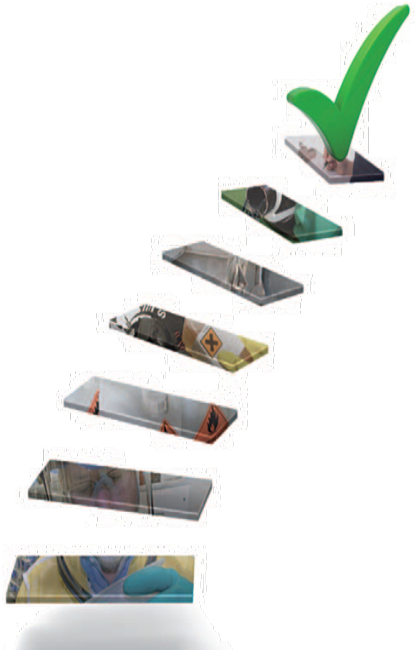
University Chemical Safety Workshop

Chemical Risk Assessments (CRA)



Dr Katharine Murray

Head of Safety

Trinity Safety Office

16th March 2022

In this Module we are going to cover

Why do a Chemical Risk Assessment?

What is a Chemical Risk Assessment?

5 Steps of a Chemical Risk Assessment

Why do a Chemical Agents Risk Assessment?

Humane Reasons

- Everyone is entitled to a safe place of study and work and to return home safely at the end of the day

Economic Reasons

- Effective safety and health management in the workplace actually saves money

Legal Obligation

- Compliance with the Safety Health and Welfare at Work Act 2005
- S,H,W@W (Chemical Agents) Regulations and Codes of Practice

Or for the HEL of it

Why do a Chemical Risk Assessment?

It is the responsibility of your academic supervisors to ensure that risk assessments are carried out for projects and/or experiments carried out by their group before work starts

Your CRA can form part of a holistic risk assessment which would cover a complete procedure including:

- Set-up
- Activities and apparatus used
- Clear-up
- Storage of unused reagents
- Safe Disposal

Why do a Chemical Risk Assessment?

……to understand what you are doing and to be able to do it safely

…….not only to protect you, but also those around you

It is not just about the chemicals……

But also how you use them

On 16 Jan. 2009, Sheharbano (Sheri) Sangji, a 23-year-old chemistry research assistant, died from burn injuries sustained in a chemical fire on Dec. 29, 2008, in a laboratory at the University of California, Los Angeles.

UCLA spent $4.5 million (£2.8 million) to defend her chemistry professor Patrick Harran against criminal charges

Injuries: serious burns she sustained from a pyrophoric *t*-butyl lithium solution, severely burning her over nearly half of her body.

Sangji was filling a syringe with t-butyl lithium the plunger came out and she was covered with the chemical, which then burst into flames,

In 2009, the California Occupational Safety and Health Administration concluded that the accident resulted from safety lapses and inadequate training, and criminal charges were brought against UCLA and Harran.

Trinity's Chemical Safety Overview

Each School or Department must have a Safety statement

Each area or research group that uses chemicals must have an up-to-date chemical inventory, easily accessible

Risk assessments must be completed for tasks involving chemicals, risk controls applied and relevant safe operating procedures established.

Staff and students who work with chemicals must be provided with sufficient training and supervision to work safely and competently.

See: **https://www.tcd.ie/safetyoffice/lab-safety/chemical-safety/**

What this means for you?

- Assess the health and physical risks and provide effective controls
- PI's must ensure that risk assessments are carried out before work starts
- Compliance with college rules and make full and proper use of any control measures and to report defects
- Be responsible - know the hazards and risks involved, carry out a risk assessment and have it reviewed by a competent person before you start work

What is a Chemical Agents Risk Assessment? Definitions - I

Chemical Agent:

- as defined in the Safety, Health and Welfare at Work (Chemical Agents) Regulations 2001 (S.I. No. 619 of 2001), means any chemical element or compound, on its own or admixed, as it occurs in the natural state or as produced, used or released, including release as waste, by any work activity, whether or not produced intentionally and whether or not placed on the market.

Hazard:

- Something with the potential to cause harm and be can classified as physical, chemical, biological, human and other

Chemical hazard:

- the intrinsic property of a chemical agent to cause harm

Risk:

- likelihood/chance that, should exposure occur, a person or the environment will be harmed by that hazard and also the severity of that harm

Risk Assessment:

- the careful examination of what, in your work, could cause harm to people, so that you can weigh up whether you have taken enough precautions or should do more to prevent harm (*HSE*)

What is a Chemical Agents Risk Assessment? Definitions - II

Chemical Risk Assessment (CRA):

- assessment of the risk from chemical agents and hazardous materials in the workplace to the health and safety of persons and the aim is to identify control measures which will reduce the risk to as low a level as possible

Risk Rating:

- High, Medium, Low, depending on severity of outcome and likelihood of occurrence
- **SEVERITY X LIKELIHOOD = RISK**

For Chemicals:

- ***HAZARD X EXPOSURE = RISK***

Result:

- written document which details the hazards, exposure limits, control measures for each procedure which involves the storage, use and transport of hazardous substances/chemical agents/ and disposal

CMR:

- Collective name for any chemical that is classified as a Carcinogen, Mutagen or Reproductive Toxin (i.e. Benzene, Tetramethyl Lead, Buta-1,3-diene etc)

Five Steps to Chemical Risk Assessment

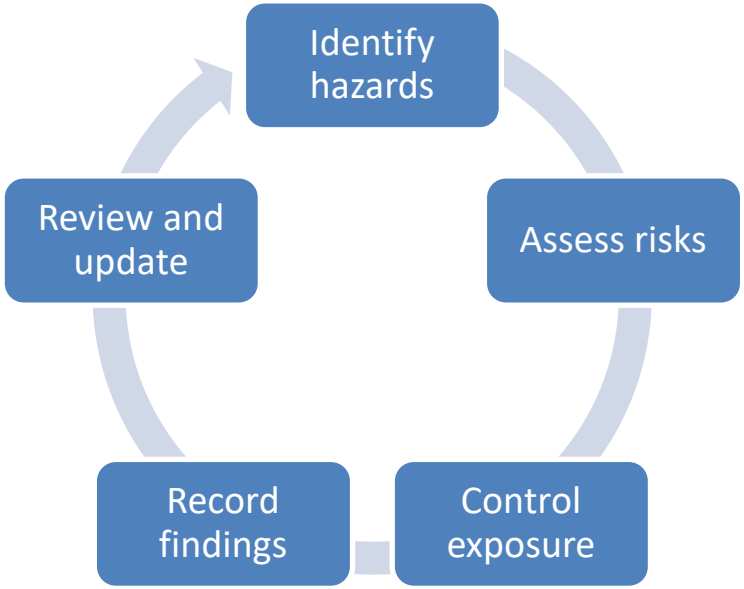
Step 1:
- Identify all chemical agents and determine associated hazards

Step 2:
- Evaluate the risks; decide who might be exposed, how, why, severity (i.e. max. exposure)

Step 3:
- Control the exposure/risk; provide appropriate protection measures, health surveillance, information and training

Step 4:
- Record your findings and implement them

Step 5:
- Review your assessment and update if necessary



Step 1: Identify the Hazards

Look at materials, equipment and work activities

Determine associated hazards of all chemical agents

- SDS (use that provided by the manufacturer)
- Labels
- Manufacturers/Suppliers /Trade Associations

  E.G. Sigma Aldrich

Step 1: Identify the Hazards

Safety Data Sheets

You must have a safety data sheet for all chemicals you are going to use

Chemicals should not be used until the SDS has been read and understood

People should know where to find a SDS and how to read it

Each lab should contain an up-to-date set of of safety data sheets (accessible)

Step 1: Identify the Hazards

Safety Data Sheets

Check the pictograms & Hazard and Precautionary statements (Section 2 of the SDS)

- H2XX (Physical Properties)
- H3XX (Health Effects)
- H4XX (Environmental Effects)
- P2XX (Advice on how to use the substance safely)
- P3XX (Response to an Exposure)
- P4XX (Storage Requirements etc)

Acrylamide

H350,H340, H317
P260, P280, P301 + P330 + P331 + P310

Step 1: Identify the Hazards

Labels

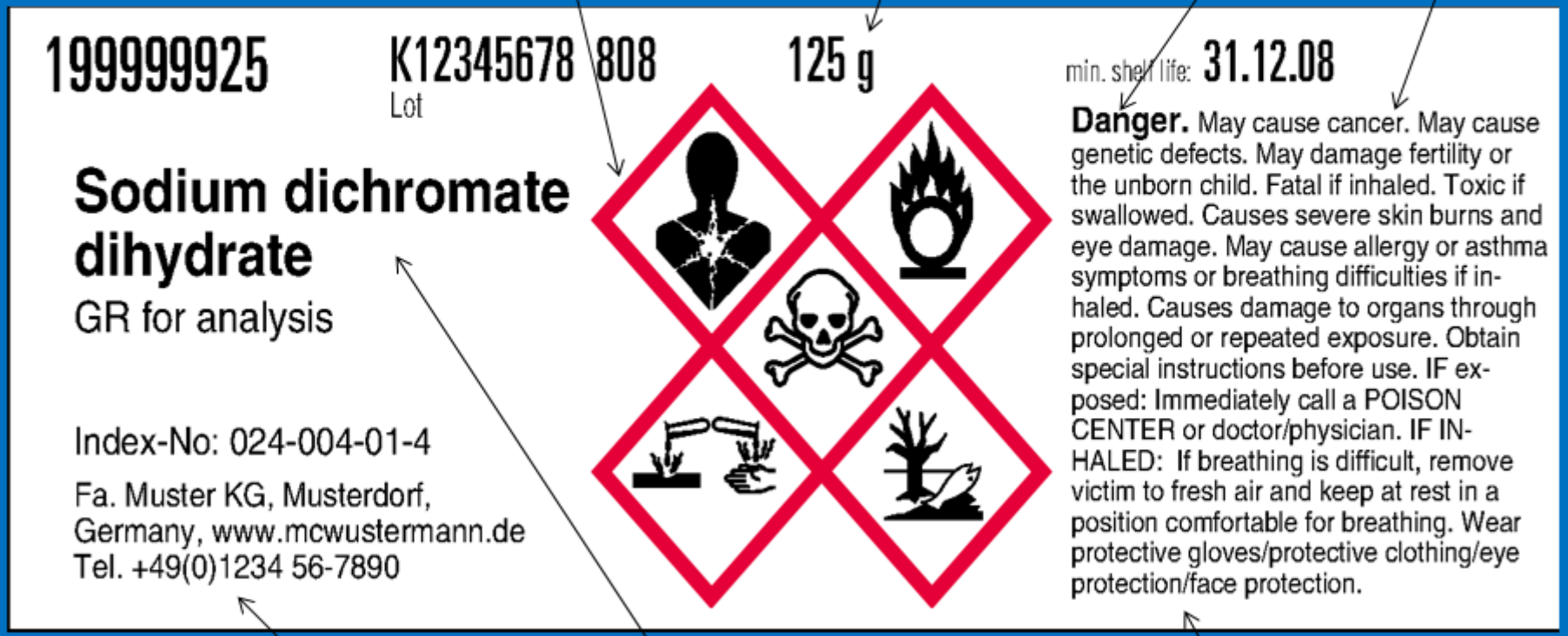
The hazard label must include:

- The common name and/or product identifier of the substance
- Contact details of the manufacturer/supplier (name, address, telephone no)
- An appropriate hazard warning and pictogram
- Standard hazard and precautionary statements
- May also have ‘Danger’ or ‘Warning’ on the Label

Other label information may include procedures for:

- **Proper handling, Storage and Emergency response**

Chemical Information - Small label



Step 1: Identify the Hazards

Labelling and Procurement

If you transfer some of the chemical to another container you must label it with a copy of the original label

All chemical samples and solutions should be properly labeled

- Name of sample (all chemical agents and concentrations)
- Appropriate hazard warning and pictogram – use a secondary container if space is limited
- Name of owner
- Date

Old samples should be given to supervisor or disposed of in correct fashion

Only buy the smallest quantity that you need

Step 1: Identify the Hazards

Occupational Exposure Limit Values (OELVs)

Occupational exposure limit values (OELVs) provide a basis for ensuring that exposure to airborne contaminants in the workplace is controlled in such a way as to prevent adverse health effects.

Two limit values identified:

- **Reference period 1: 8 hr**
- **Reference Period 2: 15 minutes**

Dimethyl Sulphate (DMSO) (Carc. 1B, Sk, Sens)

- **Ref. 1: 0.1 ppm or 0.5 mg/m^3**
- **Ref. 2: 0.1 ppm or 0.5 mg/m^3**

Step 1: Identify the Hazards

Category , Form , Concentration, Quantity

Category of hazard/danger

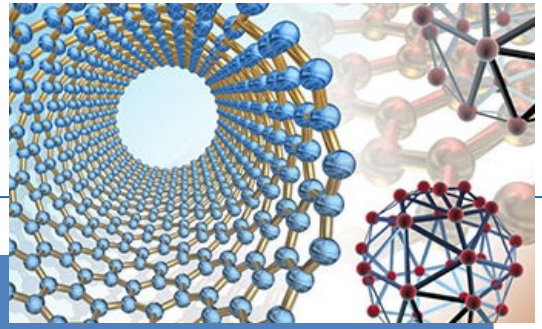
- Physical (e.g. flammable),
- Health (e.g. Carcinogenic)
- Environmental (e.g. Bio-accumulative) or any combination of these

Consider:

- Different forms of the chemical
- Chemicals as ‘fibrous’ agents
- Reaction of two or more chemicals, bi-products and waste
- Differences when mixed; toxicology not necessarily sum of individual parts
- Incompatible chemicals
- Concentration

Step 1: Identify the Hazards

Nanomaterials



Nanomaterials often exhibit properties and behaviour that are very different from the bulk materials.

Some particulate nanomaterials may have inherent hazardous properties and may be classified as carcinogens or mutagens.

Some are not necessarily intrinsically hazardous *per se but* their size, shape and surface-related properties can cause problems - Toxicity studies indicate that the effects appear to be related to the total surface area of the particles.

Step 1: Identify the Hazards

Nanomaterials

The exposure potential is also directly related to the structure and form of the nanomaterial e.g. the exposure risk to particles encapsulated in a matrix or strongly adhered to a substrate will be lower than that from free particulate nanomaterials

Dust clouds of organic, inorganic and metallic substances can cause fire and explosions. The higher surface area and reactivity of particulate nanomaterials means that this hazard must also be addressed in risk assessments

Agreed that current knowledge regarding toxicity of particulate nanomaterials is incomplete and current safety data sheets may not contain adequate safety data. Hence adopt a precautionary approach when uncertainties are encountered during exposure risk assessment.

https://www.tcd.ie/safetyoffice/lab-safety/nanotechnology-safety/

Step 2: Assess the Risks

Consider who can be affected (staff, students, visitors etc.), the severity, possible length of exposure etc.

Must identify vulnerable employees e.g. pregnant, asthmatic, sick

Exposure routes (how the chemical gets into the body)

Identify which route is more hazardous for each chemical and also selective toxicity properties of certain chemicals:

- **Inhalation**
- **Skin penetration**
- **Ingestion**

Step 2: Assess the Risks

Exposure

Extent of exposure

- **Nature of the chemical and its use**
- **Consider the possibility of emergencies/accidents occurring; fires, spills etc**
- **Record position of exits, fire escapes, fire extinguishers and blankets, breathing apparatus, nearest telephone, eyewash and first aid cabinet and do not obstruct**
- **Doors of laboratories must NEVER be blocked.**

Step 2: Assess the Risks

Classification - Checklist

Risk assessment is about taking sensible steps to prevent ill health.

- **Decide on severity of harm:**
  - **Has product you use a danger label?**
  - **Is it harmful to breathe in?**
  - **Can it harm your skin?**

You need to know how you/students are exposed, and to how much, before you can decide if you need to do anything to reduce their exposure (OELS)

Is it likely that harm could arise because of the way you use or produce it? Does your process produce gas,fume, dust, mist or vapour?

Health surveillance?

Step 2: Assess the Risks (Classification-Summary)

High	Hazard is severe Serious, irreversible or fatal health effects e.g. carcinogenicity, mutagenicity, reproductive toxicity, respiratory sensitisation Serious physical effects e.g. explosive chemicals	Exposure is high (Acute response: immediate effect) or low (Chronic response: effect may take years)
Medium	Hazard is medium Potentially irreversible, non-fatal health effects e.g. skin sensitisation, corrosive to skin or eye Physical effects e.g. flammable Environmental effects (e.g. harmful to aquatic organisms	Exposure likely Frequent use Large quantities used Little ventilation control
Low	Hazard is low Potentially irreversible, non-fatal health effects or slight/transient, reversible, non-fatal health effects (e.g. irritating to skin or eyes)	Exposure unlikely Infrequent use Very small amounts Closed/contained system (e.g. fume hood)

Step 2: Assess the risks

Definition of Risk Level

High

- Substantial efforts must be made to reduce the risk. Risk reduction measures should be implemented urgently within a defined time period and it might be necessary to consider suspending or restricting the activity, or to apply interim risk control measures, until this has been completed. Considerable resources might have to be allocated to additional control measures. Arrangements should be made to ensure that controls are maintained, particularly if the risk levels are associated with extremely harmful consequences and very harmful consequences.

Medium

- Consideration should be as to whether the risks can be lowered, where applicable, to a tolerable level and preferably to an acceptable level, The risk reduction measures should be implemented within a defined time period. Arrangements should be made to ensure that controls are maintained, particularly if the risk levels area associated with harmful consequences.

Low

- No additional controls are required unless they can be implemented at very low cost (in terms of time, money, and effort) but arrangements should be made to ensure that the controls are maintained.

Step 2: Assess the Risks

Risk assessment is about taking sensible steps to prevent ill health.

You've assessed the risk. What are you going to do about it?

Control Exposure - Step 3

Step 3: Control Exposure

Decide on Control Measures & Precautions

1. Develop and implement measures that eliminate the hazard or reduce its risk.

- **Eliminate the substance or substitute a less hazardous chemical**
  - **e.g. iso-propanol instead of methanol**
- **Use minimum amounts**
- **Use a less hazardous form of the same chemical**
  - **e.g. use pellet rather than powder**
- **Reduce the number of people who may be exposed**

2. Provide appropriate protection measures, health surveillance, information and training

- **Use engineering controls such as a fume hood, i.e. can contain experiment and use ventilation**
- **Use personal protective equipment**

Step 3: Control Exposure

Decide Precautions

3. Control/Reduce exposure

- Use dispensers where possible to keep evaporation to a minimum and reduce spillage
- Keep lids on containers unless contents are being poured or dipped etc.
- Organise work to reduce the number of people who may be exposed
  - e.g. job rotation, restrict entry to lab when dangerous work in progress

4. Provide welfare facilities

- Safety shower, wash hand basin, eye wash station
- First-aid station
- Never use solvents for washing the skin
  - Can remove the natural protective oils from the skin and cause
- irritation and inflammation
  - May be toxic or facilitate absorption of a toxic chemical

Step 3: Control Exposure

Provide Protection

Always use a fume hood with harmful or toxic substances

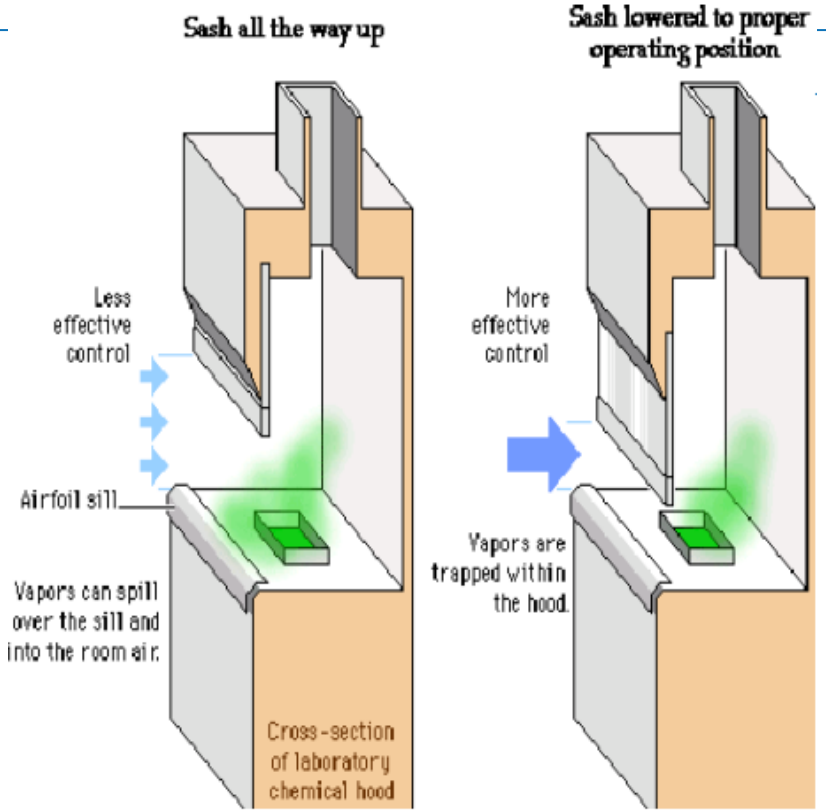
Use correctly!

- Sash at proper height

Chemicals should not be stored in fume hoods used for experimental work

- Remove all equipment and chemicals brought into the hood
- Place all reagents back in proper storage place
- Dispose of all waste
- Keep equipment at back of hood

Minimise obstruction to the airflow across the floor and sides of the fumehood



Step 3: Control Exposure

Provide Protection

Use appropriate personal protective equipment

- Not an alternative, used in addition to other controls
- Should conform with international standards (CE marked)
- Always wear goggles when heating chemicals, doing preparative chemistry, or standing near a chemical reaction

Use breathing apparatus or chemical filters when dealing with poisonous or irritant substances outside the fume hood

Keep protective equipment clean, store safely, get instructions on how to use properly

Step 3: Control Exposure

Provide Protection

Use the correct glove

- Gloves must be resistant to the specific chemical with which you are working – Check SDS
- For concentrated acids and alkalis or organic solvents, natural rubber, neoprene, or nitrile gloves are recommended
- Non-woven particles more efficient against nanoparticle penetration – avoid cotton
- Remove gloves when opening doors, typing on computers or using the phone!

For handling hot objects, gloves made of heat-resistant materials should be available and kept near the vicinity of ovens or furnaces

Special insulated gloves should be worn when handling very cold objects such as liquid Nitrogen

Step 3: Control Exposure

Cryogenics

Cold burns

Wear appropriate gloves and shoes

↓

Asphyxiation in poorly ventilated space

↓

Spillage of 20-30L nitrogen can cause lab to be shut down

↓

Chemical asphyxiates reduce body's ability to transport, absorb or use inhaled oxygen

↓

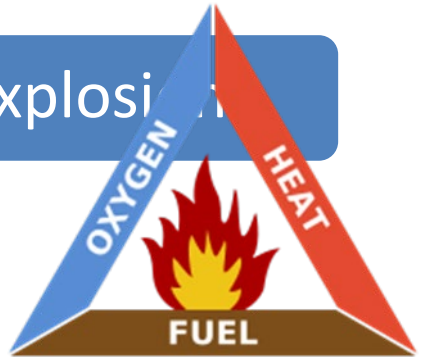
Risk of explosion

Over-pressurisation from large volume expansion ratio

Step 3: Control Exposure

Provide Protection – Fire, Environment

Flammable materials: minimise risk of fire or explosion



- Prevent accumulation of flammable vapours in air
- Prevent static charge build-up
- Eliminate sources of ignition
- Be aware of flammability limits
  - LEL-lower explosion limit and UEL- upper explosion limit (min a max concentrations of the material in air that will burn)
- Be aware of flash points and auto ignition temperature (AIT)

Also need to be aware of hazards to the environment

- Toxic to living organisms
- Persistent
- Bio-accumulative

Step 3: Control Exposure

Provide Protection – Storage

Chemicals should be segregated according to their compatibility

The following groups should not be mixed

- Flammables and Oxidizers (can cause explosion or fire)
- Corrosives and Flammables (risk of explosion or fire)
- Corrosives and Toxic Chemicals (risk of poison gas)
- Acids and Bases (create heat and corrosive vapours)

If unsure get advice

Step 3: Control Exposure

Provide Protection – Storage of Flammables and Oxidizers

Flammable liquids and oxidizing agents should be stored separately

Containers of highly volatile liquids (flash point $<15^0C$) should be kept tightly closed

Di-alkyl ethers and THF should be stored in dark bottles with air space above liquid kept to a minimum

- Store under N_2 if possible as many ethers will form explosive peroxides on prolonged standing

Use a flammable storage cabinet for all flammable liquids

Keep away from open fires, sources of heat and sparks

Step 3: Control Exposure

Provide Protection – Storage of Acids and Bases

Should not be stored in unapproved metal cabinets or on high shelves

Use corrosive storage cabinets separated from all other chemicals

- If space is limited can separate acids from bases with plastic containers
- Organic acids and organic bases may be stored with the flammables, but acid resistant plastic trays must carefully segregate them
- Perchloric, Hydrofluoric and Nitric acid must be stored separately (e.g. in nalgene buckets)

Step 3: Control Exposure

Provide Protection – Storage –Water-Reactive and Toxic

Water Reactive Substances and Aqueous Solutions

- **Reactive Metals e.g. sodium and other alkali metals, hydrides of alkali metals are extremely hazardous and should be handled with caution**

Highly Toxic Chemicals

- **Poisons or Toxins cabinet (secure)**
- **Highly toxic chemicals whose containers have been opened must be placed in unbreakable secondary containers**
- **Small containers may be stored in desiccators or other secure cabinets**
- **Fume hoods which are used for the storage of chemicals which emit noxious vapours should not be used for conducting chemical reactions**

Step 3: Control Exposure

Non-hazardous chemicals and sensitive chemicals

Non-hazardous Chemicals

- Only small volume containers of non-hazardous chemicals should be stored on elevated shelves
  - dry powders, aqueous solutions of buffers, salts, and other dilute materials
- Dry chemicals can be stored together
  - To ensure compatibility, keep organic and inorganic chemicals segregated
- Store Liquids below solids
  - Do not place Winchesters on edge of bench

Sensitive Chemicals

- Some chemicals need to be refrigerated
- Refrigerators used for such purpose should be of the explosion proof design if flammable vapours are an issue
- Refrigerators used for chemical storage should **NEVER** be used for foods

Step 3: Control Exposure

Unstable Chemicals and Pyrophorics

Unstable Chemicals

- Some chemicals are unstable over time (for example, many ethers will form explosive peroxides on prolonged standing)
  - Chemical containers should be dated when they are opened
  - Any material beyond its safe retention period should be discarded

Pyrophorics

- These ignite spontaneously upon contact with air (e.g. titanium dichloride, phosphorus, tributyl aluminum, dichlorosilane, organoboranes)
- Store in air-tight containers in a dark, cool and dry place
- Label containers with receiving and opening dates, and dispose before expiration date
- Yellow/white phosphorus should be stored and cut under water

Step 3: Control exposure

Waste Chemicals

Almost all Chemical waste is hazardous and should be disposed off promptly (via HMF)

There are three categories which are disposed of by the "waste solvent" route

- **Waste flammable solvent (Ethyl acetate, diethyl ether, xylene etc)**
- **Waste chlorinated solvent (Chloroform, dichloromethane, trichlorethylene etc)**
- **Waste oil**

These should be stored in approved safety cans and sent to the HMF when they are no more than 2/3 full

It is dangerous to mix chlorinated solvents and flammable solvents together

On no account should oxidisers be added to flammable solvent, since there is a high risk of fire or explosion

Solvents containing toxic or carcinogenic substances should also be separated

Step 3: Control exposure

Toxic Waste

Never throw toxic substances or glassware into the wastepaper bin!

All chemical waste should be segregated and clearly labelled and disposed of via the HMF

Sharps, needles, fine broken glass, pipette tips, disposable pipettes contaminated paper, vials, gloves and tissues should be disposed of in the same manner

Tissues and cloths which have been used to mop up or apply flammable liquids should be disposed of in metal containers with well-fitting lids and removed from the workplace at the end of each shift or working day;

Containers which have been emptied but which may contain residues of hazardous chemicals should be treated as hazardous

In cases of doubt about the degree of hazard, the waste should be classified as the highest hazard

Step 3: Control exposure

Emergency Procedures/Accident Prevention

Work areas, aisles and passage ways must be kept clean and free from obstructions that could create a hazard

Spills should be cleaned up immediately but only if:

- You are thoroughly familiar with the hazards of the material (Reference SDS)
- You have been trained to deal with spills/releases of the size in question
- You have the proper Personal Protective Equipment (PPE), and the appropriate absorbent/neutralizers are readily available

Use a spill kit for spills of > 30cm diameter

Step 3: Control exposure

Essential Safety Equipment

Every Department/School should have:

- Breathing apparatus and
- Safety Shower within easy reach

Every Lab should have:

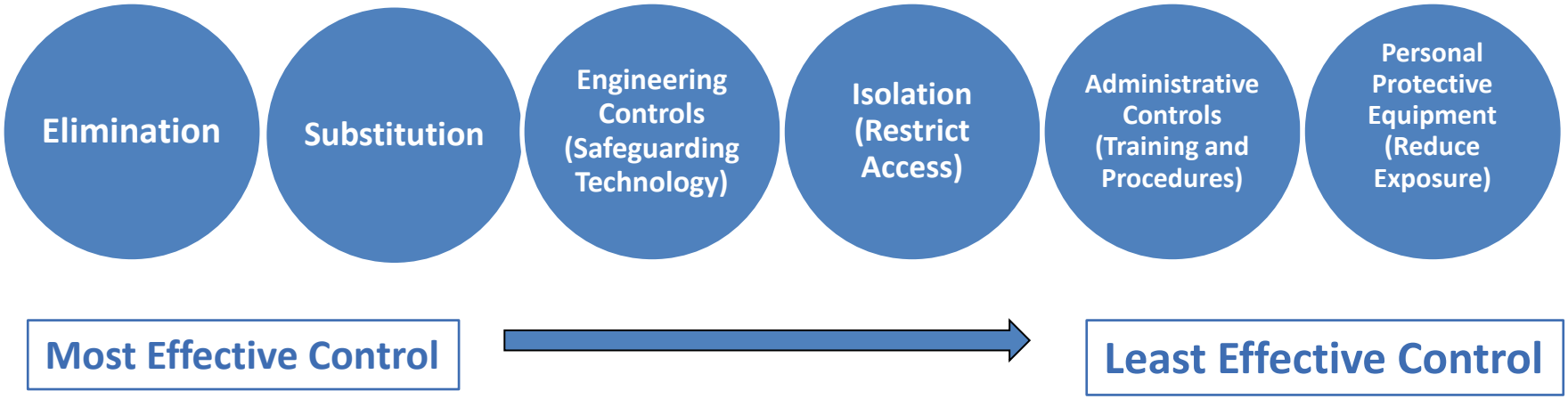
- Eye Wash Station
- First Aid Kit
- Spill kit
- All emergency equipment such as safety showers, eye wash stations, containment and cleaning up materials should be made available and maintained.

Step 3: Control Exposure: Summary

Level of risk	**When would this occur?**	**What should you do?**
High	Severe hazard, high or low exposure	Replace the chemical or process with a less hazardous one.
Medium	Medium hazard, likely exposure	You should aim to minimize/reduce exposure.
Low	Medium or low hazard, exposure unlikely	You should still ensure that adequate control measures are in place.

Step 3: Control Exposure

Hierarchy of controls



Step 4: Record Findings

Chemical Safety Management

All stocks of chemicals or hazardous substances used in each research group must be properly stored and listed in a database with links to Risk Assessments and SDS sheets - LABCUP

- Create a complete list of the chemicals in your lab.
- Know where they are located, how much you have, how you are using them and who is potentially exposed to them.
- The inventory should also give details of the hazards and the risks they pose as well as OLEVs and degree of dustiness/volatility
- It should be continuously up-dated and a stock-take done every two years

Step 4: Record Findings

Chemical Safety Management

List resources and training necessary to ensure everyone's safety

Record findings of risk assessments and any safety measures implemented

- Check whether the necessary controls are in place.
- Identify corrective actions to be taken where controls are lacking.

List standard operating procedures and manufacturing instructions

Step 4: Record Findings

Chemical Safety Management

Two types of Chemical Risk Assessments

- Chemical Risk Assessment : must be completed out before chemical is purchased
- Assessment of risk for synthetic chemistry experiments : must be completed out before work commences

Other forms related to chemical safety (available from local/safety office web site)

- Chemical Safety Rule 1; Unattended Operations
- Chemical Safety Rule 2: Picric acid
- Accident/incident reporting - https://iprotectu.tcd.ie/report/full#
- Compressed gas cylinder in use
- Temporary Compressed gas permit form

Step 4: Record Findings

Documentation Chemical Database/Inventory

Chemical	Formula	Date	CAS number	EINICS #	Manufacturer	Quantity
Acetaldehyde (Ethanal)	C2H4O	27/05/2010	75-07-0	200-836-8	BDH	500ml
Acetic Acid, glacial	C2H4O2	22/05/2010	64-19-7	200-580-7	Aldrich	2.5L
Acetic anhydride	C4H6O3	05/06/2010	108-24-7	203-564-8	Aldrich	1L, 2.5L
Acetone	C2H5CHO	03/06/2010	67-64-1	200-662-2	Aldrich	500mL
Acetone	C2H5CHO	03/10/2010	67-64-1	200-662-2	HMF	2.5L
Acetonitrile	C2H3N	06/06/2003	75-05-8	200-835-2	Aldrich	2.5L
Acrylamide	C3H5NO	21/05/2003	79-06-1	201-173-7	Aldrich	~150g
Acrylic Acid	C3H4O2	07/06/2003	79-10-7	201-177-9	Aldrich	500ml
Adogen	C84H180Cl3N3	18/06/2003	63393-96-4	264-120-7	Aldrich	~85ml
L-Alanine	C3H7NO2	21/06/2003	56-41-7	200-273-8	BDH	~25g
Aluminium powder	Al	21/06/2003	7429-90-5	231-072-3	Merck	~500g
Aluminium Foil	Al	21/06/2003	7429-90-5	231-072-3	M+B	~500g
Aluminium Chloride	AlCl3	21/06/2003	7446-70-0	231-208-1	Aldrich	~200g
Aluminium Oxide	Al2O3	21/06/2003	1344-28-1	215-691-6	Riedel-de Haën	~600g
Aluminium Oxide	Al2O3	21/06/2010	1344-28-1	215-691-6	Aldrich	~20g

Hyperlink to RA

Step 4: Record Findings

Documentation Chemical Database/Inventory

esult (243) EXPORT PRINT

Barcode	Laboratory	Chemical name	CAS number	Product number	Quantity	Hazard labels
1200012	049, East End 4/5 > Panoz Institute - Lab Smalls > Back Table	Chloroform	67-66-3	Sigma-Aldrich 288306-2L	2l	
120022	049, East End 4/5 > Panoz Institute - Lab Smalls > Back Table	MERCURIC ACETATE ACS REAGENT		Aldrich 1.04410	2.5l	
10996	049, East End 4/5 > Panoz Institute - Lab Smalls > Back Table	(R)-(+)-Limonene	5989-27-5	Sigma 183164	500ml	
10995	049, East End 4/5 > Panoz Institute - Lab Smalls > Table	Sodium orthovanadate	13721-39-6	Aldrich 450243-10G	10g	
10994	049, East End 4/5 > Panoz Institute - Lab Smalls > Table	Deoxyribonucleic acid sodium salt	438545-06-3	Deoxyribonucleic acid sodium salt 42027	100g	
10993	049, East End 4/5 > Panoz Institute - Lab Smalls > Shelf 6	Selenium dioxide	7446-08-4	BDH 30050	100g	
10293	049, East End 4/5 > Panoz Institute - Lab Smalls > Shelf 6	Sulphur	7704-34-9	Riedel-de Haen 13803	1kg	
10298	049, East End 4/5 > Panoz Institute - Lab Smalls > Shelf 6	Rosaniline hydrochloride	569-61-9	BDH 30024	100g	
10004	049, East End 4/5 > Panoz Institute - Lab Smalls > Shelf 4	3-Aminopropyltriethoxy-silane	919-30-2	Sigma A-3648	100ml	

Chemical Risk Assessment Form

Chemical Name	Assessor
Location/Room No.	Date

No. of people working in this location

Area	Hazard	Risks	Protection and Prevention Measures	Risk Rating
Storage				
Use				
Waste				

Emergency Procedures

In case of fire:

Extinguishing media:

In case of accidental release:

Personal Protection Equipment

First Aid

Other Information

Assessor's signature

Supervisor's signature (if assessor is a student)

DEPARTMENT OF CHEMISTRY, TRINITY COLLEGE, DUBLIN
ASSESSMENT OF HEALTH RISK ASSOCIATED WITH PROPOSED EXPERIMENT
(SYNTHETIC CHEMISTRY)

Graphical description of experiment, including *hazard* and "*information source codes*", *R and S numbers*, *OEL*, *TEL* and estimated *maximum environmental exposure*, for all materials employed, *reaction conditions* and indication of *scale of reaction*.

Starting Material

Reagents and Conditions

Intended product

Hazard codes : F – Flammable, C – Corrosive, T – Toxic, E – Potential explosive, RW – Reacts violently with water, RO – reacts violently with oxygen.

Information Source Codes : A – Sigma-Aldrich Library of Chemical Safety Data, B – Bretherick's Handbook of Reactive Chemical Hazards

Information sources and/or material related hazards not covered by above codes

SPECIAL PROCEDURAL HAZARDS (e.g. UV/laser, high pressure)

CONTROL OF REACTION	Condenser	Magnetic stirrer
Overhead stirrer	Fume cupboard	Heating mantle
Mineral oil bath	Silicone oil bath	Water bath
Ice bath	Other cooling bath (specify)	
Inert atmosphere N_2 Ar	Special control measures (specify)	
SPECIAL SAFETY EQUIPMENT	Explosion shield	Respirator
Special goggles	Other (specify)	

EMERGENCY

Fire extinguisher to be used : (H_2O, CO_2, Powder, Sand, Class D)	Special medical procedures : (Include special antidotes and their locations)
Action in event of power and/or water failure: Turn off power Turn off water Other (specify)	

SPECIAL DISPOSAL REQUIREMENTS

Name of person who provided these particulars : Date : Signature :	***Name of supervisor (for students only) :*** Date : Signature :

Appendix B – Unattended apparatus form

Unattended apparatus

Please leave running.

Location	
Type of apparatus	

Services used	Electricity	Water	Compressed gas	Cylinder in room
	☐	☐		☐
				☐
				☐
				☐
				☐
				☐
				☐

Special hazards	

To shutdown in an emergency

Contacts			
Name			
Telephone			

Please read the instructions on the following page before completing.

45

The University of Dublin
Trinity College

Telephone +353-1-896 1726
Facsimile +353-1-671 2826
Email: chemdept@tcd.ie

School of Chemistry
Trinity College
Dublin 2
Ireland

Unattended Operation Authorisation Form

NAME OF PERSON CARRYING OUT OPERATION.....

CONTACT NUMBER*.....

REAGENTS/REACTION HAZARDS:

.....

.....

.....

.....

LOCATION:

.....

DATE/S:

.....

SPECIFIC INSTRUCTIONS IN CASE OF INCIDENT*

.....

.....

.....

.....

AUTHORISATION

THE ABOVE APPARATUS HAS BEEN ASSEMBLED AND INSPECTED, AND IS CONSIDERED TO BE SAFE WHILE UNATTENDED ON THE DATE/S SPECIFIED

Electrical Connections

☐ **Water Supply & Waste**

☐ **GAS** _____

☐ **OTHER:**_____

OVERNIGHT	HOTPLATE

DATE: SET UP: SIGNED (1) .....

SET UP: SIGNED (2) .....

* This authorisation is **not** valid without this information

Step 5: Review and Update

Evaluate the effectiveness of controls and adjust/update as necessary

- Your supervisor should have:
  - assessed the risks to your health from your use of hazardous materials and noted the precautions necessary to protect it
  - ensured that control measures are used to prevent you from being exposed to hazardous materials, equipment is properly maintained and checked and procedures are observed
  - trained you in the use of control measures and any protective equipment which is required

Step 5: Review and Update

You must:

- make full use of any control measures and use the protective equipment provided
- not use any materials containing toxic substances unless the area is adequately ventilated and, where necessary, you are provided with suitable respiratory protection

Ensure lessons learned are fed back into the system for future planning.

- report any accident or incident which may have resulted in the release of hazardous substances and consider how this can be prevented
- report any defective equipment

The final message.....

YOU MUST make sure you have completed the Risk Assessment and all necessary precautions are implemented!