Safe Chemical Handling and Waste Disposal Methods

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Topics

Personal Safety

Laboratory Safety

Know Your Chemicals

Safe Laboratory Practice

Storage and Transportation

Segregation and Disposal of Waste

Exposure to Chemicals

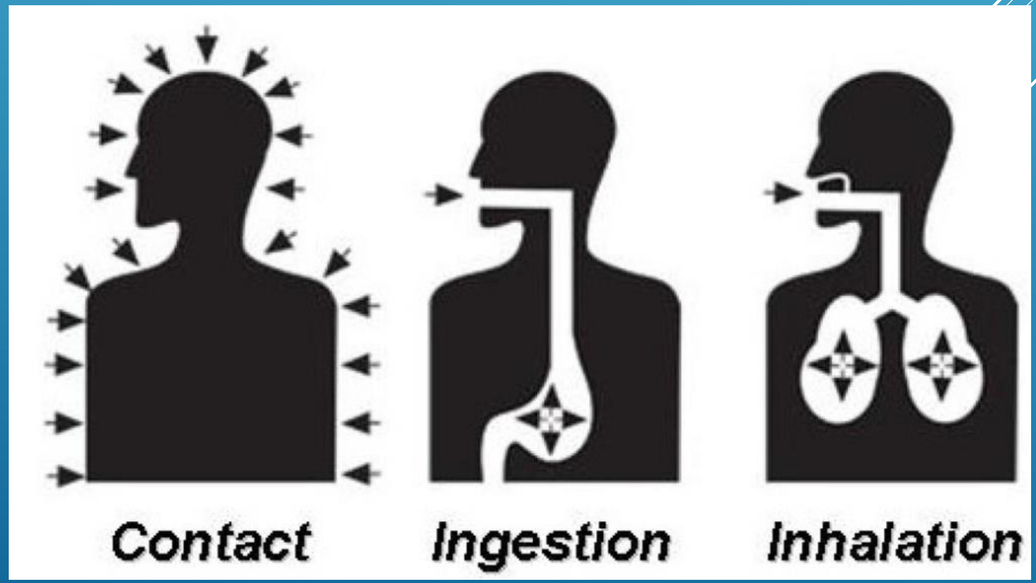
The main routes of entry of the chemicals into the human body are:

Exposed vital organ: Eyes

Absorption through skin

Ingestion via mouth

Inhalation



Personal Safety

Personal Safety

Your lab may contain many chemicals with the following symbols

Know and Use Personal Protective Equipment Kit – (PPE Kit)

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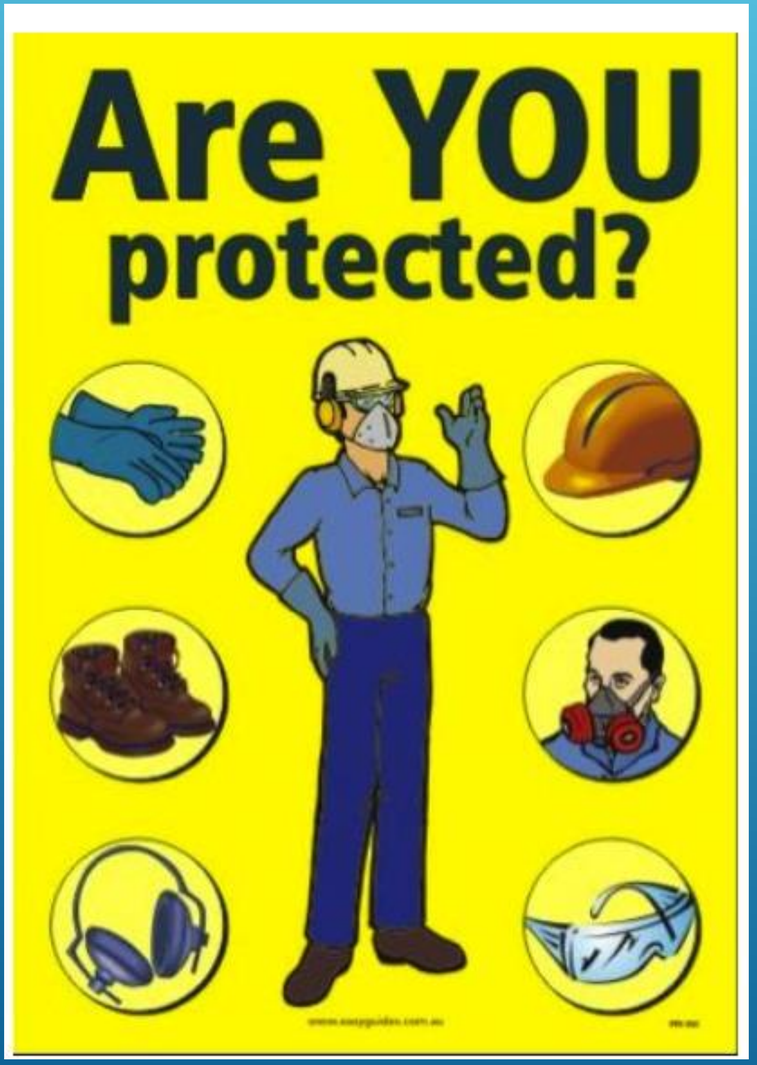
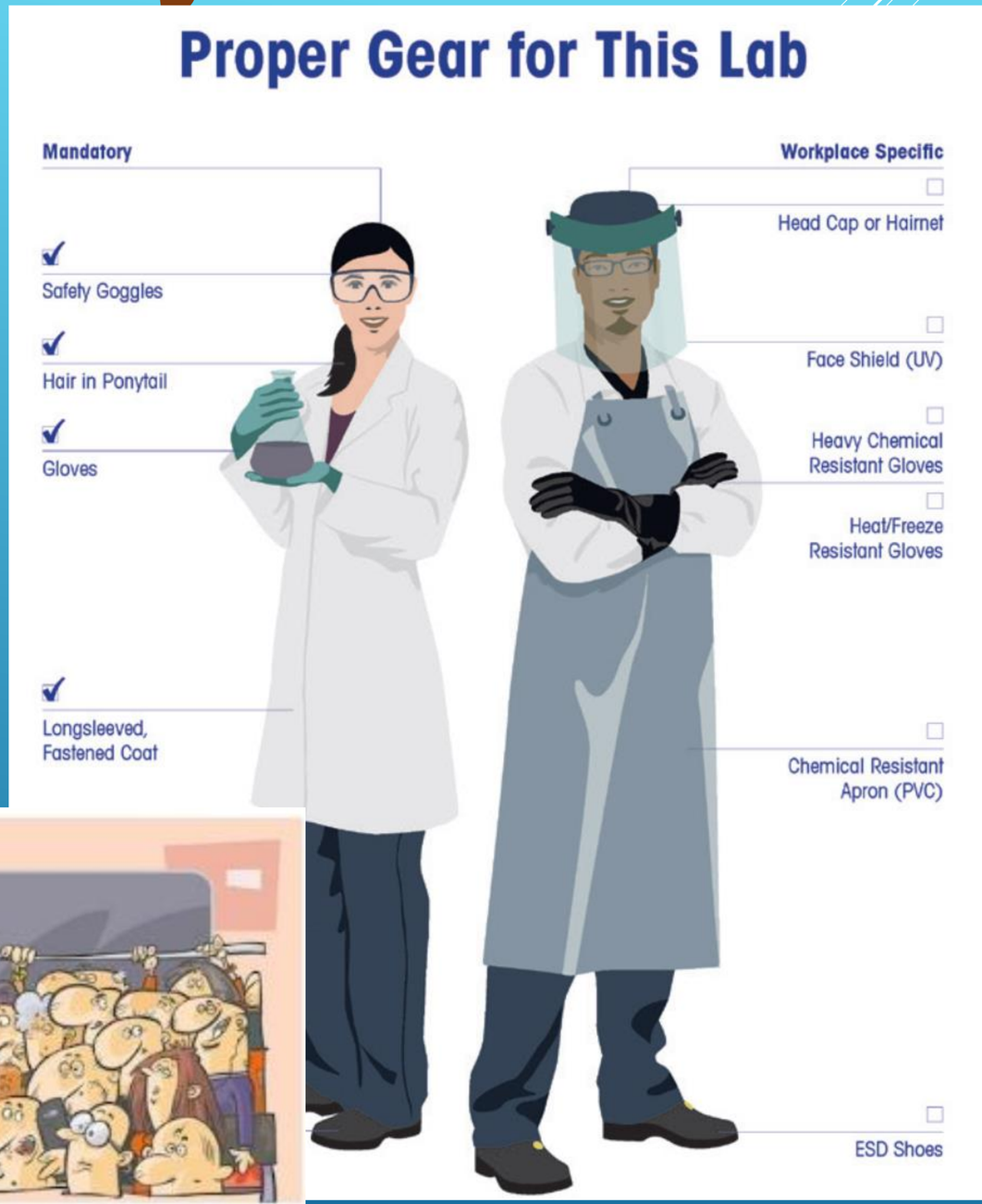
Know and Use Personal Protective Equipment Kit – (PPE Kit)

Personal Safety

Proper Attire and PPE Kit



Remove the lab coat before leaving the lab: Protect yourself and others from chemical exposure



Personal Safety

Proper Attire and PPE Kit

- Keep all long hair tied back
- Do not wear loose clothing that could catch on fire
- Foot wear that completely covers the foot
- Use appropriate PPE kit

Personal Safety: Eye

Eye Safety: Safety Goggles

It can protect your eyes from chemicals, gasses, flames, heating devices, possibility of flying debris, mild explosion

Personal Safety: Eye

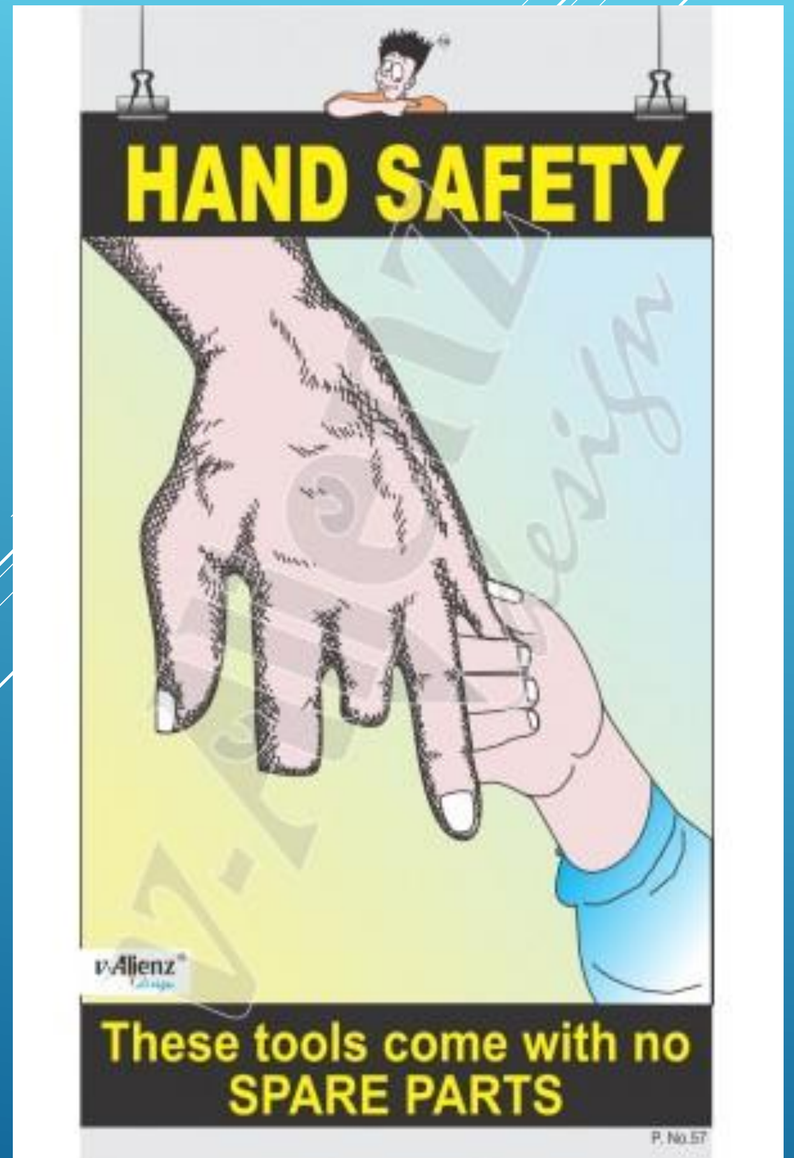
Eye Safety: Safety Goggles

In case of emergency in which a chemical goes into one's eye, use the eyewash station

Personal Safety: Hand

Hand Safety: Gloves

Gloves: Wear suitable gloves when handling chemicals. Inspect all gloves for defects before usage.



Personal Safety: Hand

Hand Safety: Gloves

Gloves: Wear suitable gloves when handling chemicals. Inspect all gloves for defects before usage.

Chemical	Glove Material					
	Butyl Rubber	Natural Rubber	Neoprene	Nitrile	Polyvinyl Alcohol	Polyvinyl Chloride
Benzene						
Diesel						
Gasoline, unleaded						
Kerosene						
Hydrochloric Acid (37%)						
Sulfuric Acid (30-70%)						

Not Recommended	Caution (1-4 hours)	Recommended (>4 hours)	Recommended (>8 hours)	Not Tested

No single glove can provide protection from every chemical

Understand the risk and select appropriate glove for the task

Personal Safety: Hand

Hand Safety: Gloves

Handle glassware, sharp tools and heated containers carefully

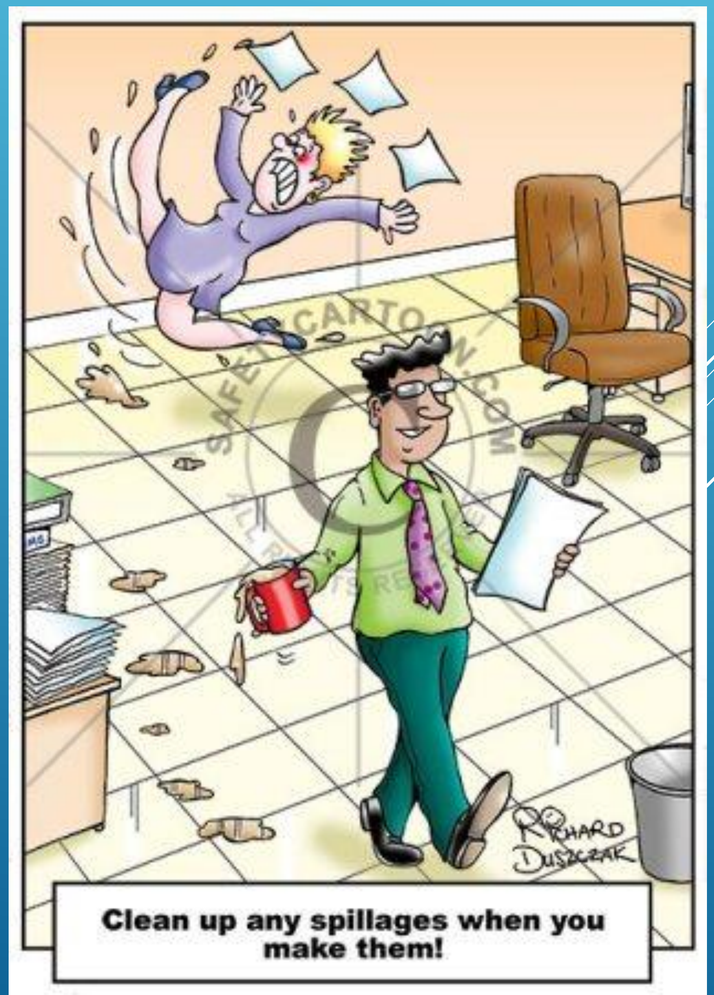
Civic Sense: Remove your gloves and wash your hand before touching a common item. Do not contaminate others

Wash your hand till you can lick before leaving the lab

Laboratory Safety

You are not alone in the lab

Safety is your responsibility



Laboratory Safety

You are not alone in the lab

Safety is your responsibility

Report accident to PI

Laboratory Safety

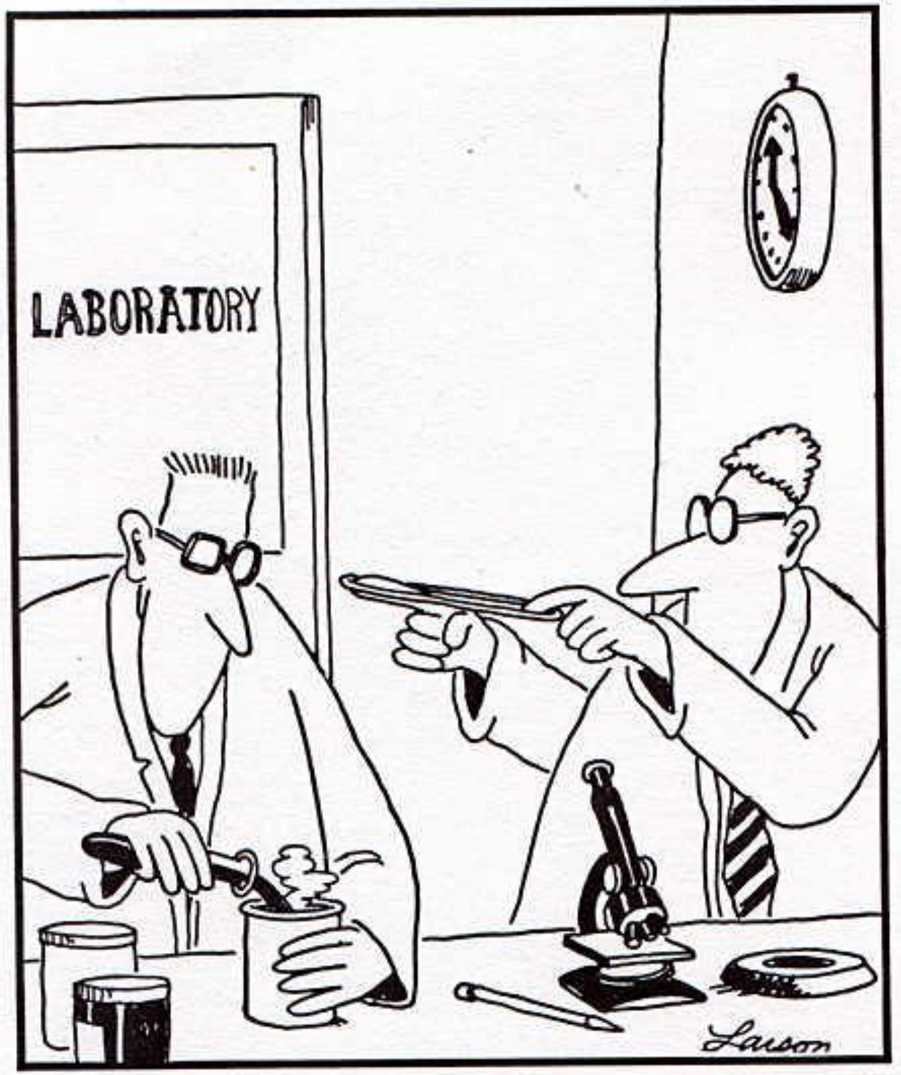
1. Familiarize yourself with all aspects of safety before using any chemicals.

2. Label all storage areas, appropriately, and keep all chemicals in properly labeled containers.

3. Maintain chemical inventory

4. Use equipment only for its designated purpose

5. Avoid distracting other worker.



On Oct. 23, 1927, three days after its invention, the first rubber band is tested.

Know Your Chemicals

Material Safety Data Sheet

Label elements

Labelling according Regulation (EC) No 1272/2008

Pictogram

Signal word	Danger
Hazard statement(s)	
H290	May be corrosive to metals.
H314	Causes severe skin burns and eye damage.
Precautionary statement(s)	
P260	Do not breathe dust/ fume/ gas/ mist/ vapours/ spray.
P280	Wear protective gloves/ protective clothing/ eye protection/ face protection.
P303 + P361 + P353	IF ON SKIN (or hair): Take off immediately all contaminated clothing.

Know Your Chemicals

Material Safety Data Sheet

GHS-US labeling

Hazard pictograms (GHS-US) :

GHS02

GHS04

GHS06

GHS08

CO

Signal word (GHS-US) : DANGER

Hazard statements (GHS-US) :
H220 - **EXTREMELY FLAMMABLE GAS**
H280 - CONTAINS GAS UNDER PRESSURE; MAY EXPLODE IF HEATED
H331 - TOXIC IF INHALED
H360 - MAY DAMAGE FERTILITY OR THE UNBORN CHILD
H372 - CAUSES DAMAGE TO ORGANS (CENTRAL NERVOUS SYSTEM) THROUGH PROLONGED OR REPEATED EXPOSURE
CGA-HG04 - MAY FORM EXPLOSIVE MIXTURES WITH AIR
CGA-HG10 - ASPHYXIATING EVEN WITH ADEQUATE OXYGEN

Precautionary statements (GHS-US) :
P202 - Do not handle until all safety precautions have been read and understood
P210 - Keep away from Heat, Open flames, Sparks, Hot surfaces. - No smoking
P260 - Do not breathe gas
P271+P403 - Use and store only outdoors or in a well-ventilated place
P280 - Wear protective clothing, protective gloves, eye protection, face protection
P377 - Leaking gas fire: Do not extinguish, unless leak can be stopped safely

Know Your Chemicals

Physical and Health Hazard Pictograms

Flammable

Do not put flammable gas near fire

The vapors released from a flammable liquid are a common fire hazard in a laboratory.

Never store flammable substance with oxidizers

Know Your Chemicals

Physical and Health Hazard Pictograms

Oxidizers

Oxidizers are chemicals which decompose readily under certain conditions to yield oxygen.

Common oxidizers: hydrogen peroxide, nitric acid, perchloric acid, sulphuric acid, chlorates, chromates, nitrates, peroxides, permanganate

Oxidizers must not be stored with flammables.

Know Your Chemicals

Physical and Health Hazard Pictograms

Explosive

Chemicals can explode to producing large volumes of gases and sudden pressure increase

Heat, light, mechanical shock, catalysts can initiate explosive reactions.

Examples: acetylides, azides, nitrogen triiodide, nitrates, nitro compounds, perchlorate salts, peroxides.

Know Your Chemicals

Physical and Health Hazard Pictograms

Corrosive

Corrosive effect in the respiratory tract in case of inhalation and in the gastrointestinal tract in case of ingestion.

- Destructive burns on the tissue
- sulfuric acid, nitric acid, potassium hydroxide, sodium hydroxide, bromine and phenol

Toxic

Sodiumcyanide, sodium azide and dimethyl mercury.

HAZARD Symbols

General warning

Low temperature

Hot surface

biohazard

High voltage

UV radiation

Inflammable

Toxic material

Oxidizing material

Explosive material

Ionizing radiation

Corrosive material

Electrical

Non- ionizing radiation

Glassware

Safe Practice

Ensure that the Material Safety Data Sheet (MSDS) is obtained with the chemical and is readily available for reference

Know the location of emergency equipment.

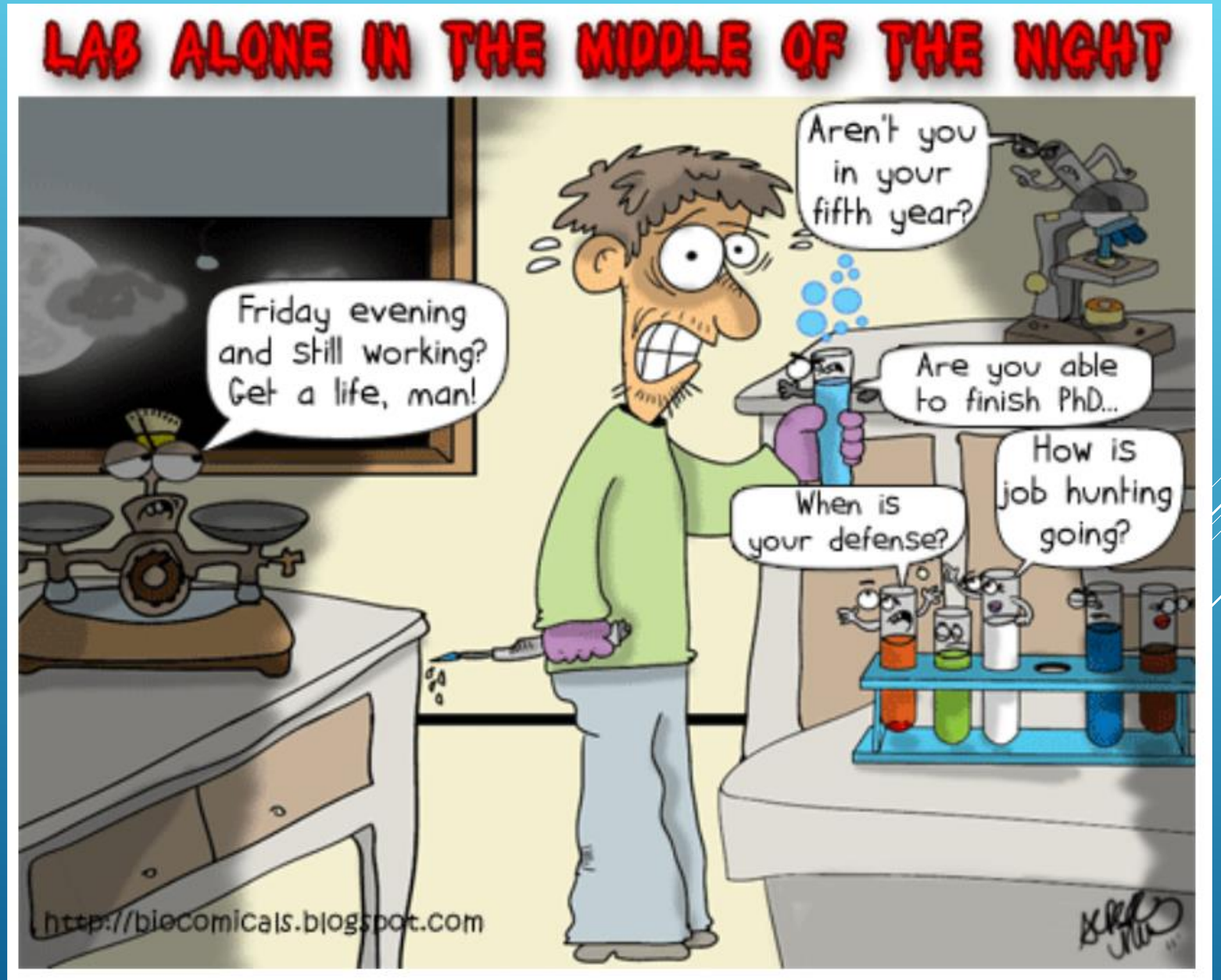
Be aware of the hazards posed by the work of others in the laboratory.

Make others in the laboratory aware of any specific hazards associated with your work

Safe Practice

Do not work alone-
Not recommended for anyone.

Certainly not for new students



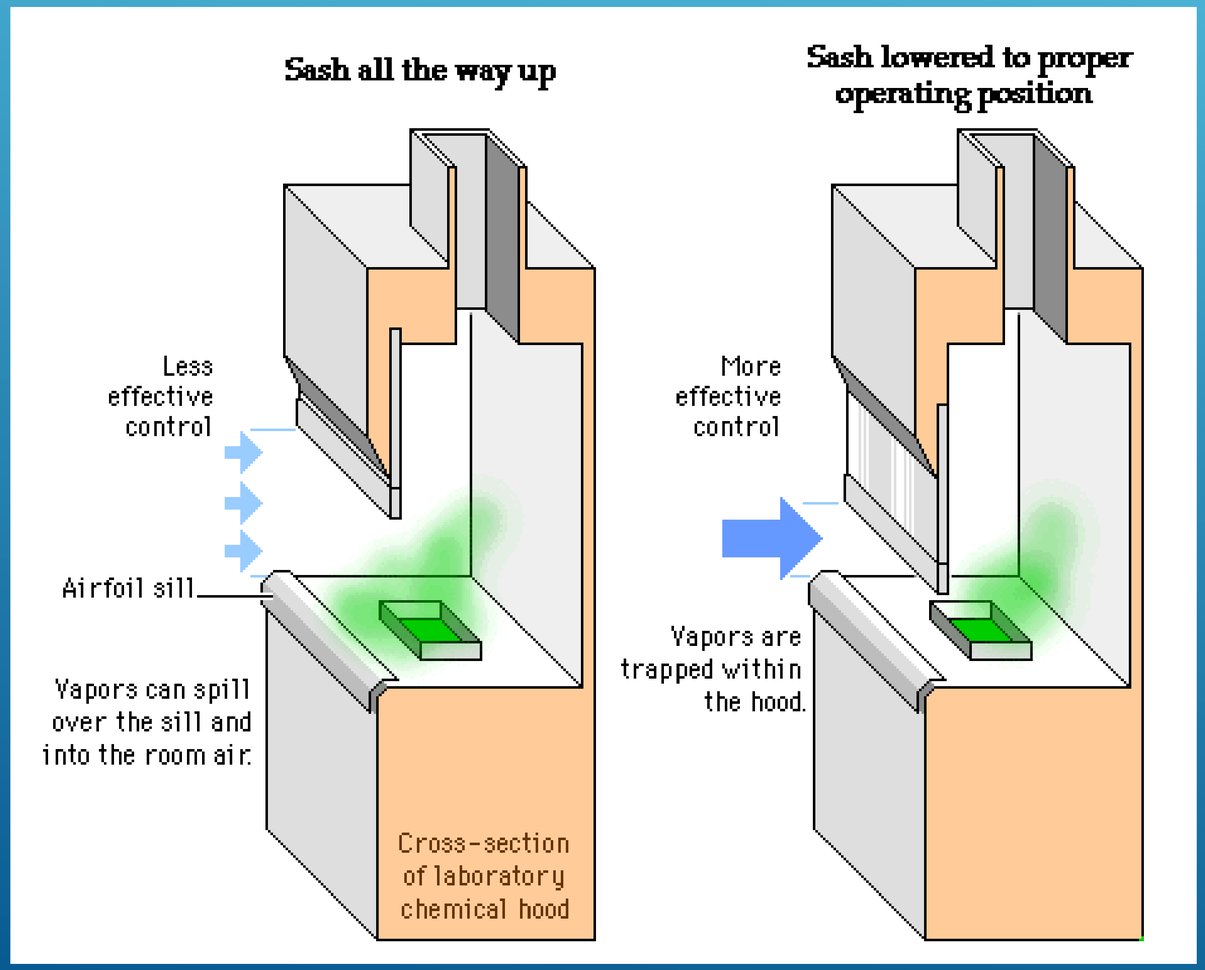
Safe Practice

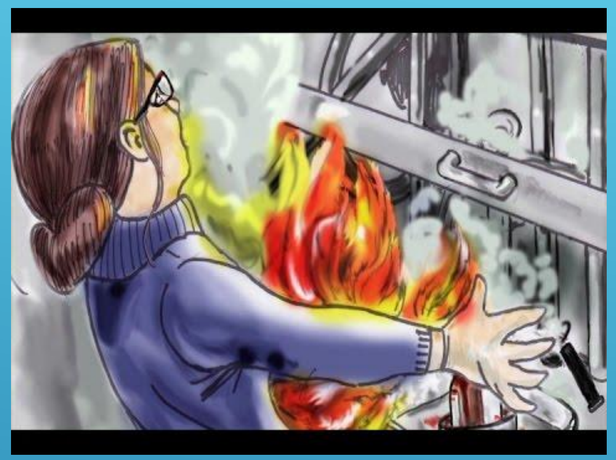
Do not eat/drink: Not allowed in any areas in which chemicals are stored/ used/ dispensed.

Do not run, play in the lab.

Safe Practice

Working with the fume hood





Know emergency equipment

Storage and Transportation

Fix the chemical shelf to the wall
Install guards in the shelf
Store heavier bottles on lower racks

Storage and Transportation

- A protective **cap** is required for storage or transport.
- Gas cylinders need to be secured in the lab with a **strap or chain.**
- Cylinders must be transported using a cart and must be secured with a strap or chain.

Storage and Transportation

- Store flammables and combustibles in flammable storage cabinets
- Make sure chemicals are on secure shelves
- All chemicals should be stored in well-lit and well-ventilated areas
- Use trays /tubs for secondary containment
- All chemical containers should be properly labeled

Storage and Transportation

Chemical Hazard Always refer to the SDS	Flammable	Acid	Base	Oxidizer	Toxic
Flammable					
Acid					
Base					
Oxidizer					
Toxic					

Storage and Transportation

Appropriate carriers must be used while moving chemicals

Secondary containment must be used while transferring chemicals outside your lab

Waste Management

Reduce waste: Always order the smallest possible quantity of chemical. This reduces hazards and chemical waste.

Dispose expired chemicals

Do not throw chemicals down the drain

Waste must be segregated in labeled container

Waste Management

Segregation of waste materials

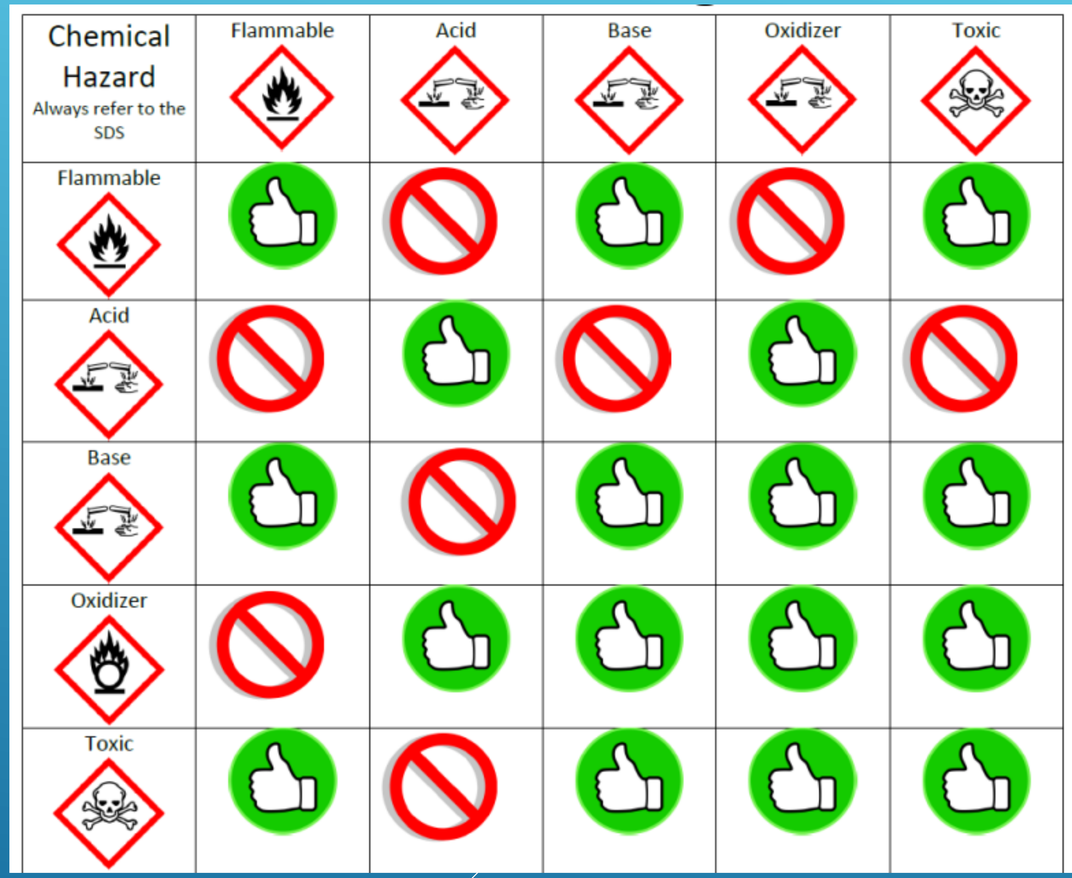
Incompatible chemical waste must not be mixed

Separate in to groups of compatible chemicals such as

- Organics, Halogenated organics
- Acids, Bases

Label the waste container with names of the chemicals and quantity

Do not fill the waste bottle completely



Chemical Waste Disposal Plan For IITH

LAB

Acids

Bases

Solvents

Used oils


broken glasses, syringes without needle, metal wastes etc.

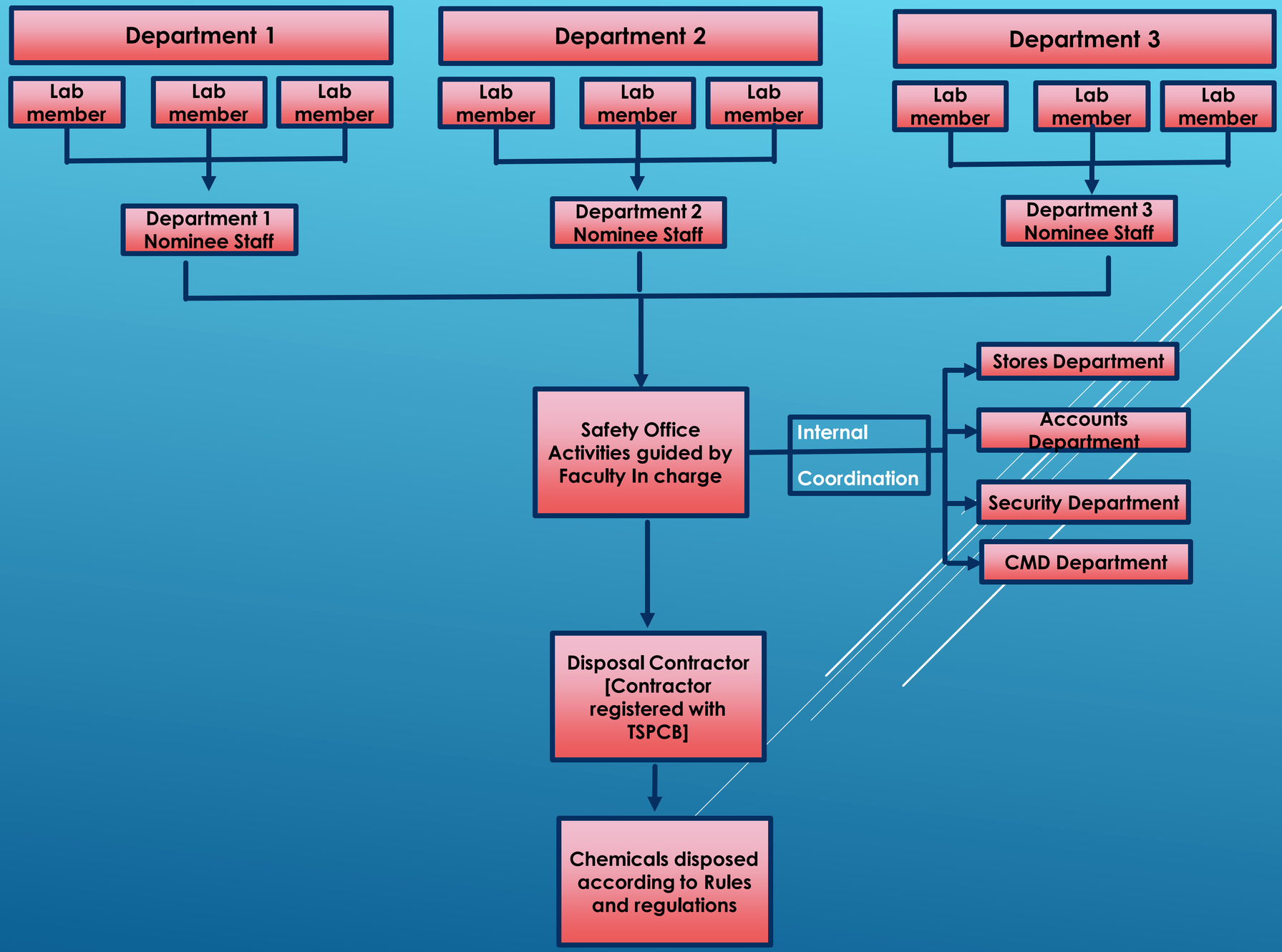
Needles/ slides/sharps

CUSTOMISED CRATES
With lid
Size: 15 bottles (1ltr)
Size: 8 bottles (2.5ltr)

Safety office

Chemical Storage Building near STP1 site

Chemical Waste Disposal Plan For IITH



Chemical Waste Disposal Plan For IITH

INSTRUCTIONS FOR WASTE CHEMICAL SEGGREGATION, STORAGE AND TRANSFER

Following wastes to be stored separately:

a) Acids
b) Bases
c) Solvents
d) Waste/used oils
e) Solids such as Agar or silica
f) Solids- sharp containers (glass/metal sharps)

- Store liquid chemical wastes ONLY in either **1ltr or 2.5 ltr** bottles with waste tag [crates come with pockets of only these two sizes).
- Use separate containers for larger volumes. These containers with proper waste tag will also be considered for removal.
- Once these bottles are 80% filled, Send chemical waste removal request form along with copy of completely filled waste tag to safety office (original waste tag retained in the waste bottle).
- Only after safety office approves, transfer the bottle/s to satellite storage site (SSS)-ground floor on the day of Pick up & bottles shall be shifted to Chemical Storage Building (near STP site)
- Once in three months or whenever necessary the chemical waste from IITH shall be sent for final disposal through RAMKY.

NOTE:

- Incompatible chemical waste must not be mixed
- Best container for waste is the original chemical container or one of the same type– including the lids! ALWAYS deface the original label
- Glass containers are usually the best, metals and plastic containers are usually not recommended
- Containers must be in good condition and NO leaks - including the lids!
- Enter in the waste tag attached to the bottle with details and volume as soon as you start collecting waste.
- Half –filled bottles will not be removed
- Never carry bottles in hand- Use trolleys.
- Excess empty 1ltr/2.5 ltr bottles shall be handed over to Safety office (will be given to labs for waste storage upon request).
- **WASTE WITHOUT THE WASTE TAG WILL NOT BE REMOVED (prepare exactly same waste tags or download)**

Chemical Waste Disposal Plan For IITH

INDIAN INSTITUTE OF TECHNOLOGY HYDERABAD

Hazardous Chemical Removal Request Form

Contact Person: Building:
Contact Number: Room:
Accumulation start Date: Pick up date:

Quantity: 1lt bottle : x

2.5ltr bottle ; x

Large volume (separate container, specify the volume): x

(Put 'x 'number of containers)

Waste type: (Tick)

Liquid- Solvent

Liquid-Acid

Liquid- Base

Used oil

Solid (specify)

List major contents in the bottles:

Waste Tag attached: Yes /No (waste tag must be completely filled)

Signature (Lab in-charge) **Date:**

(This form and copy of waste tag must be emailed to safety@iith.ac.in)

Note: Containers filled 80% and more will be removed; never fill 100%; no leakage; keep bottle clean

Safety Office-IITH

INDIAN INSTITUTE OF TECHNOLOGY HYDERABAD

HAZARDOUS CHEMICAL WASTE TAG

Contact Person: **Building:**
Contact Number: **Room:**
Accumulation start Date: **Pick up date:**

COMPOSITION OF WASTE (Do not write the abbreviation or formula)

Chemical name	**Volume**	**Hazard category**
1.		
2.		
3.		
4.		
5.		
6.		
7.		

Hazard category: Inflammable (IF); Corrosive (C); Reactive (R); Toxic (T); Oxidiser(O):
Other specify_____
The above mentioned information are true and accurate

Signature **Date:**
(lab in charge)

(WASTE WILL NOT BE REMOVED IF ALL SECTIONS ARE NOT COMPLETED)
For further information write to safety@iith.ac.in

Safety Office-IITH

Chemical Waste Disposal Plan For IITH

Lab responsibility

- Segregation and storage
- Waste tag entry
- Sending e-mail to technical staff in their department and cc to safety office–
  (1) Chemical waste removal request form
  (2) Waste tag copy .

Technical Staff (department) responsibility

- Point of contact in the Department for chemical waste disposal
- Individual labs and safety office contact this person
- Checks waste tag entries
- Transfers the waste from each lab to the storage building using safe practices with the help of assigned housekeeping staff
- Keeps copy of waste removal request form and waste tags
- Responsible for chemical waste disposal in the department
- Visit individual lab once a month to gather information about the generated waste

Chemical Waste Disposal Plan For IITH

Role of safety office

- Co-ordinate with PI and assigned Technical staff from each department with regard to chemical waste disposal
- Trains the technical staff with regard to segregation, storage & disposal of chemical wastes.
- Transport of waste from SSS and to Storage Facility and loading to RAMKY Vehicle for final disposal
- Co-ordinate between IITH and RAMKY for chemical waste disposal
- Keeps records related to chemical waste disposal from IITH
- **WASTE BOTTLES WITHOUT TAGS AND PROPER LABELING AS DIRECTED WILL NOT BE ACCEPTED BY THE SAFETY OFFICE**

Chemical Waste Disposal Plan For IITH

Following are the Department Nominees:

Department	Name of the staff
Biomedical	Jayalakshmi JT
Biotechnology	Jayavardhana Reddy
Physics	Ranjit Kumar
MSME	E. Rangaiah
MAE	V. Srikanth
Electrical	Santu Kayal
Civil	Sandeep K
Chemistry	Ramana Babu
Chemical	Nagarjuna P
Central workshop	Praveen Kumar A

Chemical Waste Disposal Plan For IITH

Safety office staff with Nominee visits each lab [entered in excel sheet] to inspect and verify the details of waste tag, bottle leakage problems etc

Safety office consolidates all data of all Departments and contacts Vendor to obtain approx. cost estimate and approx. date of pick up

Accordingly, the date of pick up is informed to Nominees

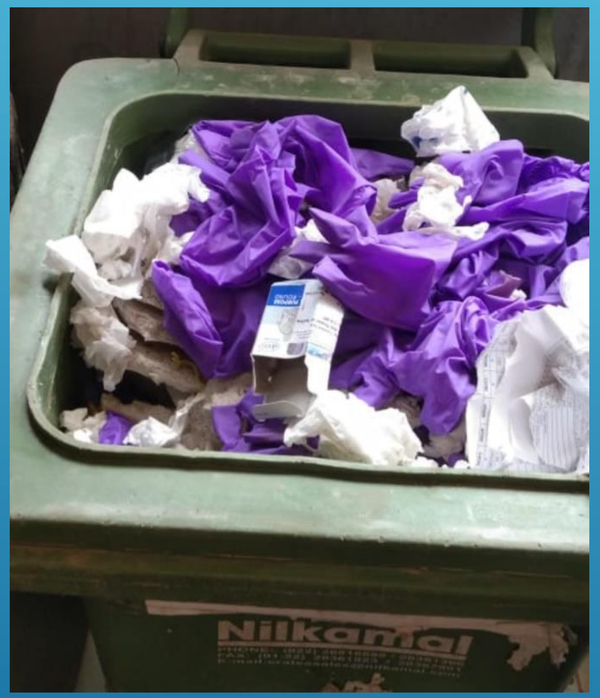
Nominees inform the Lab members

Pick up from Lab premises to Storage building is arranged prior to 24 hrs of Vendor pick up

Important: Until then chemicals shall be stored in respective labs only

Waste Management

Improper segregation



If Safety is compromised!!

Accidents in Laboratory

Four students injured in explosion inside chemistry lab in Assam university

According to reports, the students of second semester, pursuing Masters in Chemistry at the university, went to the Chemistry lab to perform some experiments.

Fire at IIT propulsion lab, nobody injured

TNN / Updated: Jun 6, 2018, 10:45 IST

3176 PTS FACEBOOK TWITTER LINKEDIN EMAIL

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Gas Cylinder Explosion Kills Researcher at Indian Laboratory

Two professors have been arrested for negligence in connection with the blast.

Ashley P. Taylor
Dec 7, 2018

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Fire breaks out at IISER laboratory in Pune, one student suffers minor injuries

An official said the fire started in the chemistry department and no casualty has been reported, nor is anybody trapped inside.

Pune: Damaged by fire and its after-effects, multiple IISER labs shut, institute to adopt tighter safety measures

On the possible cause behind the fire, the officials called it an accidental spillage of flammable liquid onto the fume hood bench-top, and the solvent coming in contact with a hot air-drying apparatus in the vicinity.

IIT-Madras student injured after lab accident

TNN / Nov 14, 2015, 00:58 IST

THANK YOU