

Safety Training

Molecular Materials Research Center
Beckman Institute
California Institute of Technology

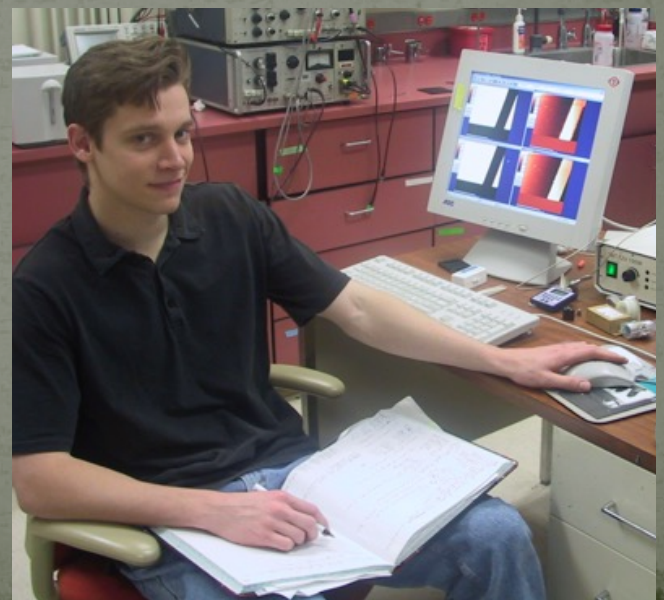
MMRC Chemical laboratory Clothing Policy

- Long pants, and shirts that cover upper torso and upper arms are required.
- **Safety glasses, lab coats, and gloves must be worn at all times in chemical laboratories.**
- Gloves should not be used to open doors, or type on computers.
- No Food or Drinks Allowed in Any Laboratories.



MMRC Instrument laboratory Policy

- Always sign up for an instrument before use.
- Long pants, shirt that covers upper torso and upper arms, and close toe shoes are required in instrument laboratories.
- Gloves should be worn when handling any samples or high vacuum equipment.
- Safety glasses, lab coats, and gloves require when working with chemicals.
- No Food or Drinks Allowed in Any Laboratories.



Samples and Chemicals

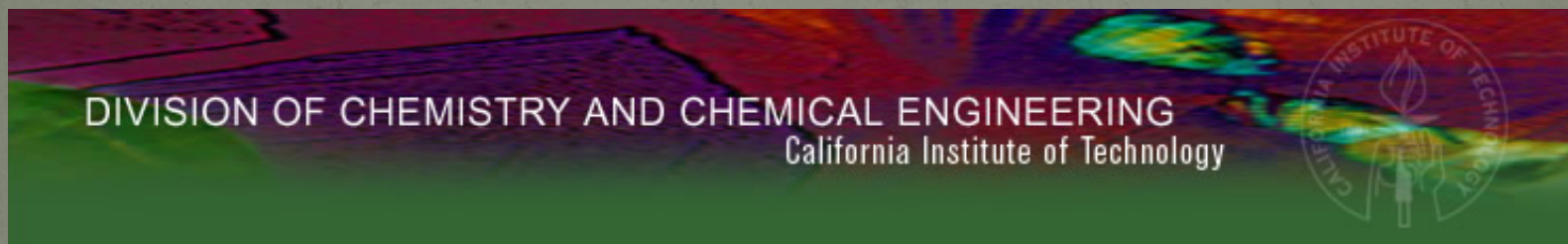
- **Label all chemicals** brought into MMRC Labs: your name, date, and sample name.
- **Remove all samples** and chemicals when you are finished with the experiment.
- **Do not**
 - leave chemicals or samples for disposal by others.
 - open bottles or use beakers if you are not the owner.
 - do any chemical experiments in the labs unless authorized.

Safety Information Resources



- Caltech Environment, Health, and Safety
 - Chemical Hygiene Plan
 - Hydrofluoric Acid Work Procedures
 - Hazardous Waste Disposal Procedures
 - Emergency Response Guide
 - All Available On-Line

Safety Information Resources



- Chemical Safety Manual
 - Available On-Line at
<http://www.cce.caltech.edu/resources/Safety.pdf>

Responding to Incidents

Remember all MMRC laboratories are chemical labs and have hazardous chemicals on benches and in hoods. Only touch your own materials.

Chemical Exposure



- **Call 5000**
- **or 626 395 5000**
- Use the Nearest Emergency Shower or Eyewash
 - 15 Minutes or Until the Paramedics Arrive
- Going to the Emergency Room or Occupational Health?
 - Take a Material Safety Data Sheet (MSDS) with You

Emergency Contact Numbers



- Call **x 5000** for Campus Emergencies
- Cell Phone
 - **(626) 395-5000**
- Emergency Kiosks
 - Hit the Button

Chemical Spill

- Chemical Spill
 - Alert People in Area
 - Small Spill
 - Self-Clean
 - Call Safety @ 6727
 - Large Spill
 - Contain
 - Call Security @ 5000
 - Provide Information



Fire



- Alert People in Area
 - Yell “**Fire**”
- Small
 - Use ABC Fire Extinguisher
- Large
 - Evacuate the Area
 - Evacuation Assembly Area
- Call x5000 Provide Information

Injuries



- Call 5000
- Keep Calm
- Provide Information
 - Don't Make Assumptions

Liquid Cryogen

- Liquid Nitrogen (LN₂)
- Liquid Helium

Working w/ Cryogenic Liquids (Liquid Nitrogen or Helium)



- Personal Protective Equipment
 - Safety Glasses w/ Side Shields – Full Face Shield for open transfers
 - Loose Fitting Thermal Gloves
 - Long Sleeved Shirt and Pants
 - Closed Toed Shoes
 - *Must be Worn When Pouring or Filling*

Working w/ Liquid Cryogenics

- Safe Handling
 - Use in Well Ventilated Areas
 - Use an Appropriate Dewar
 - Keep capped but not sealed When Not in Use
 - Use Gloves or Tongs to Handle Frozen Objects
 - Do Not Submerge Gloves in LN_2



Hazards of Liquid Cryogenics

- Extremely Low Temperature
 - Splashing Liquid Can Cause “Burns”
 - Frost Bite
 - Materials May Become Brittle and Break



Hazards of Liquid Cryogenics

- Liquid to Gas Expansion Ratio: 1 to ~700
 - Build Up of Pressure
 - Possible Explosion
 - Like a Rocket
 - Displacement of O₂ in Confined Spaces



Compressed Gases

High Pressure Gas Tanks

Securing Gas Cylinders

- All Cylinders Must be Stored and Secured in a Approved Gas Cylinder Rack
 - Double Chained
 - Top and Bottom



Regulators

- Make Sure That the Regulator has the Proper CGA Connection for the Valve Outlet
 - The Regulator CGA # Must Match the Gas Cylinder CGA #
- Do Not Over Tighten the Regulator When Attaching it to the Gas Cylinder Outlet

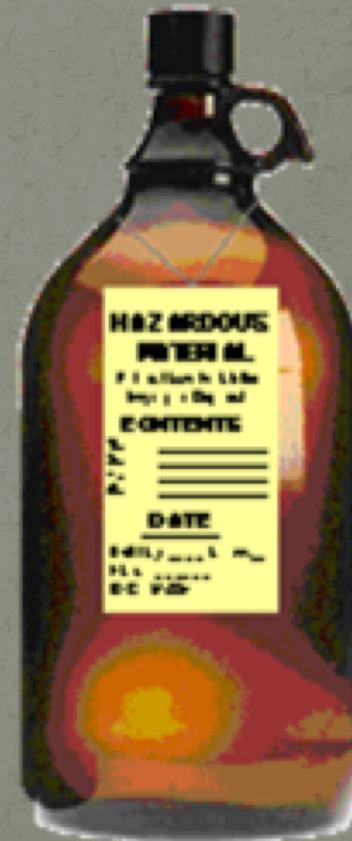


Hazardous Waste Disposal

All chemicals and samples should be taken with you when you leave the MMRC laboratory. Only authorized users are allowed to dispose of or store chemicals in MMRC laboratories.

Waste Determination

- Material vs. Waste
 - No Intended Use or Reuse
 - Don't Want it
 - Don't Need It
 - Call it Waste



Hazardous Waste Tag

- “Waste”
 - Must Have a Tag
- Each Container
 - Individual Waste Tag
 - Attached and Dated
 - *First Drop*
 - Hazard Class / Physical State
 - List Quantities or Percentages
 - **No** Formulas or Abbreviations

№ 96051

CALTECH
Pasadena, California

HAZARDOUS WASTE
IDENTIFICATION TAG

Complete and Attach to Container
When Waste Is First Generated

Date Waste Is First Generated _____

Department _____

PI _____

Contact Person _____

Lab Location _____

Phone Number _____

Substance Identification
Do Not Abbreviate / No Chemical Formulas

Component (List All Compounds)	Quantity

Physical State (check one)
☐ Gas ☐ Liquid ☐ Solid

Hazard Class (check one)
☐ Asbestos ☐ Flammable ☐ Corrosive
☐ Reactive ☐ Poison ☐ Oxidizer
☐ Other (specify) _____

I certify that this substance is accurately described and
contained for safe handling.

S. _____
Authorized Signature

Date _____

Waste Containers

- Closed at All Times
 - Except When Adding Waste
 - No Evaporation or Drain Disposal Allowed
- Use Spill Trays
 - Secondary Containment



Remember

- **Label all chemicals** brought into MMRC Labs with your name, date, and sample name.
- **Remove all chemicals** and samples when finished.
- Only work in lab areas where you were trained.
- Only work on instruments after you are trained.
- Do not touch chemicals that do not belong to you.
- If you need help contact a GLA
- For safety incident call x5000 from lab phone.
- **Report instrument problems** in logbook and to a GLA and Bruce Brunschwig (bsb@caltech.edu)