Laboratory Safety – Giannetta group

Chemical safety

Electrical safety

Liquid nitrogen, liquid helium

High pressure gas tanks

Magnetic fields (NMR magnets)

Machine shop

Division of Research Safety Website:

http://www.drs.illinois.edu/training/index.aspx

Chemical Safety

- 1. Complete the DRS online chemical safety training module.
- 2. Wear safety glasses and plastic gloves when dealing with hazardous chemicals. Hazardous chemical currently in the lab:
 - All organic solvents
 - Nitric, hydrochloric, sulfuric acids
 - Stayclean solder flux
 - Gold-plating solution
 - FeCl circuit board etching solution
- 3. Extended use of volatile solvents should be done in MRL fumehood.
- 4. Store organic waste solvents in appropriately marked plastic containers
- 5. Store acid waste in appropriately marked plastic containers.
- 6. Extended use of volatile chemicals should be done in a fume hood.
- 7. Chemical waste disposal:
 - a. Complete the DRS online chemical disposal training module.
 - b. Mark waste containers appropriately, complete waste disposal forms.
 - c. Request chemical request waste pickup from DRS.

Electrical Safety

- 1. Complete DRS online electrical safety training module: <u>http://www.drs.illinois.edu/training/index.aspx</u>
- 2. All equipment must be grounded. No "cheater plugs"!
- 3. Leak detector cab side panels must be in place before power is on.
- 4. Immediately remove instrument with frayed power cord, label it and let me know.
- 5. Recognize plugs for single phase 110 VAC (15 A, 20 A, 30 A) and 3-phase 208 VAC.

Liquid nitrogen and helium

- 1. Make sure helium storage tanks are vented to return line when not in use.
- 2. All helium dewars must have pressure release set no higher than 4 psi.
- 3. Do not transfer liquid helium into a space filled with liquid nitrogen.
- 4. If helium transfer tube becomes frosty, stop the transfer, remove the tube, warm it up, check vacuum jacket for leaks.

High pressure gas tanks

- 1. Never open a high pressure gas tank without a pressure regulator attached !
- 2. Tanks must be secured by (1) strapping to wall or table or (2) chained to rolling gas cart.
- 3. Attaching a regulator:
 - a. Remove steel safety cap.
 - b. Close tank valve. Again, close the tank valve!
 - c. Thread regulator onto tank and snug with wrench. Don't force it!
 - d. Open tank value, note tank pressure.
 - e. With tank valve and regulator valves open, adjust output pressure to desired value.
 - f. When finished, close tank valve and the output valve.
- 4. Detaching a regulator
 - a. Close tank valve
 - b. Use wrench to loosen thread connection and unscrew regulator.
 - c. Keep tank valve closed and screw steel safety cap back onto the tank.
 - d. Wheel empty tank back to helium facility or other return location.
- 5. Oxygen tanks have a left-handed thread and require a special regulator.

Superconducting Magnets (4 and 9 Tesla)

- 1. Maintain required liquid nitrogen and helium levels above 30%.
- 2. Order nitrogen and helium in advance.
- 3. Make sure helium space is open to helium return line.
- 4. Make sure someone else can maintain liquid levels if you are away.
- 5. Remove any magnetic objects (tools, steel, rolling carts) that may be pulled into the magnet.
- 6. Visitors with pacemakers at least 10 feet away from either magnet.

Machine shop

- 1. Safety glasses must be worn at all times in the shop.
- 2. Use of power machine tools (lathe, mill, drill presses, grinder) only after student has earned an MRL shop key.
- 3. Sheet metal

Drilling – for holes > ¼" diameter use <u>only</u> sheet metal-specific non-grabbing drills. <u>Do not use high speed drills!</u>

No use of lathe for sheet metal, under any circumstances.

Use the hand "nibbler" to cut holes in aluminum chassis.

- 4. Brass Use brass drills *only*. Do not use high speed drills! Keep piece clamped securely in a vise for all drill press work.
- 5. Lathe shut off main power switch (lower right side of lathe) after use. Remove chuck wrench from chuck <u>immediately</u> after securing piece.
- 6. Milling machine remove the wrench from the spindle immediately after use. Do not leave mill unattended with power feeds running.
- Torches Shut off gas and oxygen supply to torch after use. Oxygen <u>first</u>, gas second. Close containers of solder flux and return to cabinet.
- 8. All tools and materials returned to proper location at the end of the day.
- 9. Do not leave shop door open after 5 PM.