of HF with skin causes severe burns, which are immediately painful.
- Dilute solutions may not cause immediate pain but can penetrate through the skin and cause deep burns as the fluoride ions migrate through and damaging the tissues until they are eventually taken up in the bones. HF damage results in long-term pain, ulcers and burns, which are slow to heal.

Precautions

- Procedures using hydrofluoric acid must never be attempted by an untrained person
- Procedures using hydrofluoric acid must never be attempted outside of normal working hours
- Procedures using hydrofluoric acid must never be attempted by someone working alone
- Before starting to work with HF an antidote gel must be obtained from the school safety advisor Alan Hughes
- Reference must be made to a current MSDS sheet, obtainable from the school safety advisor
- An appropriate First Aider must be informed
- All procedures must be carried out in a fume hood
- Such areas must be thoroughly clean after HF use.
- Appropriate personal protective equipment must be worn i.e. Safety glasses (or face shield), PVC or Neoprene gloves which must be regularly checked for damage (even pinholes), lab coat and preferably a chemical proof apron.
- Hydrofluoric acid, no matter the quantity, must always be stored in a secure acid safety cabinet

Disposal

Unless large quantities (>10mole) of HF have been used, spent acid is best added slowly to a copious

Appendix 4

ater running down a drain. The flow of water must be continued for some time after to ensure that all the acid has been cleared.

Emergency procedures

Skin or eye exposure

Immediately wash with large amounts of water. Call for First Aid. Even if no pain is present, affected areas must be treated with calcium gluconate gel. Seek medical attention for all exposure to HF.

Spillages

- Small spillages (100 ml or less or <10% solutions) can be neutralised with sodium carbonate or sodium hydroxide solution. Full personal protection must be worn.

- Large spillages. Immediately contact both the school safety advisor and the Safety Advisor, School of Chemical Sciences through the Technical Officers' office in that School

9.9 Waste disposal policies in School of Physical Sciences (Spring 2018)

- A significant amount of Physics waste can be dealt with in the WEEE collection - all electronic and metal waste [including table frames] can go into every three months. Alan Hughes can advise.

- Plain unprocessed wood such as palettes will be collected by arrangement with Estates Office. Alan Hughes can advise (note that chipboard & formica table tops are NOT collected by Estates, please see final point below)

- Large paper clear outs [say of an office] are dealt with by requesting a green recycling bin. Alan Hughes can advise.

- Large cardboard boxes and packing will be dealt with by the cleaners, and should be left outside the building every evening.

- Styrofoam packing, while not recyclable, once bagged and left outside the building, will be removed by cleaners.

- There is a glass recycling bin behind the wooden fencing at the side of the DCU Sports Centre which can be used for non-chemical related glass.

- There is a clothes bank at the side of the DCU Sports Centre.

- Glass demi-johns and other HDPE chemical containers, once thoroughly cleaned and made safe, can be disposed of by arrangement with Alan Hughes.

- Each laboratory should have its own sharps waste container and Alan Hughes can advise on procurement of same

Other types type of waste such as damaged furniture, table tops and chairs should be collected and temporarily stored safely locally (i.e. not left out in corridors).

Alan Hughes is to be informed about this waste and the School of Physical Sciences will order a skip to deal with such waste periodically.