Combustion Science Laboratory
Safety Guidelines and Procedures

Directions: The goal of these guidelines is to promote behavior that will protect students, staff, faculty and visitors from hazards associated with activities in the Combustion Science Laboratory.

Index (not updated)

General Rules

1. SAFETY IS THE NUMBER ONE PRIORITY

Safety is each persons' responsibility. You must have 100% understanding of what you are doing. You are not required to do anything you feel is unsafe. If you feel uncomfortable about anything you see or are asked to do, talk to your advisor, the lab staff or the Faculty Coordinator.

Note that the lab staff can stop, at any time, experiments they feel are unsafe. If agreement between students and lab staff can not be reached on how to proceed, then the Faculty Coordinator will be consulted.

3. Preparing to work in the lab

When your Sign-up and Summary Sheet has been approved, you can schedule training, set up and testing time with the lab staff. This is to insure that the equipment you need will be available and the lab is not overcrowded.

When arriving/leaving the laboratory to work, check in and out on the board. This allows all to see what other activities are going on that day. Be aware of what else is happening in the lab.
No student may conduct experiments alone in the laboratory. At least one other person who understands the safety precautions of the experiment and the emergency notification procedures must be present. This person must have a current Sign-up and Summary Sheet or a Safety Observer Sign-up Sheet approved. Written permission must be given for any student to work alone in the combustion fire safety lab.

Appropriate clothing as described below, under Dress Code and Personal Hygiene, must be worn at all times.
Smoking is not allowed in the lab at any time.
No eating or drinking is allowed while any experiment is running in the lab.

Working In The Laboratory

1. Scheduling

Lab work at other than scheduled times is prohibited unless specifically authorized by the Faculty Coordinator.

2. Work area and apparatus

Do not use any apparatus you have not been trained on.
To allow easy movement within the lab, do not block any travel paths or exits.
Access to emergency equipment, fire extinguishers, showers, eyewash stations and exits should never be blocked by anything, not even temporarily.
Each student must be able to clearly identify two escape paths from the apparatus to a safe point outside the Fire Science Laboratory.
Each student must be prepared for emergency shutdown procedures before initiating any experiment.
Maintain a safe and neat work area at all times. Be organized and keep all work areas clear of clutter and obstructions. Good housekeeping should be practiced in the lab and storage areas.
Do not leave an experiment unattended at any time. Turn off cell phones when conducting an experiment.
No eating or drinking is allowed around any experiment area. Food and drink are only allowed in the conference room and the office.

Clean up after yourself at the end of the workday and experiment completion, including cleaning up your work area, putting tools away, workbenches and floor. Cleaning supplies are available in the lab.

3. Exhaust Hoods

Use exhaust hoods when experiments producing fumes are in progress.
Exhaust hoods must be used when ventilation is an effective method for limiting airborne contaminants or when the manufacturer instructions say to work in a well ventilated area. This includes when creating a lot of dust or spray painting.

4. Injuries and Accidents

Do not handle emergencies alone. Notify others nearby and the campus police at X5555 as soon as possible.
Do not apply medical aid procedures without the proper training.
If a person has been splashed with a chemical, wash the victim with plenty of water for at least 15 minutes, remove contaminated clothing and call the campus police at X5555 for medical attention.

If a person has been overcome by inhalation, get the victim to fresh air and call the campus police at X5555 for medical attention.
All injuries, accidents and "close calls" must be reported to the lab staff and an incident report C-006 should be filled out.

5. Malfunctioning Equipment

All non-operable or malfunctioning equipment and instrumentation must be immediately reported to the lab staff, and an equipment malfunction form C-007 should be filled out.

6. Visitors

Visitors must follow all safety rules and their adherence is the responsibility of the person being visited. YOU are responsible for your visitor !!
With prior approval, tours can be offered by those in the lab at their discretion. Do not allow people to randomly wander through the lab on their own.

Emergency Procedures

1. Proper planning

Planning experiments correctly is the most effective way to avoid accidents. Consider what equipment will be used and what could wrong.
Two escape routes must be worked out ahead of time.

2. Notification

Notify others in the lab about any problems. Notify campus police of any emergencies.

3. Experiment problems

If you are having problems with an experiment or something weird is happening, shut down the experiment according to the PRE-PLANNED emergency shutdown procedures as stated in your Experimental Plan.

Personnel safety is more important than saving the data or material ! You can always redo the experiment later.

Shut off any electrical power to the equipment. Use the main power shutoff if necessary.
Contact Campus Police at X5555.
Use fire blanket to extinguish any person on fire.

4. Small scale fire starting to get out of control

Any sample in a holder being burned will eventually burn itself out. Hence there is no need to panic. Calmly follow extinguishing procedures.

Non-typical testing

Extinguishing procedures and strategies must be pre-approved as part of your Experimental Plan. Insure you have all the necessary equipment required.

5. Large scale fire starting to get out of control

Natural Gas Line

Gas: Shut off flow at bottle, allowing line to bleed fully.

Non-typical testing

Extinguishing procedures and strategies must be pre-approved as part of your Experimental Plan.
Insure you have all the necessary equipment required and they are in operating and charged condition.
Steam expansion from water extinguishing may cause exhaust hood overflow.
Be prepared.

Turn off all gas flows before attempting extinguishment.

6. Fire Alarm in Building Goes Off

The Faculty Coordinator will be notified in advance of fire alarm drills in Higgins' Labs and will notify students who have scheduled testing time. Testing should be rescheduled to avoid testing during this time.
IF THERE IS A FIRE ALARM, IT IS REAL
AND YOU ARE TO RESPOND ACCORDINGLY !
Benchtop (includes Cone, Smoke Chamber and LIFT)

Extinguish burning items, shut off gas and put equipment into standby mode, unless imminent building hazard is apparent, then you should leave the building immediately.

Large Scale (includes LODS and Vaporizer)

Extinguish burning items promptly (by primary and/or backup methods) and insure that suppression is successful. If there is an imminent building hazard, then you should leave the building immediately.
How this situation will be handled by the team conducting tests must be pre-planned.
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Medical Emergencies

1. Minor cuts and scrapes

Minor cuts and scrapes can be dealt with locally. There is a basic first aid kit, containing band-aids, antiseptics and bandages, located next to the emergency eyewash station. Use latex gloves to protect your skin and hands from coming in contact with blood.

Contact EMS by calling X5555 for all other medical emergencies.

2. Bloodborne Pathogens

Bloodborne pathogens are viruses or bacteria present in human blood which can affect and cause disease. Contact with infected blood or body fluids carries the risk of possible infection.
Treat all blood and body fluid spills as if they were infectious. Wear appropriate personal protective equipment.

Dress Code and Personal Hygiene

1. Appropriate Footwear

Leather shoes must be worn when performing experiments. Sneakers are NOT TO BE WORN while conducting large scale experiments since they may melt when exposed to high heat flux. Sandals, high heels, clogs or open toed shoes may not be worn while conducting or observing experiments.

2. Clothing, Hair and Jewelry

No loose clothing or jewelry may be worn when using any power equipment or conducting experiments.
Tie back long hair while using any power equipment or conducting experiments.
Do not wear shorts or skirts while conducting experiments. Jumpsuits are available to wear during an experiment to cover exposed skin.

3. Contacts

Contact lenses may not be worn when working with chemicals or large scale fires.

4. Personal Hygiene

Do not store chemicals or batteries in the "Food Only" refrigerator.
All students and staff should wash their hands immediately after conducting experiments. This is to keep you from spreading material from your experiment around the lab, such as on computers and desks, ect., which may cause others to become ill.
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Personal Protective Equipment

1. Safety Glasses and Goggles

Safety glasses, which protect from impact hazards, are to worn when conducting or observing any experiment and during cutting, sanding and drilling.
Safety goggles, which protect from splashes, are to be worn when working with chemicals and solvents. Also when cutting a material which produces hazardous dust, i.e., cutting fiberglass composites.
Disinfect and clean safety glasses and goggles before putting away.

2. Hearing protection

Hearing protection is to be used when performing any activity that creates a noise hazard. This includes using power tools and anything that generates an above ambient noise.
Disposable ear plugs are available as well as ear muffs.

3. Gloves

Wear leather fire ("Firefighter") or aluminized fire gloves to protect against thermal materials.
Disposable latex gloves are available for use with non hazardous materials.

4. Lab coats, jumpsuits

Lab coats or jumpsuits are to be worn to protect skin from hazardous materials.

5. Respirators

Wear disposable respirators for nuisance dust when cutting or sanding.
Cartridge respirators are to be worn for vapor hazards. These MUST be obtained through the lab staff to insure proper fit and use.

Since a proper fit and choice of cartridge is essential to the protection that respirators provide, they are NOT interchangeable from one person to another. If you need either a respirator or cartridges, obtain through the lab staff and keep for yourself. Do not allow others to use.

Small Scale Fires

1. Preparing

Read any Standard Operating Procedures and your Experimental Plan for non-typical testing.

Thoroughly investigate the material to be tested. If you don't know what it is, don't burn it until you talk to your advisor or the Faculty Coordinator.
Schedule time with lab staff.
Conduct shakedown tests before running your material.
Prepare for emergency shut down procedures BEFORE initiating any experiment. Insure exhaust hoods and equipment are operating properly before initiating experiment.

2. Conducting

Do not block any travel paths or access to emergency equipment, showers, eyewash stations and emergency exits. Each student must be able to clearly identify two escape paths from the apparatus to a safe point outside the Fire Science Laboratory.
Maintain a safe and neat work area at all times. Be organized and keep work areas clear of clutter and obstructions.
Do not leave an experiment unattended for any reason.
No eating or drinking is allowed while conducting an experiment. Turn off cell phones and do not leave experiment to answer phone.

3. Extinguishing

Non-typical testing

Extinguishing procedures and strategies must be pre-approved as part of your Experimental Plan.

Insure you have all the necessary equipment required.

4. Concluding

Clean up after yourself at experiment completion. Clean apparatus, tools, workbenches and floor. Insure all bottles are closed and equipment is off.
Insure that burned materials are cool to the touch. Dispose of waste as described in the appropriate Standard Operating Procedures or your Experimental Plan.

Large Scale Fires

1. Preparing

Read any Standard Operating Procedures and your Experimental Plan for non-typical testing.
Thoroughly investigate the material to be tested. If you don't know what it is, don't burn it until you talk to your advisor or the Faculty Coordinator.
Schedule testing time with the lab staff. More than 2 people may be required at the time of testing due to the complexity of the experiment.
All visitors and observers must be approved by your advisor or the Faculty Coordinator if your advisor is not a Fire Protection Engineering professor.
Conduct shakedown tests before running your material.

Initial experiments can not be run unless the student's advisor, the lab staff or Faculty Coordinator is present. If the advisor is not a Fire Protection Engineering professor, then the Faculty Coordinator MUST be present.

Prepare for emergency shut down procedures and evacuation BEFORE initiating any experiment.
Insure exhaust hoods are operating properly before initiating experiment.
Campus police are to be notified of the start and end of all large scale tests. Remove all combustible materials located around experiment location.

All pool fires are required to have a secondary container.

Protect all in-place instrumentation.

2. Conducting

Each person involved must fully understand the experiment and each persons' role in conducting that experiment.

Coordinate people involved in running the experiment. Each activity associated with the experiment must be assigned to a specific person. Insure all involved understand what is happening.

Each person must feel fully comfortable with the experiment. Any person, including the students, advisor, lab staff or Faculty Coordinator, involved in running a large scale fire can decide to discontinue testing. The pre-determined procedure according to the Experimental Plan is to be followed.

No student is required to be involved in any testing that they feel is unsafe. The decision to discontinue an experiment until safety issues are resolved will in no way affect the students' grade, standing or otherwise.

The Fire Science laboratory has a "zero hood excess smoke" policy in effect. Only with prior approval of the Faculty Coordinator may this policy be relaxed.

Do not block any travel paths or exits. Do not block access to emergency equipment, showers, eyewash stations and emergency exits.

Each student must be able to clearly identify two escape paths from the apparatus to a safe point outside the Fire Science Laboratory.

Do not leave an experiment unattended at any time.

No eating or drinking is allowed while conducting an experiment. Turn off cell phones and do not leave the experiment to answer the phone.

3. Extinguishing

Gas: Shut off flow at bottle, allowing line to bleed fully. Natural Gas Line

Gas: Shut off flow at bottle, allowing line to bleed fully.

Non-typical testing

Extinguishing procedures and strategies must be pre-approved as part of your Experimental Plan. Insure you have all the necessary equipment required and they are in operating and charged condition.

Steam expansion from water extinguishing may cause exhaust hood overflow. Be prepared.

Turn off all gas flows before attempting extinguishment.

4. Concluding

Insure lab is free of smoke. Clean up after yourself at experiment completion. Clean apparatus, tools, workbenches and floor. Insure all bottles are closed and equipment is off. Insure that burned materials are cool to the touch. Dispose of waste as described in the appropriate Standard Operating Procedures or your Experimental Plan.

Natural Gas Line

1. Preparing to use

Read Natural Gas Line Standard Operating Procedures.

The natural gas line is a low pressure system that is capable of producing a 400 kW fire. This is variable each day (the source is shared among campus users).

2. Using

If an odor is noticed, immediately shut off system. Retighten gas delivery system connections. If odor continues, inform lab staff so the system can be leak checked.

Note that the gage is a total flow not rate. You must time manually. This is explained in the Natural Gas Line Operating Procedures.

Connections should be capped when not in use. Valves should be closed.

Policy on locking the lab
Policy on shutting off lab equipment
Policy on storage of personal items
Elevator Policy
Flammable liquids cabinet policy
Policy on document storage

Compressed Gas and Liquified Gas Bottles

All information related to compressed gas bottles refers to BOTH compressed gas and liquefied gas bottles. The difference between the two is described below for your information only.

Liquefied gas, such as LP, is different than compressed gas. A compressed gas is a substance that is in gaseous form at atmospheric pressure that is compressed to a higher pressure, but is still in gaseous form in the bottle. Liquefied gas is a substance that is a gas at atmospheric pressure that is compressed to liquid form in the bottle. Hence, the pressure in the bottle is the vapor pressure of the liquid, which is temperature dependent, and is the maximum pressure that is available from the bottle.

The amount of compressed gas in a bottle is determined by reading the pressure. The amount of liquefied gas is in a bottle is determined by weight. You weigh the bottle and subtract off the tare weight (empty bottle weight) to get the weight of the liquefied gas.

1. Storage

Storage of compressed gas and liquefied gas cylinders shall be in the FPE outdoor storage facility. Bottles must be closed, capped, tagged and chained.

2. Moving

All bottles are to be capped and chained before moved with an approved gas cart.

Strap bottles to a sturdy fixed object during use.

Close bottles during non-use. Regulator and lines must be depressurized.

3. Regulators

When using a compressed gas or liquefied gas bottle, first determine the appropriate regulator connection. These are summarized for typical gases used in the Fire Science Laboratory in

the table below. A more complete table for other materials can be found in the Safety Items folder in the lab office or a gas supplier catalog.

Sometimes, bottles come with different connection types. Insure you are using the connection type as marked on the bottle stem. Air	CGA 590	Methane	CGA 350	Propylene	CGA 510
Nitrogen	CGA 580	Propane	CGA 510	Acetylene	CGA 510

Also, check the gas compatibility table to insure the regulator construction is appropriate.
Do not use adapters or try to modify any gas regulator or connection.
Do not use an oiled gage for oxygen use. A proper gage will clearly state that it can be used for oxygen. Excess flow valves can be used to limit the maximum flow from a compressed gas bottle. A listing of these can be found in a gas supplier catalog.

4. Use

Once you have chosen a regulator with the appropriate connection, screw the connection (do not use tape or goop) into the female port on the gas bottle. There should be no resistance until it is almost completely on. Do not cross thread. Then tighten with an adjustable wrench.

Note that connections marked with a scribe are left handed and they tighten to the left.

Next connect the downline components. Insure you are using appropriate material for the expected pressure range.
When you are ready to open the bottle, just crack it a bit and listen and snoop for any leaks. If there are no leaks, then open bottle fully.
Then open regulator to a low pressure and check the rest of your downline components for leaks. If none are found, then open the regulator until you reach the desired pressure and check one last time for leaks.
When shutting down a compressed gas source, first note the pressure in the bottle and write on bottle tag. Then close bottle and allow gas to bleed out of the line fully before closing regulator.
When shutting down a liquefied gas source, first note the weight of the bottle and write on bottle tag. Then close bottle and allow gas to bleed out of the line fully before closing regulator.

5. Flammable gas

If using a flammable gas, you must have the ignition source activated at the burner BEFORE starting gas flow.

An exception to this rule is when working with approved pressure vessels, since explosion testing requires specifically timed ignition

The maximum number of compressed or liquefied flammable gas bottles is three, exclusive of the cylinders permanently attached to the Cone, LIFT, LODS and Smoke Chamber.
All cylinders to be removed from the laboratory when not in use as part of a current experimental program. When in the lab, all cylinders must be properly secured in the preferred location in the wet side of the lab. Cylinders can be secured elsewhere if approved as part of the students' Experimental Plan.

6. LP and heavier than air gas (i.e., propane)

Excess flow valves MUST be used for all LP bottles, but not the liquid withdrawal bottle attached to the Vaporizer.
Do not store heavier than air gas cylinders in the lab unless extreme precautions are taken and you have approval for limited quantities from the lab staff.

1. Chemicals, Solvents and Flammable Liquids [1,2,6,10c]

All chemicals, solvents and flammable liquids are to be in tightly closed containers at all times.

1. Ordering

Flammable or combustible liquids shall be ordered in 1 gallon or smaller metal containers wherever feasible, even if the price is higher than glass or plastic. Glass containers are the LEAST desirable from a safety standpoint. If glass must be used, it MUST have a shatter resistant coating or container.
Upon delivery, the student who ordered the material shall review the MSDS and the safety guidelines to determine safe storage. The students' advisor (or the Faculty Coordinator if the advisor is not a Fire Protection Engineering professor) shall be consulted. The student shall promptly transport the material to the outside storage locker under the supervision of the lab staff.
The lab staff shall be informed immediately of the delivery and whereabouts of the material. The MSDS is to be delivered to the lab staff for the MSDS Binder.

2. Storage

Use only approved storage bottles. Do not use glass bottles for flammable liquids. Label all bottles and store in the chemical cabinet, even if it contains only water.

Temporary storage needed for specific experiments can be kept in the lab, not exceeding 1 gallon per container if explicitly approved in writing as part of the student's Experimental Plan.
Maximum amount of flammable or combustible liquids allowed in the Fire Science Laboratory is 10 gallons.

Larger quantities are allowed when approved as part of an Experimental Plan.

Maximum allowable container capacity for flammable liquids (NFPA 45) Container Type and Max Number	Flammable Liquids			Combustible Liquids	
IA	IB	IC	II	IIIA	
Glass	1 pint	1 quart	1 quart	1.1 gal	5 gal
Metal or Approved Plastic	1.1 gal	5 gal	5 gal	5 gal	5 gal
Safety Cans	2.1 gal	5 gal	5 gal	5 gal	5 gal
Metal Drums	n/a	n/a	n/a	n/a	n/a

3. Handling

Handling, transport and storage of chemicals and solvents should be in accordance the provisions outlined in the MSDS. Use safety carriers and the proper protective clothing.

Filling small storage containers from a larger main source requires proper grounding of the container to prevent possible explosions. Consult with the lab staff before attempting to refill containers.

Wash promptly if skin contact is made with any chemical.

Do not deface or remove labels from storage bottles.

Do not pipette anything, including water, by mouth. Avoid inhalation of chemicals, do not "sniff" test chemicals.

4. Spills

Report all spills immediately to those nearby. Cleanup non-hazardous materials with the proper absorbent. This then becomes hazardous waste, which must be disposed of according to WPI's Hazardous Waste Policy.

Notify the campus police for hazardous material spills and evacuate area. They will inform the campus safety office.

2. Hazardous Waste Disposal

Promptly discard waste into a proper container to house the waste. If you are not sure what is a proper container, ask the lab staff. Label the container with the "Hazardous Waste" Stickers located on the clipboard hanging on the wall in the office and place in the hazardous waste tray inside the flammable liquids cabinet in the dry lab.

Call the Environmental and Occupational Safety officer (Dave Messier) at X5216 and date the container with the date of the call. The EOS office has 3 days to dispose of the waste.

3. Tools and Equipment

1. General rules

No tools are to be tossed from one person to another.

Use the right tool for the job. If you are unsure of what to use, ASK !

Examine before use. Do not use if damaged. Report damaged tools and equipment immediately to the lab staff.

Use the appropriate personal protective equipment.

Replace clean tools & equipment to the exact location you got them.

Secure work with clamps.

Do not remove equipment from the lab without prior permission from the staff.

Standing on a chair or table is prohibited. Use a ladder for reaching high locations.

2. Power tools

Proper training is required for all power tool use.

Operate in accordance with the manufacturers' instructions. These can be found in the lab office.

Disconnect tools when not in use, before servicing or when changing accessories such as blades, bits and cutters.

Keep good footing when using power tools.

Never yank a cord to disconnect tool from the receptacle and never carry a tool by its cord or hose.

3. Hand Tools

Do not use a tool for other than its intended use.

Do not store tools or equipment above shoulder height, even temporarily.

4. Sharps

Used razors, blades, cutters and broken glassware should be disposed of in a proper container. They are not to be placed in a trash can as is. If you are unsure of what is a proper container, ask the lab staff.

5. Soldering

Wear safety glasses when soldering. Use the proper solder and temperature for the materials you are soldering.

6. Compression fittings

Compression fittings, such as Swagelock© work by means of a flared ferrule and back that attaches to tubing, hence, they must be tightened properly. See safety references in the lab office. Instructions can be found in any new box of fittings.
Always check ferrule tightness when using a compression fitting.
Do not tape or goop compression fittings.
Do not mix and match parts from different manufacturers.

7. Fittings, pipe and tube[10a]

There are two main types of pipe fittings. These are "straight" and "tapered." Insure that you are using the proper type for your application. Note that pipe threads are tapered and use pipe tape and straight threads require an o-ring seal.
"Pipe" and "tube" are different sizes. Do not interface without the proper adapters. See safety references in the lab office.
Each size pipe fitting requires a certain "minimum required thread engagement." See safety references in the lab office.
Do not force a fitting or you may cross thread it.
Use a vise to secure your work.
Tube comes in different material and wall thickness. Insure that you use the proper wall thickness for the expected pressure range. Tube suppliers typically give pressure ratings in theoretical bursting pressures. This is NOT the allowable working pressure. See safety references in the lab office for calculations of working pressure from theoretical pressure. In general, allowable working pressures are approximately 25% of theoretical bursting pressure.

Laser Safety

Do not look directly into the laser beam.
When working with an exposed laser beam, notify others who may be in the area by putting up a warning sign. Block off paths of travel that would expose others to the beam.
When working with an exposed beam, be careful of reflections that can cause exposure to others in the lab

4. Electrical Safety

Use a "power wand" to determine electrically hot casing.

1. Grounding

Use proper grounding for all equipment. Do not use two pronged converters, floaters or extension cords.
Even low voltage can be dangerous. Use proper wiring techniques.

2. High voltage

Use extra caution when working with high voltage. Insure all equipment is properly rated.

3. Servicing equipment

Shut off and disconnect power before servicing any equipment or rewiring an experimental apparatus. Lock out any disconnects you turn off.

5. MSDS

1. Basic information

MSDS are developed by chemical manufacturers to meet certain government requirements. They allow you to become familiar with the chemical hazards, appropriate personal protective equipment and emergency procedures relating to the material.

Use your own good sense as to the information contained in the MSDS. Even if something is not listed there could still be a hazard. Treat all materials with proper caution and respect. Talk to your advisor and check other appropriate references.

2. Proprietary materials

Sometimes a company will provide a sample for testing but won't define what it is. In this case, you MUST consult with the Faculty Coordinator to determine the proper precautions to take when handling and testing this material.

3. How to use

Refer to the MSDS binder kept in the lab office. It has full instructions on how to read and use an MSDS.

In summary, a MSDS should tell you (a) what a chemical is (b) where the manufacturer can be located (c) why the chemical is hazardous (d) how you can be exposed to the hazard (e) what conditions could increase the hazard (f) how to handle the substance safely (g) what to do if exposed (h) what to do if there is a spill or emergency and (i) what protection to use while working with the chemical.

6. Miscellaneous

1. Follow Laboratory Etiquette.
2. Follow Instructions for Placing Purchase Orders.
3. ASK about anything you are unsure of.
4. No horseplay is allowed.
5. Be considerate of others working in the lab.

7. References

This information is available in the laboratory office.

1. Hazardous Chemicals Desk Reference
2. Safety in Academic Chemistry Laboratories
3. Prudent Practices in the Laboratory
4. Laboratory Safety Pocket Handbook

page 125, Electrical Safety

page 177, How to Read and Understand a MSDS
page 171, Selection Criteria for Protection Devices 4d. page 94, Hazards of Compressed Gas
page 137, Emergencies
page 67, Standard Methods of Prevention

5. Safety in Academic Chemistry Laboratory
6. Hazardous Chemicals Desk Reference
7. Matheson General Regulator Instruction Handbook
8. Matheson Guide to Safe Handling of Compressed Gas
9. Gas Data Book
10. The Pocket Reference

page 339, Plumbing and Pipe
page 109, Electrical
page 257, Glues, Solvents, Paints and Finishes
page 385, Tools

8. Where To Find Other Information

1. Dave Messier, Environmental and Occupational Safety Office, Olin 030 X 5216, www.wpi.edu/Admin/Safety
2. WPI Chemical Hygiene Plan, www.wpi.edu/Admin/Depts/Safety/Laboratory/hygiene.html
3. Federal Register 29 CFR Part 1910, www.counterpoint.com
4. Lab Safety Supply webpage, www.labsafety.com
5. OSHA webpage, www.osha.com
6. Vermont SIRI MSDS online webpage, www.hazard.com/msds
7. NIOSH webpage, www.cdc.gov/niosh/homepage.html
8. NFPA Chemical Hazard Labels Explained, www.orcbs.msu.edu/chemical/nfpa/nfpa.html