Information on Chemical Waste Routes & Procedures in the Department of Chemistry

Solvent Waste

Hydrocarbon Solvent

1. Securely seal within a solvent container or drum wrapped once round with red hydrocarbon waste tape. Store the drum or container in the appropriate solvent storage cabinet.
1. Label with Lab number, group name & date.
2. Place in laboratory waste disposal area and await/request collection.

Chlorinated Solvent

2. Securely seal within a container or drum (obtained from Chemistry Research Technicians). Wrap yellow chlorinated waste tape once around the drum. Store the container or drum in the appropriate solvent storage cabinet.
3. Label with lab number, group name & date.
4. Place in laboratory waste disposal and await/request collection.

Specialist Chemical Waste

Any chemical waste not specified in other categories

1. Obtain a Waste Number from Estates Facilities (EF) using the defect reporting form
   Or email EF customer services: ef.csc@imperial.ac.uk
2. Fill in the Imperial Waste Form and log a job request on https://imperial.service-now.com/crt/.
3. Ensure all chemical bottles are labelled with either
   a. Original commercial label, or
   b. Yellow Imperial chemical waste sticker
4. Chemical bottles MUST be placed into a green box labelled with the Waste Number. Any oversized containers can be left loose as long as they are fully contained and have a yellow chemical waste sticker with the Waste Number on it.

Miscellaneous (non-solvent) Waste

Silica Waste (including: Drying agents, TLC plates etc.)

1. Securely contain within a sealed plastic container.
2. Label “Silica Waste” with lab number, group name and date.
3. Place in laboratory waste disposal area and await collection.
4. NO powders must be put in domestic waste (however innocuous). And NO heavy metals.

Sharps

1. All sharps MUST be placed within rigid, yellow safety sharp boxes. DO NOT OVERFILL.
2. Sharps boxes must be fully closed and labelled “Sharps” with lab number and group name.
3. Place in laboratory waste disposal area and await/request collection.

Glass waste

1. Clean and decontaminated glass waste must be put in the red glass waste bins.
2. When full, the bin should be taken to the glass waste compound.
3. Wearing Personal Protective Equipment (PPE), the user must then empty the red glass bin into the larger waste glass bin in the compound.

Clinical waste (including: gloves and blue roll – but excluding any waste requiring sterilisation via an autoclave i.e. genetically modified organisms)

1. Placed into orange clinical waste bags with a blue clinical waste tag (cable tie) fastened round the neck.
2. Contaminated gloves and blue roll may also be disposed of using this waste route.
3. Place in laboratory waste disposal area and await/request collection.

The information below is included in all lab books used in Dept. of Chemistry. Additional information is available via the Chemistry Health and Safety Handbooks that are on the Dept. Health and safety webpages.

Local emergency procedures for laboratory room number: .....

Floor: ..... **Building: .....**

Principal Investigator:	Nearest first aider name:	Nearest first aider name:
Phone:	Location:	Location:
Mobile:	Extension:	Extension:
	Mobile:	Mobile:

Confirm local lab / hazardous area induction has been completed: ☐

Confirm the locations of emergency response equipment in the area are known: ☐

Confirm individuals know of no lone working policy during synthetic chemistry: ☐

Skin or eye exposure	**Inhalation exposure**	**Spillages of hazardous materials**
Unless risk assessment advises alternative response: Wash/irrigate with copious amounts of water – for 20 minutes minimum and seek further advice from first aider.	Unless risk assessment advises alternative response: Evacuate and isolate the area, remove any casualties to fresh air, contact first aider and your supervisor.	Unless risk assessment advises alternative response: Isolate the spill and prevent it from spreading or anyone coming into contact with the spill. Clear up at the earliest opportunity.
Response to fume cupboard alarms: Make the experiment safe, turn off ignition sources, close reagent containers. Pull down sash to its lowest point. Inform supervisor and report to Estates Facilities as priority defect at earliest opportunity (ext 48000)	**Response to alarms or faults from other protective equipment:** Make the experiment safe, ensure the equipment power is turned off and a notice indicating it is faulty is attached. Inform supervisor and chemistry technical support at earliest opportunity.	**Fire** Only attempt to put out a fire if you are not putting yourself or others at risk and have been trained to use the correct type of extinguishers If you cannot put out the fire or your initial attempt fails: 1. Raise the alarm at the nearest call point. 2. Leave the building shutting windows and doors as you go if you can do so safely. 3. Proceed to the building assembly point. 4. Do not re-enter the building unless told to do so.

Reporting health and safety related incidents and near misses:

To reduce risks of incidents reoccurring all accidents or near misses or failure of protective equipment should be reported at the earliest opportunity using the College online reporting system (SALUS) via the webpages. Also ensure your supervisor is informed.

Evacuation and assembly points:

Confirm location of nearest evacuation exit known: ☐

Identify the evacuation assemble point for your location: .....

Guidance on experimental approvals and documentation

Standard Operating Procedures (SOPs) and risk assessments

1. Dept. approved SOPs for the use of generic laboratory equipment (e.g., rotary evaporators) and for generic procedures (e.g. use of pyrophoric liquids) are available via the Dept. Health and Safety webpages. They must be reviewed by the operator and approved by the Principal Investigator to ensure they are appropriate for each location and specific procedure. Where needed they must be amended to reflect research group location, specific risks and risk reduction measures.

2. As not all individuals will be level 1 trainers in all techniques in a lab the SOPs must identify the designated trainers for those particular techniques on the appropriate documentation.

3. SOPs are used to train others in the relevant techniques, control measures and emergency procedures. Training in SOPs can be recorded in the 'Procedural and Equipment Safety Training' section using the online 'My Health and Safety Records' system.

4. Where Dept. approved SOPs are not available the Principal Investigator is responsible for ensuring appropriate risk assessments and SOPs have been produced and approved. The College have a variety of assessment templates for various hazardous activities that should be used where a Dept. approved SOP is not available.

Chemical Reaction Assessments for synthetic chemistry

The Chemistry lab book contains a specific Chemical Reaction Assessment on every other page for use when performing synthetic chemistry. The reaction assessment identifies the chemicals involved, hazards and appropriate control measures following the hierarchy of control as required in the Control of Substances Hazardous to Health Regulations (COSHH). All reactions require this assessment to be completed and signed off as described below:

1. A Chemical Reaction Assessment does not replace a Dept. approved SOP or other assessment. Assessments for other hazards (i.e. not chemical) must be in place and approved as well as the Chemical Reaction Assessment. Confirmation that controls identified from related SOPs are in place must be given in the Chemical Reaction Assessment.

2. Chemicals are classified depending on their physical and health hazards. The European approach of labelling relating to these properties is called the 'Globally Harmonised System of Classification and Labelling of Chemicals' or GHS. Chemicals will have a material safety data sheet (MSDS), this is **NOT** a risk assessment, but can be used to inform the Chemical Reaction Assessment and will include the relevant GHS information.

3. All those doing a procedure requiring use of the Chemical Reaction Assessment for the first time in the lab must have their competency assessed by a designated level 1 trainer. The level 1 trainer provides training as required and agrees the competency level of the trainee. This is recorded on the Chemical Reaction Assessment in the lab book. When an individual is assessed as having reached level 2 '*Can work without direct supervision*' in a reaction the level 1 trainer does not need to sign repeat experiments.

4. Certain chemicals are identified as being intrinsically higher risk than others as indicated by their GHS label. The Table of high hazard classes and categories included in the front of the Chemistry lab book must be referred to when using the Chemical Reaction Assessment. Chemicals used in a reaction identified as having any of the hazard or health classes in the table must be peer reviewed by a competency level 1 trainer or the PI before each use. This includes repeat experiments.

5. A competency level 1 trainer must have their initial and high hazard Chemical Reaction Assessments peer reviewed by another level 1 competency trainer or their Principal Investigator.

Declaration of understanding

Declaration: I have read and understood the information contained in the Chemistry Department health and Safety Handbook **and** the additional information in this lab book. I will work within the Dept. rules concerning lab work and consult my Principal Investigator or nominated trainer before attempting a new protocol.

Your signature:	Date:
Principal Investigators signature:	Date:

Assessing and allocating the competency level

Before beginning an experiment for the first time in the lab where you are working, the PI or nominated trainer **must** assess the level of supervision required for separate SOPs and Chemical Reaction Assessments, and assign the individual one of four competency categories.

When a trainer or supervisor assigns a competency category in a SOP or Chemical Reaction Assessment this is reflecting the individuals experience, technical capability, knowledge and practical skills. As the trainee becomes more competent in a technique, process or use of equipment their increased competency must be recorded.

Complete all sections with your supervisor

Your name:	Principal Investigator (PI):
Project Title(s):	

Principal Investigator to complete:

List the competency level 1 personnel you have assigned to train the individual named above in SOPs and review their Chemical Reaction Assessments. Those assigned as level 1 trainers for SOPs must be listed on the SOP documents for each group.

Name:	Name:	Name:
Name:	Name:	Name:

Recording the competency level

In the case of the *'Chemistry Reaction Assessment'* the competency level can be assigned and recorded on the pre-printed assessment form within the lab book.

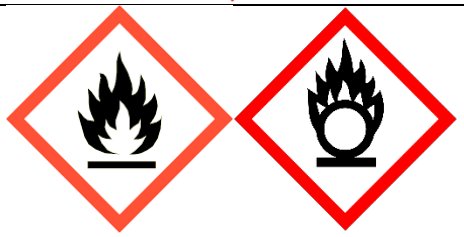
For inductions, SOPs, equipment and other health and safety training Individuals can use the online 'My Health and Safety Training Records' system to record and update competency levels and refresher training.

Competency level	Definition of competency level
1	**Can train others and work without direct supervision** The individual has a high level of competence to be able to train others in the particular techniques, process or use of equipment. The individual will: 1. Know technical aspects of the technique and be able to explain and demonstrate these to a trainee 2. Have experience to be able to identify potential high risk situations and explain why the appropriate control measures are in place to reduce risks 3. Be able to explain the associated emergency procedures and identify locations of any emergency equipment to the trainee 4. Demonstrate appropriate safe practices associated with the technique, process or equipment to the trainee
2	**Can work without direct supervision** The individual has been trained sufficiently by a 'level 1' and has demonstrated technical competence and safe use of appropriate control measures and has knowledge of emergency procedures. Repeat experiments do not need to be signed off by a level 1 trainer. Where appropriate the individual may have had to demonstrate use of emergency procedures to the trainer.
3	**Can work supervised** The individual has basic knowledge of the technical aspects of the technique, process or piece of equipment but needs supervision and relevant experience to reinforce knowledge with the practical aspects to ensure safety of themselves and others. This is 'hands on' training while being supervised and trained until the trainer is confident the appropriate practical skills and other knowledge have been achieved.
4	**Can observe and participate** Initially the individual does not have sufficient technical or background knowledge and will have demonstration and close supervision from an individual of competency level 1 or 2. If intention is to train the individual to competency level 3 or 2 this must be completed by a trainer of level 1 competency.

Table of high hazard classes and categories

The table below must be referred to when using chemicals for any work (including compressed gases). If the MSDS for the chemical includes any of the Physical or Health hazards listed below the work can only begin after peer review and approval by the Principal Investigator or a level 1 competent trainer.

A level 1 trainer **cannot** sign off their own work but should get another level 1 or their principal investigator to peer review their work and control measures and sign it off.

Hazard class - physical	**GHS symbol**
H200 – unstable explosive H201 – Explosive; mass explosion hazard H202 - Explosive; severe projection hazard. H203 - Explosive; fire, blast or projection hazard.	
H220 - Extremely flammable gas. H222 - Extremely flammable aerosol. H230 - May react explosively even in the absence of air. H231 - May react explosively even in the absence of air at elevated pressure and/or temperature. H250 - Catches fire spontaneously if exposed to air H260 – In contact with water releases flammable gases which may ignite spontaneously H270 - May cause or intensify fire; oxidizer H271 - May cause fire or explosion; strong oxidizer	
Hazard class - health	**GHS Symbol**
H300 - Fatal if swallowed H310 - Fatal in contact with skin H330 - Fatal if inhaled	
H334 - May cause allergy or asthma symptoms or breathing difficulties if inhaled H340 - May cause genetic defects H350 - May cause cancer H360 - May damage fertility or the unborn child. H361 - Suspected of damaging fertility or the unborn child. H361d - Suspected of damaging the unborn child. H362 - May cause harm to breast-fed children. H372 - Causes damage to organs through prolonged or repeated exposure	
H317 - May cause an allergic skin reaction.	

Examples of chemicals needing peer review of Chemical Reaction Assessments:
Pyrophoric agents: Organolithiums, organozincs, Organoaluminiums, NaH, KH, potassium/sodium/lithium metals, others / Peroxides (including 30% H_2O_2) / Toxic, corrosive or vesicant gases (e.g. HCl, NOCl, $COCl_2$, Cl_2, CO, H_2S, HCN, butadiene, etc.), Beryllium, Thallium, Lead, Inorganic cyanides, HF, Alkylating agents (e.g. MeI, R_2SO_4, CF_3OSO_2R, HCHO, ethylene oxide, $ClCH_2OMe$ etc.), Diazomethane, Highly toxic solvents, e.g. benzene, CCl_4, CS_2, HMPA, 1,4-dioxan, etc.) and human carcinogens, use of perchlorates, azides, or acetylides.