



# Laboratory Safety Manual and Procedure For Organic Chemistry Laboratory 2021-22



# Lab Safety



# Laboratory Safety Manual and Procedure For Organic Chemistry Laboratory 2021-22





## Laboratory Safety Manual and Procedure For Organic Chemistry Laboratory 2021-22





## Laboratory Safety Manual and Procedure For Organic Chemistry Laboratory 2021-22

Description	Number
University Ambulance	8895467798
Local Police Station	100
Women Help Line	1091
Children Help Line	1098
Fire Help Line	101
Ambulance Help Line	108
Janani Ambulance Help Line	102
Traffic Help Line	1095
N.H.A.I. Help Line	1033





## Laboratory Safety Manual and Procedure For Organic Chemistry Laboratory 2021-22

### General Safety Rules



1. Listen to or read instructions carefully before attempting to do anything.
2. Wear safety goggles to protect your eyes from chemicals, heated materials, or things that might be able to shatter.
3. Notify your teacher if any spills or accidents occur.

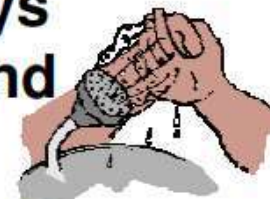




## Laboratory Safety Manual and Procedure For Organic Chemistry Laboratory 2021-22

### General Safety Rules

4. After handling chemicals, always wash your hands with soap and water.



5. During lab work, keep your hands away from your face.

6. Tie back long hair.





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### General Safety Rules

7. Roll up loose sleeves.
8. Know the location of the fire extinguisher, fire blanket, eyewash station, and first aid kit.
9. Keep your work area uncluttered. Take to the lab station only what is necessary.





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### General Safety Rules



10. It is suggested that you wear glasses rather than contact lenses.
11. Never put anything into your mouth during a lab experiment.
12. Clean up your lab area at the conclusion of the laboratory period.
13. Never “horse around” or play practical jokes in the laboratory.







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### Glassware Safety



1. Chipped or cracked glassware should not be used. Show it to the teacher.
2. Broken glassware should not be disposed of in a classroom trashcan. There is a special glass disposal container for it.
3. When pouring liquids into glassware, make sure the container you are pouring into is resting on a table at least a hands breadth from the edge.



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### Glassware Safety



4. If a piece of glassware gets broken, do not try to clean it up by yourself.  
Notify the teacher.
5. Do not place hot glassware in water.  
Rapid cooling may make it shatter.





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## Chemical Safety



1. Wear protective goggles whenever heating or pouring hazardous chemicals.
2. Never mix chemicals together unless you are told to do so (and then only in the manner specified).
3. Never taste any chemicals (you should never taste anything in the lab).





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### Chemical Safety



4. If you need to smell the odor of a chemical, waft the fumes toward your nose with one hand. Do not put your nose over the container and inhale the fumes.





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### Chemical Safety



5. Follow the instructions of your teacher when disposing of all chemicals.
6. Wash your hands after handling hazardous chemicals.





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## Heating Safety



1. Use tongs and/or protective gloves to handle hot objects.
2. Never reach across an open flame or burner.



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### Heating Safety



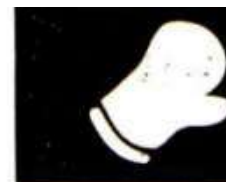
3. Always point the top ends of test tubes that are being heated away from people.
4. When heating a test tube, move it around slowly over the flame to distribute the heat evenly.





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### Heating Safety



5. Only glassware that is thoroughly dry should be heated.
6. Heat glassware by placing it on a wire gauze platform on a ringstand. Do not hold it in your hand.







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### First Aid

**Injury:** Burns

**To Do:** Immediately flush with cold water until burning sensation lessened.





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### First Aid



**Injury:** Cuts, bruises

**To Do:** Do not touch an open wound without safety gloves. Pressing directly on minor cuts will stop bleeding in a few minutes. Apply cold compress to bruises to reduce swelling.





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### First Aid



**Injury:** The eyes

**To Do:** Flush eyes immediately with plenty of water for several minutes. If a foreign object is lodged in the eye, do not allow the eye to be rubbed.





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## Safety Rules

⌘ Wear appropriate protective clothing





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- ⌘ Your clothing should cover your legs to the knees - shorts are not appropriate for the laboratory
- ⌘ Lab aprons can be used to protect good clothing
- ⌘ Loose clothing should not be worn because it may dip into chemicals or fall into a flame and catch fire



## Laboratory Safety Manual and Procedure For Organic Chemistry Laboratory 2021-22

Wear shoes that cover your feet.

Sandals and open-toed shoes do not protect your feet from broken glass that is frequently found in the lab



⌘ Also, leather shoes protect your feet from chemical spills - canvas shoes do not.





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### Tie Back Loose Hair



- ⌘ Dangling hair can fall into the Bunsen burner and catch fire or can fall into a chemical solution





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### **Do not wear contact lenses**

- ⌘ Vapors in the laboratory ( e.g. HCl) dissolve in the liquids covering the eye and concentrate behind the lenses.







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- Know the locations of the nearest available telephones and emergency phone numbers to use to call for help in case of an emergency.





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- Know the locations and operating instructions for the fire extinguishers, fire blankets, fire alarms, fire hoses, first aid kit, eye washes and showers.
- Wash eyes for at least 15 minutes.





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Do not apply cosmetics, eat, or drink  
in the lab.

⌘ These activities are ways by which you  
can accidentally ingest harmful  
chemicals





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Do not taste any chemical!





## Laboratory Safety Manual and Procedure For Organic Chemistry Laboratory 2021-22

- ⌘ Follow instructions carefully. Know the safety hazards of each experiment before starting.
- ⌘ Do not perform unauthorized experiments. Only work in the laboratory when supervised by an instructor.





## Laboratory Safety Manual and Procedure For Organic Chemistry Laboratory



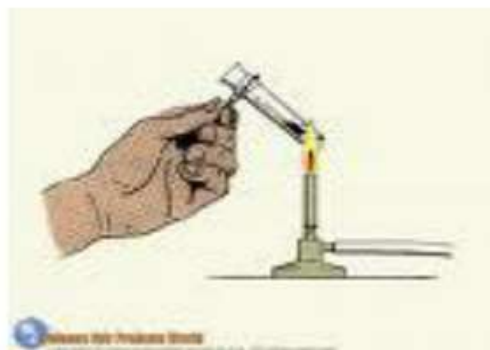
- ⌘ Keep burners in the middle of the lab table, not on the edge.
- ⌘ When heating liquids in test tubes, never point the tube toward yourself or anyone else.
- ⌘ Use boiling chips when boiling





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**Heat test tubes at an angle, directing the opening oppositely to you and other people in the laboratory.**





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**Pour from large containers to  
smaller ones.**

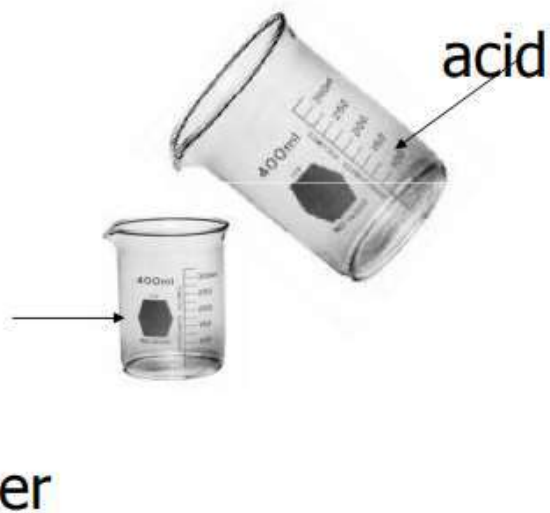






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Always **ADD ACID** to water



“Do not spit into acid!” – a good phrase to



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**Hold your hand over the label  
while pouring.**





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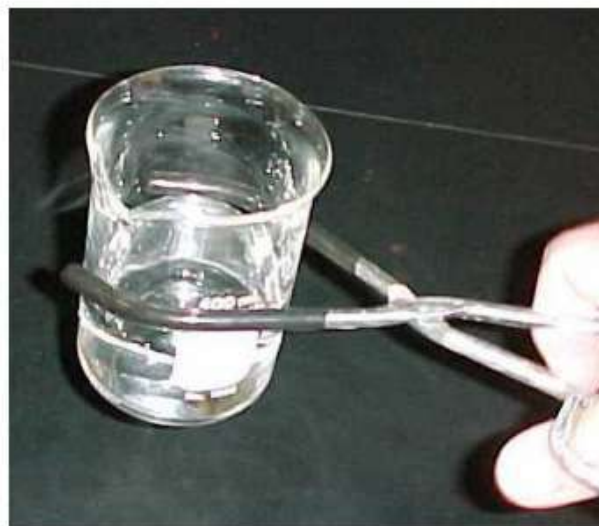
**Work with volatile chemicals  
under a fume hood.**





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**Handle hot glassware with gloves  
or beaker tongs.**





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First light the match

THEN



Turn on the gas!





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Do not smell any chemicals directly!



⌘ If absoluteley necessary to smell, use your hand to fan the vapor to your nose.



## Laboratory Safety Manual and Procedure For Organic Chemistry Laboratory 2021-22

Do not pipet solutions by mouth!



⌘ Use a rubber suction bulb or other device to fill a pipet.





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Wash your hands with soap and water before leaving.

⌘ This rule applies even if you have been wearing gloves!







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- ⌘ Report all accidents, no matter how minor, to the instructor.
- ⌘ If you break something made of glass, be sure to use dustpan and hand broom to sweep it up and dispose of it in the glass waste receptacle.





## Laboratory Safety Manual and Procedure For Organic Chemistry Laboratory 2021-22



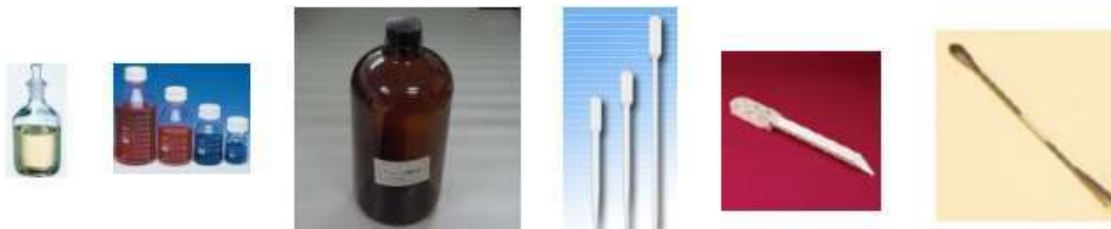
- ⌘ Never return chemicals to bottles of their origin. If you have excess, give it to another student or throw it away.
- ⌘ Check labels on containers twice to make sure you use the right chemical and of the correct concentration. Dispose of chemicals in proper receptacle.





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- ⌘ Do not stick objects into bottle except spatula or dropper provided for that bottle. Do not set the spatula or dropper down on the counter (you may contaminate it).
- ⌘ Keep each spatula or dropper with the proper bottle.





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Don't work alone in the lab

- ⌘ In case of a problem, you may need another person to prevent injury or even save your life!





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Before leaving the lab:

- ⌘ Keep table tops clean.
- ⌘ Return all equipment to its original location before leaving the lab.
- ⌘ Clean all spills immediately.
- ⌘ Wash your hands after every experiment.





# Laboratory Safety Manual and Procedure For Organic Chemistry Laboratory 2021-22

## Where to start



- ⌘ Before looking at this presentation, ensure that you have watched the one on General Laboratory Safety



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### hazards from chemical materials?



- ⌘ Toxic substances
  - ⌘ Solvents
  - ⌘ Corrosives
  - ⌘ Flammables
  - ⌘ Irritants
  - ⌘ Carcinogens
  - ⌘ Teratogens
  - ⌘ Mutagens
  - ⌘ Explosives
  - ⌘ Radiation
- and many, many more



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### How do toxic materials enter the body?

- ⌘ By mouth  
(contaminated fingers!)
- ⌘ By breathing in gases, aerosols or powder
- ⌘ By skin contact or damage
- ⌘ By absorption through intact skin
- ⌘ By splashes into the eyes







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# What legislation applies? (1)

### ⌘ Control of Substances Hazardous to Health Regs 2004

- ☑ Use data sheets and other relevant information (eg EH40) to assess risk
- ☑ Consider not only reactants but also intermediates, products and waste
- ☑ Take into account the format (eg solution or powder) and the quantity to be used
- ☑ Determine safe working procedures
- ☑ Determine emergency procedures, ensuring that all equipment and "mop-up" materials are available
- ☑ Consider correct waste disposal



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# What legislation applies? (2)

### ⌘ Other relevant legislation includes:

- ☑ Dangerous Substances & Explosive Atmosphere Regs 2005
- ☑ Pressure Systems Regs 2000
- ☑ Provision & Use of Work Equipment Regs 1998



This list is not  
exhaustive!!



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### Fume Cupboards

- ⌘ Ensure that the equipment is working properly
- ⌘ Ensure you know the meaning of warning signals and how to use any controls
- ⌘ Close the sash unless loading or unloading
- ⌘ Do not use fume cupboards for storage
- ⌘ Keep the work area clear of other materials etc





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## Materials

- ⌘ Obtain the **minimum** amounts needed for your work
- ⌘ Ensure that all containers are clearly **labelled** with their contents and a hazard label
- ⌘ Toxic materials must be **locked away**
- ⌘ Corrosive substances must be stored securely at a low level in **bunded trays**
- ⌘ Keep flammable materials in **specialty designed cupboards** and only have out the minimum for immediate use (<50L per room)
- ⌘ Store acids, bases & solvents separately





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## Good practice

- ⌘ Never mouth-pipette
- ⌘ Always dilute concentrated acids by adding the acid to water, never the reverse
- ⌘ Never carry Winchester's by the neck – always use a carrier
- ⌘ Always leave benches, balances etc clean & tidy after use





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### Radio-Active Materials & Work with Lasers

- ⌘ Work with radio-active materials and lasers requires special training
- ⌘ You **must not** use them without authorisation and training
- ⌘ Your Departmental Safety Staff can advise or contact Trevor Moseley in Safety Services





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### Work with Cyanides & Hydrofluoric Acid

- ⌘ If you plan to use Cyanides or Hydrofluoric Acid, you will have to have specific permission from your Departmental Safety Officer
- ⌘ Attendance at a training course at Safety Services will normally be required
- ⌘ The dangers of both substances, especially hydrofluoric acid can be greatly underestimated with potentially **fatal** results.
- ⌘ They are both **VERY DANGEROUS** substances





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### When in doubt – ASK!!!

⌘ Do not carry out a new or unfamiliar procedure until you have been fully trained & understand the precautions necessary for safe working



⌘ DO NOT GUESS!!!!





## Laboratory Safety Manual and Procedure For Organic Chemistry Laboratory



### Handle By

Respirator  
Long rubber gloves  
Boots  
Industrial apron  
Chemical safety goggles  
Face shield

Carbolic **acid** or phenol does not mix with water, so use alcohol first to flush the chemical off the **skin** and then flush with water. If alcohol is not available, flush with a large amount of water. **Do** not flush the eye with alcohol. **Sulfuric acid** is flushed with a mild, soapy solution if the **burns** are not severe.





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Hydrofluoric acid is flushed with a large amount of **water and treated with calcium gluconate**. You need immediate medical care.





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Chemical burns not rinsed with water

Some chemical burns are made worse if rinsed (flushed) with water.

**Carbolic acid or phenol** does not mix with water, so use isopropyl (rubbing) alcohol first to flush the chemical off the skin and then flush with water. If alcohol is not available, flush with a large amount of water. Do not flush the eye with alcohol.

**Sulfuric acid** is flushed with a mild, soapy solution if the burns are not severe. Sulfuric acid feels hot when water is added to the acid, but it is better to flush the area and not leave the acid on the skin.

**Dry powders**, such as dry lime, are brushed away first, because adding water can make a liquid that burns. After the powder is brushed away, flush with water for 20 minutes.

**Metal compounds** are covered with mineral oil.

The most important first aid for a **chemical in the eye** is to immediately flush the substance out with large amounts of water to reduce the chance of serious eye damage. For any chemical burn to the eye, see the topic Burns to the Eye.



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### Artificial Respiration



1  
Make sure the airway is clear and remove any obstructing substance.



4  
Check Neck for a pulse.



2  
Place one hand under his neck. Lift up on neck and partially tilt the head back.



3  
Pull his chin upward. Place your mouth firmly over the victims open mouth, pinch his nostrils shut, and blow hard enough to make his chest rise.



5  
Apply Cardiopulmonary Resuscitation.

**Repeat the procedure until the victim begins to breath.**



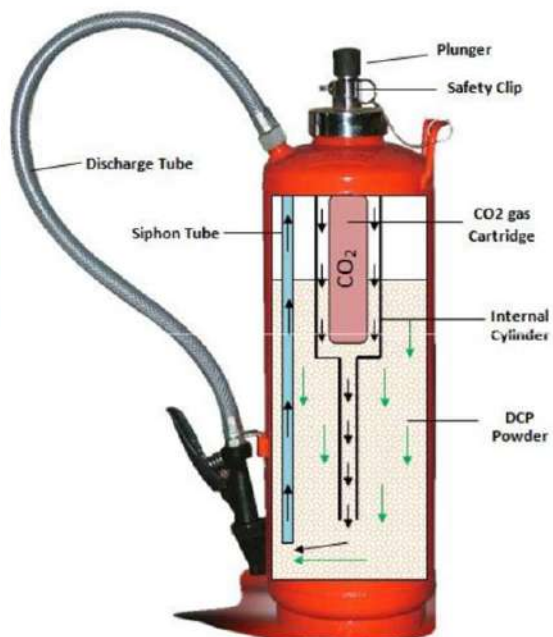
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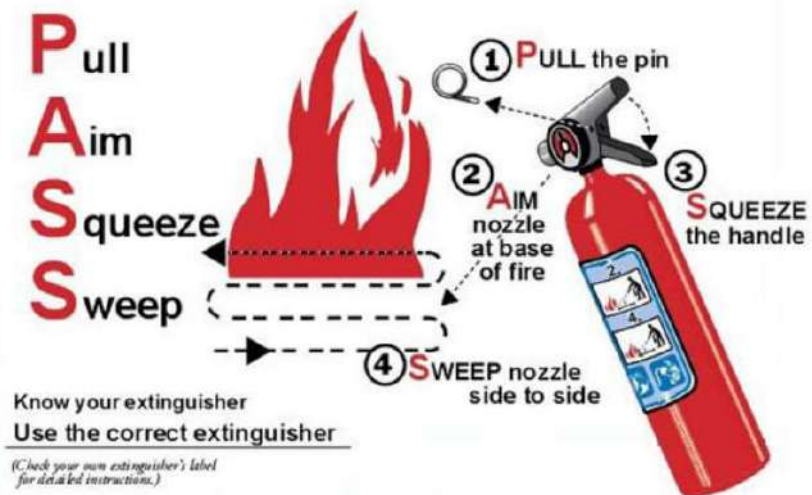


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## CO<sub>2</sub> Extinguisher



To operate an extinguisher:





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# FIRE ALARM

