UNIVERSITY OF DUBLIN

TRINITY COLLEGE

School of Chemistry

SAFETY IS YOUR BUSINESS

August 2015

Contents

SCHOOL OF CHEMISTRY SAFETY PRECAUTIONS

The School of Chemistry has a good safety record and takes safety very seriously. No regulations can take the place of individual care by all members of the School, but a minimal number of rules have to be laid down. The following rules are a minimum requirement of the School of Chemistry, and are supplemented by particular regulations that may apply in buildings other than the Chemistry Building. They neither supersede nor are superseded by such other regulations. In the case of any queries, advice should be sought from the School's Safety Officer.

The Head of School, **Prof. M. E. Lyons** is legally responsible for safety in the School of Chemistry. She will appoint another member of staff of in the School to act in her absence, and a record of the name of this acting Head of School will be retained in the office of the School.

The Safety Officer of the School is **Prof. R. J. Baker**. He has executive responsibility for safety and reports to the Head of School. Particular duties of the safety officer include upkeep of the floor plans and safety information for the School, delivery of safety workshops for School and the College Safety Office, and assisting the Safety Officer with the School Safety Statement and other safety related topics that arise.

Prof. Baker is supported by **Ms. T. A. McDonnell** (Chief Technical Officer) and by **Mr. P. Brien**. Ms. McDonnell is responsible for those aspects of safety which concern work carried out in the School by cleaners, plumbers, electricians and all other workers who are not directly employed by the School. In the event that Ms. McDonnell is absent from the School, her safety functions will be performed by Mr. Brien.

The Radiation Safety Officer is **Dr. B. Twamley,** who is responsible for the control of radiochemicals in the School subject to the requirements of the College Radiation Safety Officer, **Dr. G. Gunning**. Dr. Twamley is responsible for the X-ray diffraction equipment which is under the control of the School.

WORKING HOURS

(A) GENERAL RULES

The normal working hours for the School are 08.00–18.00, Monday to Friday, excluding bank holidays. The access doors to the School are locked before 8.00 and after 18.00 hr Monday to Friday, and at all times on Saturdays, Sundays and public holidays. The front door of the Chemistry Building is operated outside these hours by a swipe-card system. Similar arrangements will apply in other buildings.

(B) NIGHT AND WEEKEND WORKING

The School maintains a "night book". This book must be signed by all staff, postgraduate students and others who are in the School outside the hours 08.00 – 18.00 from Monday to Friday, or at any time on a Saturday, Sunday or public holiday. Night books are provided at the main entrance to the Chemistry Building,

in the lobby of the SNIAM building and at the desk in TBSI. **Persons working outside normal hours are also required to "sign out' on leaving the School.**

No academic staff member, postdoctoral worker or postgraduate student will be permitted to carry out experimental or technical work of any kind in the School at any time outside normal working hours unless there is another person within earshot and *who is aware of their presence* so that they can summon assistance in the event of an accident. The name of this other person must be entered in the night book. It is important that regular contact is maintained with this other person, and at a minimum, contact should be every 15 minutes or more frequently.

The only circumstances in which those other than staff members and postgraduate students are permitted to be in the School outside the above hours are as follows:

(1) Persons attending evening lectures
(2) Security Staff
(3) Domestic Staff
(4) Maintenance Staff

Persons in categories (1), (2) and (3) above need not sign the night book.

The School of Chemistry views breach of the rules on night and weekend working as serious offences, for which the following penalties shall apply.

1. **First Offence**. Formal interview, with a warning, from the Head of School or his/her nominee.

2. **Second Offence.** Withdrawal of late working privileges for a fixed period of at least one week. Restoration will be dependent on a written undertaking (countersigned by the supervisor in the case of postgraduate students) to obey rules in future. Breach of these conditions will be treated as a third offence.

3. **Third (and subsequent) offences.** Exclusion from the School premises outside of normal working hours for a fixed period of at least one month, and until an undertaking (as at 2) is received.

These penalties are **minimum** sanctions, which may be increased in serious cases.

HAZARDS

(A) NATURE OF HAZARDS

The School of Chemistry is acutely aware that it is a hazardous environment for those who enter it. The main ***hazards*** are as follows:

Poisoning due to chemicals in whatever form

Burns due to chemicals, fire, hot apparatus, etc.

Explosions due to chemical reactions, fires or pressurised apparatus

Mechanical Injury due to the use of machinery, the lifting or falling of heavy objects, etc.

Electric Shock due to contact with high-voltage sources and equipment

Eye Injuries due to contact with chemicals or exposure to ultra-violet radiation

All of the above may lead to **serious physical injury** or to **death**.

The School is aware that chemicals which were previously believed to be relatively harmless are now known or suspected to be dangerous. The consequences of exposure to chemical agents can appear long after the exposure has taken place. Accordingly, care will be taken with the manipulation of *all* chemicals, with special care being taken in dealing with those known to be highly toxic.

Persons whose research or other work involves the use of especially harmful materials, including such items as scheduled carcinogens, mutagens, teratogens, radioactive substances, and human materials will be *obliged* to attend a consultation with ***Dr. McGrath*** of the College Health Service.

All other members of the School *may*, if they so wish, also attend a consultation with **Dr. McGrath.**

(B) SOURCES OF SAFETY DATA AND INFORMATION

The School requires Materials Safety Data Sheets (MSDS) to be supplied, as appropriate, with chemicals which are purchased. These forms will be retained by ***Mr. F. Cowzer*** in the Chemical Stores where they may be consulted as necessary.

The School keeps available the current editions of the following safety texts:

Hazards in the Chemical Laboratory (Royal Society of Chemistry)

The Sigma-Aldrich Library of Chemical Safety Data (Aldrich Chemical Company)

Handbook of Reactive Chemical Hazards (Butterworths)

Safety Science for Technicians (Longmans)

Prudent Practices for Disposal of Chemicals from Laboratories (American Chemical Society)

Prudent Practices for Handling Hazardous Chemicals in Laboratories (American Chemical Society)

Destruction of Hazardous Chemicals in the Laboratory (Wiley)

Handbook of Poisoning (Appleton and Lange)

The above, together with a variety of other texts on safety, toxicology and the safe handling and disposal of chemicals, are kept in Room 2.5, Chemistry Building.

In addition, the College Library keeps the following periodicals:

Chemical Hazards in Industry (Royal Society of Chemistry)

Laboratory Hazards Bulletin (Royal Society of Chemistry)

In the event that further information on a particular compound is considered to be necessary either or both of the following, which are available through the School of Pharmacy, may be employed:

The Registry of Toxic Effects of Chemical Substances

Various computer-based systems detailing toxic hazards.

An important source of information is the HSA website:
www.hsa.ie

Other websites may also be useful, but you will need to ensure that the information on them is reliable and accurate.

Particular risks are noted below:

(a) Many solvents, besides being flammable, are highly toxic. Useful information on permitted exposure levels can be found in the Code of Practice published by the HSA.
See
http://www.hsa.ie/eng/Publications_and_Forms/Publications/Chemical_and_Hazardous_Substances/Code_of_Practice_Chemical_Agent_Regulations_2011.pdf

(b) Liquid compounds can be adsorbed through the skin as well as by vapour inhalation. Every precaution should be taken to prevent such adsorptions into the body. Solvent evaporations should not be carried out in the open laboratory but in a fume cupboard. Splashes on the skin should be drenched with water for five minutes (or longer if thought necessary). Even water-insoluble substances can be removed in this way, while gently rubbing the skin with soap. Substances known to cause cancer or other severe or fatal diseases should be avoided. These include benzene, which is often the recommended solvent in many organic reactions described in the literature. Usually another solvent, e.g. toluene, can be satisfactorily substituted. Great care should be exercised when using halocarbons, especially carbon tetrachloride and chloroform.

(c) Mercury is a cumulative poison and should be treated with respect. When using mercury always work over a deep-sides tray. Do not use thermometers for stirring solutions. As little as 0.25 mg of mercury vapour per cubic meter of air is dangerous to health. This is only $1/70^{th}$ of the room temperature equilibrium concentration. Spilt mercury must therefore be collected immediately. Special apparatus is now available from the Chemical Stores for this purpose. When mercury is

accidentally spilled, any residues, which cannot be mechanically collected, must be chemically treated to avoid the dangers arising from mercury vapour in the atmosphere. All vacuum pumps which are utilised as backing pumps for mercury diffusion pumps must be vented to the outside of the building. All mercury-filled traps associated with vacuum lines or with pressurised inert gas lines must be vented to the atmosphere *via* an adequate trap containing elemental sulfur. Mercury **compounds** should be treated with care.

(d) Toxic chemicals and their solutions should never be pipetted by mouth. Use a Pasteur pipette for small quantities and a pipette filler for larger quantities.

(e) Winchesters of strong acids, alkalis, solvents, etc. **must always** be carried in the containers provided. Failure to do this may lead to very serious accidents.

(f) Reactive chemical hazards involve the release of heat energy so fast that destructive effects follow. Avoid, if possible, working with high concentrations of reagents and keep the temperature of the reacting mixture as low as possible (using an ice bath or other refrigerant). As a rule of thumb, remember that an increase in temperature of 10°C doubles the reaction rate. Many of the more hazardous chemical reactions are oxidations. When there is more bound oxygen in a system than that required to oxidise fully the carbon, hydrogen and other elements to CO_2, H_2O etc.("positive oxygen balance"), a potential hazard exists. Arrange to keep the oxygen balance negative by e.g., adding oxidants in several small amounts rather than in one large amount. Compounds with a positive balance are usually unstable, but so also are some with negative or zero oxygen balance. Examples of the latter are performic acid and the explosive T.N.T. Compounds with unusually high proportions of nitrogen and N-N bonds are also suspect. Compounds with multiple bonding between certain atoms are also hazardous, e.g. acetylenes, azo-compounds, some oxygen/halogen compounds and peroxides.

(g) Pyrophoric compounds react violently with air/or moisture. These may include many classes of materials, e.g. finely divided metals such as calcium or titanium, metal hydrides, metal carbonyls and organometallic compounds. Many require inert atmospheres and appropriate handling techniques.

(h) Many compounds react slowly with air (often aided by exposure to sunlight) and, over time, may build up dangerous concentrations of peroxides which explode when heated or treated chemically. The common structural feature in organic peroxidisable compounds is the presence of an H atom which can be converted to a hydroperoxy group-OOH. Examples are ethers, iso-propyl, alkyl, vinyl compounds, cumene, hydronaphthalenes and styrenes. An explosion due to peroxidation of butan-2-ol has been reported. Solvents such as diethyl ether, tetrahydrofuran, dioxane and diglyme should always be tested for peroxides (using acidified KI solution). Di-isopropyl ether should not be used unless absolutely necessary.

A few inorganic compounds and many organometallic compounds are subject to autoxidation leading to peroxide formation. Further

information on peroxidation may be found in Jackson *et al., J. Chem. Education,* 1970, **47**, P.A175.

(i) Common ether (diethyl ether) and carbon disulfide can be ignited by a warm hotplate or heating mantle. Ignition does not require a free flame or spark. Ether vapour is heavier than air and can travel long distances towards a source of ignition.

When carrying out an experiment which may involve what may be a reactive chemical hazard:

(i) Work on a small scale
(ii) Use adequate eye-protection, preferably a visor or full face-mask
(iii) Carry out the experiment on a wall-facing bench behind a portable safety screen or in a fume cupboard, designed as a protection against explosion
(iv) Have a suitable fire-extinguisher and breathing apparatus readily to hand
(v) Remember to protect your neighbours as well as yourself

(j) When pouring **liquid nitrogen** always wear safety spectacles and gloves. If a domestic Dewar flask is being used, make sure that its outer surface had been taped. Never leave unused liquid nitrogen in a Dewar flask for any length of time, and never leave in a liquid nitrogen bath any vessel which is open to the atmosphere, so that dangerously explosive liquid oxygen cannot accumulate. If you notice a **blue colour** (due to liquid oxygen) in a Dewar flask which has contained liquid nitrogen, or in any vessel which has been cooled with liquid nitrogen, **do not touch it, but seek assistance immediately.**

(k) Special care should be taken when using or setting up **electrical apparatus** to ensure that the area in the vicinity of the apparatus is dry and free from a danger of flooding. All mains and other high voltage connections must be properly made and not exposed in such a manner as might endanger other persons in the laboratory. Particular care should be taken when using Variac transformers, electrophoresis apparatus, and electrically operated thermostat baths. The use of any form of multiple mains connector should be avoided where possible. If such connectors are used it is essential to ensure that they are in good condition and that they are not **overloaded**. Fuses must be replaced only by competent persons and after the circuit or apparatus has been carefully checked. Familiarise yourself with the poster describing what to do in the event of an electric shock.

(l) **Vacuum and High Pressure Apparatus** There is always the danger of an implosion when an apparatus is evacuated even by a “low vacuum pump”, e.g. a water pump (which will give a net pressure of about 1 kg cm^2). Evacuations of large vessels should be carried out behind protective screen. Smaller vessels should be taped with adhesive tape. Those carrying out vacuum distillations must always wear suitable eye protection or, alternatively, a screen must be used to protect the apparatus. Pumps should be vented to the outside of the laboratory or into a fume cupboard if possible.

(m) **Gas Cylinders and Compressed Gases.** It is a long-standing policy of the School that, wherever practicable, the use of compressed gas

cylinders in labs should be minimised and that, wherever possible, gases should be piped from an external cylinder storage area. Before using chemicals which are stored under pressure in gas cylinders make sure you have read the instructions on handling these containers. Always use a proper cylinder trolley when transporting **cylinders of compressed gases**. During transport, the cylinder must be well secured in the trolley by a chain or other means. Cylinders placed at work stations or benches must be **secured** from falling over by the attachment of a strap or chain. Cylinder valves must always be turned off when the gas is not being used.

The regulations for laboratory housing of cylinders are:
Two cylinder permit forms **MUST** be completed before any cylinder is brought into a lab, and/or is moved within a lab (except for the replacement of an empty cylinder with a full one). These are available online (see Appendix B).

The form "Cylinder Movement Report Form 1" **MUST** be completed and signed by the PI and then countersigned by either the Safety Officer or the Deputy Safety Officer; copies are to be kept in the CTO's office, the School Office and the Chemical Stores.

The second ("Cylinder Movement Report Form 2"), after completion, **MUST** be attached to the outside of the lab door and must include – or be accompanied by – a sketch map of the lab clearly indicating the exact position within the lab of any gas cylinders along with the identity of the gas(es) concerned. This should now be accompanied by a GSH-style warning (the white diamond, with red border, and black cylinder across the diamond).

If the lab has more than one door, copies of the form/map/sticker should be put on **EACH** door.

Like all hazardous materials, the gas (and cylinder) MUST be risk assessed. The risk assessment should include consideration of all cylinder movement, including replacement of empty cylinders; and the requirement for PPE (protective footwear and "high grip" gloves) in handling cylinders. All such movement of cylinders **MUST** be carried out by, or under the direct supervision and in the presence of, someone suitably competent in the handling of compressed gases and also in manual handling.

(n) Only take limited amounts of **sodium** or **potassium** from the stock bottles. Have alcohol available for disposal of residues and for the cleaning of cutting equipment. Make sure that the sodium or potassium in any bottle is well covered with dry liquid paraffin or naphtha. You **MUST** be supervised by a senior technical officer or other competent person the first time you handle sodium or potassium.

(o) **Bunsen burners** must never be left burning when a laboratory is unattended.

(p) Take care whenever working with **glass**. Caution is required when heating or cutting glass tubing or rod. Always use a proper glass knife to prescore the point at which you wish to cut. **Protect your hands** with gloves and a heavy cloth when snapping pre-scored tubing or rod. Never attempt to cut tubing which is more than 6 mm in diameter:

take it to the glassworking shop for professional attention. Before inserting sections of glass tubing (or glass apparatus in general) into rubber bungs or into corks **make sure** that there are no jagged ends (round them in a flame if necessary), **use a lubricant** such as glycerol or Teepol, and **protect your hands with gloves and a heavy cloth.** Place all broken glass items in the special containers provided: do not use the ordinary bins.

(q) Due care must be taken to ensure that any continuous supply of water (e.g. for condensers, diffusion pumps etc.) is adequately plumbed in. In particular, rubber tubing should not be used if there is an alternative available. **UNDER NO CIRCUMSTANCES MAY ANY WATER FLOW THROUGH RUBBER TUBING BE LEFT UNATTENDED –** even for "a few minutes".

(r) **Please remember that it is a school regulation that all persons in laboratories used for wet chemistry and/or synthetic chemistry MUST wear a laboratory coat, safety spectacles and closed, waterproof shoes. It is especially important to comply with this regulation in any teaching laboratory during any class in that lab.**

FIRE SAFETY

(A) FIRE ALARM SYSTEM AND FIRE DRILLS

The School is provided with a sophisticated, automatic fire alarm system which protects all secondary means of escape and which is tested regularly by the College Buildings Office. The fire alarm can be manually triggered from any of the several break-glass alarm boxes which are placed in various strategic areas of the School. The locations of the various heat sensors, smoke sensors, fire hoses and exit signs are shown on the lists and plans in the hallway of Chemistry – similar data is available for SNIAM and TBSI. The East End 4 Cocker Laboratories have a similar fire alarm system, which is part of that servicing the EED4 building as a whole.

Fire drills for each building in college are held twice during each calendar year and are attended by the Fire Safety Officer, Mr. Karl Flynn, by the College Safety Officer, Mr. Tom Merriman, and by members of the College ***security staff***. Drills are held without prior warning and during working hours when the building houses large numbers of staff, postgraduate students and undergraduate students. When the alarm is sounded, all persons in the main building are required to leave as quickly as possible by the nearest exit at the Flat Iron. Persons in the Cocker Laboratory are required to assemble at an appropriate location, currently Assembly Area D, between the Lloyd and ORI Buildings. Security Staff check the entirety of each building for defaulters before the all-clear is given. Persons working in the Chemistry and SNIAM Buildings are required to assemble at an appropriate location, currently the Flat Iron. A written record of each fire drill is maintained, indicating the date, the approximate number of persons evacuated from the building, and the time taken for complete evacuation.

(B) FIRE EXTINGUISHERS AND FIRE BLANKETS

Three different types of fire extinguisher are commonly available at appropriate locations within the premises occupied by the School. These include the following:

CO_2 extinguishers, which are suitable for fires involving burning liquids such as organic solvents, and for use on electrical fires and fires which involve papers or rubbish. These extinguishers are *never* used on fires which involve metal hydrides or metals such as sodium, lithium or magnesium.

Class D extinguishers, which are suitable for use on fires which involve metals such as sodium and other alkali metals, magnesium and other alkaline earth metals, metal alkyls and metal hydrides.

Dry powder extinguishers, which are suitable for fires involving burning liquids or electrical equipment.

Fire blankets (which do not contain asbestos-based materials) are available in all laboratories.

Regular inspection, renewal and servicing of the extinguishers is carried out by Diskin Fire Protection Ltd. under the direction of the College Buildings Office. Any person who has used one of the School's fire extinguishers, even for a very short time, must report the fact to the Chief Technical Officer immediately so that it can be fully recharged or replaced. Additionally, an Accident/Incident Report Form (see **Section 6** below) must be completed in respect of each such use of any fire extinguisher, and returned to the School Safety Officer, who will, in turn, report to the College Fire Safety Officer.

(C) ACTION IN THE EVENT OF FIRE

If any member of the School discovers a fire, the following actions will be taken.

The person discovering the fire will:

(1) *Briefly* attempt to extinguish the fire using appropriate means *provided* that to do so does not compromise their personal safety,

(2) Activate the fire alarm,

(3) *Leave the building* and call for further help.

(4) Proceed to the designated assembly area and remain there until told it is safe to leave.

(D) LIAISON WITH DUBLIN FIRE BRIGADE

The School recognises the special hazards which its use of compressed gases presents to fire-fighters from the Fire Brigade. The School will seek to reduce these as follows:

(1) It will pursue, as far as is practicable, a policy of piping in gases rather than keeping gas cylinders on the premises.

(2) It will keep records of the main hazards relating to cylinders of compressed gases in each area of the building. These will be sent to the Fire Brigade and will also be available in a locked box situated on the outside wall of the building to the right-hand side of the entrance door facing Lincoln Place. The keys to the padlock on this box (which can be forcibly opened by the Fire Brigade in the event of an emergency) will be kept in the following locations: the School's Safety Officer's office, the Chief Technical Officer's office and the Chief Steward's office.

The School also recognises the general hazards which the large number of different chemical substances within it presents to the Fire Brigade. A copy of the building Plan showing the degree of hazard (classified as High, Medium or Low) in each area will be kept in the front hallway of the School.

USE OF REFRIGERATORS AND FREEZERS

No flammable liquids, solids or gases will be stored in any refrigerator or freezer unless the thermostatic control has been moved to the exterior casing of the unit so that ignition inside the cabinet cannot be caused by this means. Additionally, the interior light of any refrigerator or freezer used for the above purpose will be removed for the same reason.

FIRST AID

(A) ACTION IN THE EVENT OF AN EMERGENCY

It is the policy of the School that first aid will not take the place of professional treatment. In the case of injuries such as cuts or burns, the person injured will be accompanied to the College Health Centre. For more serious injuries an ambulance will be summoned and medical assistance will be sought from neighbouring Schools, in particular from the Medical School Office, the Anatomy School, and the Dental Hospital. Additional assistance will be sought from any of the several members of the School who possess a qualification in First Aid (*cf*. **(D)** below).

(B) FIRST AID BOXES

It is the policy of the School that first aid boxes will be kept in all laboratories. These first aid boxes will be stocked with contents according to the official list issued by the secretary to the Faculty of Engineering, Mathematics and Science Safety Committee. Whenever a first aid box is used, an Accident/Incident Report Form setting out the reasons why access to the box was required will be completed (available online, see Appendix B).

First aid boxes are located in the following areas:

Main Chemistry Building: 0.5, 0.14, 1.20, 2.1 and 1.14

EED4/5: Cocker Lab.

SNIAM: 1.29, 1.16, 2.10, 2.14 – 2.16, 2.27, 2.22, 3.2, 3.32.

TBSI: B2.44, B2.18, 6.35, 7.16, 7.19, 7.23.

(C) MAINTENANCE OF FIRST AID BOXES

First aid boxes are maintained by Martin Services Ltd., Unit 11 Bluebell Business Park, Old Naas Road, Dublin 12. Personnel from the above Company will visit the School at intervals of not more than six months, check that the contents of each box are in order, and replace missing or outdated items.

The School carries stock of commonly used first aid materials which will be employed to replace items necessarily used during the intervals between service visits from Martin Services Ltd. These will be available from the Chief Technical Officer.

(D) FIRST AID TRAINING

It is the policy of the School to encourage selected members of the permanent staff and postgraduate students to attend official First Aid courses, which lead to the award of a Certificate in Occupational First Aid. For further details contact the School Safety Officer.

WASTE DISPOSAL

It is the policy of the School of Chemistry to act in a responsible manner with respect to the disposal of waste. Waste minimisation and the recycling of materials whenever this is appropriate are considered to be important elements in the overall management of chemical waste.

Certain types of waste which, carefully handled, are normally regarded as being non-hazardous may be disposed of *via* the sanitary sewer after great dilution with water, or *via* the daily domestic dustbin collection operated by the College. Solvents which are essentially immiscible with water or which have such high vapour pressures that explosive atmospheres can be formed above their aqueous solutions will not be disposed of *via* the sanitary sewer system. Chlorinated solvents will never be disposed of in this way.

Uncontaminated (*i.e.,* chemically clean) broken glassware will be collected in designated containers. When full, these will be sealed using adhesive tapes and disposed of *via* the domestic dustbin collection service.

All other types of waste are designated as hazardous wastes and are treated as described below.

(A) DISPOSAL OF HAZARDOUS SOLVENT WASTE

Solvent waste is collected in specially designated labelled containers which are located in all teaching and research laboratories. A clear distinction is drawn between waste which contains chlorinated solvent and that which does not. Different containers are provided for each category of solvent waste. Full containers are taken, with due precaution and with relevant accompanying documentation which accurately describes the nature of the waste, to the HMF Solvent Waste Store where they are received by the person in charge, **Mr. M. Phelan** or **Mr. C. Deevey**. Thereafter, the solvent wastes are handled in accordance with the regulations pertaining to the operation of that Store, and are ultimately taken away for disposal by the designated contractor.

(B) DISPOSAL OF HAZARDOUS SOLID CHEMICAL WASTE

Hazardous solid waste is collected in appropriately labelled containers, which are located in the relevant teaching or research laboratory. Different containers are used for each type of waste. When it is necessary to dispose of such solid waste, arrangements are made, in advance, with the person in charge of the Waste Store (Mr. Phelan) for its reception there. Appropriate documentation accurately describing the nature of the waste will be provided at that time. Thereafter the solid wastes are handled in accordance with the regulations pertaining to the operation of that Store and are ultimately taken away for disposal by the designated contractor.

(C) DISPOSAL OF CONTAMINATED GLASSWARE AND SHARPS

Glassware and metal (including hypodermic needles) which are contaminated with chemical residues will be disposed of in the specially marked bins or boxes which are provided in each laboratory. When full, these bins or boxes will be collected by a designated disposal company and taken away for incineration.

MISCELLANEOUS

(A) LABELLING OF CHEMICALS

The School recognises that the accurate labelling of containers of chemicals is of the utmost importance. The School will ensure that the containers of all chemicals bear a label indicating their contents. Hazardous chemicals will be additionally marked with labels in accordance with the EU system. Self-adhesive labels covering a wide range of hazards will be kept in the Chemical Stores and will be available through Mr. Cowzer.

(B) CHEMICAL SPILLS

Chemical spills will be dealt with according to the chart supplied by British Drug Houses which is available in most laboratories. Appropriate protective gloves and clothing will be worn by those cleaning up the spill, and breathing apparatus will be used if volatile toxic materials are present.

(C) FUME CUPBOARDS

The School of Chemistry recognises fully the importance of the use of fume cupboards for the manipulation of volatile toxic materials. Fume cupboards must conform to BS 7258.

Fume cupboards will be tested at least once per year using an appropriate instrument such as a hot wire anemometer and a written record of the tests will be kept.

ACCIDENTS AND INCIDENTS

All accidents and incidents must be reported using the official College Accident/Incident Form (available online, see Appendix B). The person reporting the accident or incident will complete Part A of this Form, and the School's Safety Officer or his/her deputy will complete Part B. The Form will then be transmitted to the College Safety Officer. Copies will be retained in the School's Office.

The School's Safety Officer will investigate any accident or incident the cause of which is not readily apparent, and will prepare and submit to the Head of School a report on the matter. Copies of all such reports will be kept in the School's Office.

In the event of any personal injury arising as a result of an accident or incident, standard College procedures in respect of attendance at the student Health Centre or removal to a hospital by ambulance will be followed.

VISITORS TO THE SCHOOL

Any member of staff or any student who brings a visitor into the Chemistry Building or into any of its associated facilities will ensure that the visitor has been informed of any special risks associated with the laboratory, room or office which is being visited.

No visitor who is not technically qualified will be left unattended in any laboratory or store.

Casual visitors to the School will normally go to the School Office in the first instance.

Transition year students who may be temporarily attached to the School will be classified as visitors.

All visitors must comply with the School's regulations regarding the wearing of laboratory coats and approved eye protection whenever they are in an area where experimental work is being carried out.

GLASSWORKING SHOP

The glassworking shop will be under the charge of **Mr. J. Kelly**. No use may be made of the workshop machinery or any other equipment under his control without his consent and unless he is satisfied that the person in question is competent to use it.

CHEMICAL STORE

The chemicals store of the School is located in the SNIAM building. There is an associated administrative office. The person in charge of this store is **Mr. F. Cowzer**, who reports to the Chief Technical Officer. The following regulations apply so that the **risks** associated with this chemicals store are minimised:

* No person may enter the store without the consent of Mr. Cowzer or his deputy

* Cleaners will not enter the store, unless specifically requested to do so.

* No person may take any chemical or other item away from this store unless a completed requisition docket has been presented and Mr. Cowzer has seen the chemical agent risk assessment.

* No person may take away a sample of a chemical or substance unless it is securely held in a container bearing an appropriate label, including hazard warnings where appropriate. Some older chemical samples held in the store do not carry hazard labels. All such samples will be treated as hazardous, and none will leave the store without hazard labels being affixed.

* Certain items which are known to be highly toxic, carcinogenic, mutagenic or teratogenic will only be issued to postgraduate students or research staff if a requisition which has been personally signed by the research supervisor/PI is presented.

* Certain items falling into the above categories (such as alkali metal cyanides, etc.) will always be kept in a locked steel cabinet within the store, and the quantities issued on receipt of a valid requisition will be recorded in a Poisons Book.

APPENDICES

(A) Faculty Booklet

This is now available online, as follows:

http://bit.ly/1NFWiah

(B) The School of Chemistry Forms

1. Accident Report Form
2. Chemical Risk Assessment
3. Experimental Risk
4. Gas Cylinder Movement Request (for use when a cylinder is being moved, except in the case of cylinder replacement)
5. Warning Forms related to Gas Cylinder Use
6. Unattended Operation Authorization Request Form

Are available online as follows:

http://chemistry.tcd.ie/safety/safety-related-forms/

SCHOOL OF CHEMISTRY ***Safety Precautions Undertaking Form***

I have read the leaflet "SAFETY IS YOUR BUSINESS" and I understand it and will abide by the regulations therein:

Name (BLOCK CAPITALS): _____

Signature:_____ Date: _____

and, if applicable,

Student Number:_____ Supervisor:_____

Please sign and return this form to the Chemistry School office.