Acid / Base Bench Procedures and Operation Manual

Contents
Overview ................................................................................................................................. 3
Safety: General Precautions ................................................................................................. 3
  Electrical Safety .................................................................................................................... 3
  Chemical Safety .................................................................................................................. 4
Acid / Base Bench Specific Instructions and Restrictions ....................................................... 5
Personal Protective Equipment (PPE) ..................................................................................... 6
Eye Wash and Safety Shower ............................................................................................... 7
Buddy Policy .......................................................................................................................... 7
Bench Layout ....................................................................................................................... 8
Bench Components .............................................................................................................. 9
  Acid/Base Bench Safety Interlocks and Alarms ................................................................. 9
  Photohelic .......................................................................................................................... 10
  GFCI Receptacle ............................................................................................................... 10
  Vacuum Chuck .................................................................................................................. 11
  Gooseneck Sink ............................................................................................................... 11
  Process Timer .................................................................................................................... 12
Acid / Base Bench System Requirements .......................................................................... 13
Operation / Process ............................................................................................................. 13
  Creating a Waste Bottle .................................................................................................... 13
  Pouring Chemicals into a Waste Bottle ............................................................................ 14
  Working with Chemicals ................................................................................................... 14
  Unattended Chemicals ..................................................................................................... 14
  Hot Plate Usage ............................................................................................................... 14
Appendices.............................................................................................................................................. 15
Appendix A: Specialty chemicals Usage and Information Guide ....................................................... 15
Appendix B: MSC Cleanroom Eye Wash and Safety Shower Locations............................................ 17
Appendix C: General Wet Chemical Use Procedures........................................................................... 18
Appendix D: General Wet Bench Waste Procedures........................................................................... 20
Appendix E: Wet Bench Troubleshooting............................................................................................ 22
Appendix F: Hot Plate Usage with Wet Bench Timed GFCI Receptacles........................................ 22
Appendix F: Buddy Policy ..................................................................................................................... 24
Overview
The Acid / Base benches are for the use of acids and bases to clean and etch a wide variety of materials. The bench is configured as follows:

- 96 inch Manual Front Access Wet Bench constructed of chlorinated polyvinyl chloride (PVC-C) and equipped with casters, leg levelers and clear Face Shields.
- Each bench is divided into two equal individual work areas separated by a solid PVC-C divider.
- Each work area is equipped with:
  - 120 VAC GFCI duplex outlet with activation controls
  - Polypropylene utility sink with gooseneck needle valve and two toggle pressure switch control and two Teflon air operated valves to drain the sink.
  - DI Water and N2 Teflon gun station.
  - Wafer vacuum chuck activated by electric foot pedal switch and vacuum pressure gauge.
  - PROCON 959T Process timer
  - MPC 901 Power up controller with system services interlocks and alarms and a mushroom EMO switch.

Safety: General Precautions
This system is designed to safely handle hazardous liquid chemicals, specifically acid and bases. To perform as designed the system must be operated per the guidelines described in this manual.

Electrical Safety
This system is powered by electricity. Like any electrically powered device, if it is not properly used it can cause an electrical shock. Users are not to perform electrical work on the bench. If there are suspected electrical problems experienced during its use, please immediately stop bench use and notify the staff.
Chemical Safety

The following suggestions are offered as generally safe chemical handling procedures, and are not meant to supplement or replace the chemical manufacturer’s MSDS information or facility safety procedures.

Ensure you have read and understand the MSDS sheets for all chemicals prior to use.

• Avoid skin contact with the chemical. Wear chemical-resistant clothing, gloves and boots when there is a probability of liquid contact.
• Proper Personal Protective Equipment (PPE) MUST be worn at this bench at ALL times. (See details in following sections)
• Chemical-resistant goggles must be worn at all times.
• A face shield must be worn at all times due to the potential of chemical exposure.
• Keep work area well ventilated and do not inhale fumes.
• Open Containers are NEVER to be transported outside of the hood.
• All chemicals must be used inside the fume hood. No chemical work (including pouring chemicals) is allowed outside the hood.
• Secondary containment should be used when transporting chemical bottles to and from the hood or anywhere outside the hood.
• Pouring/Handling of chemicals and containers must be done with (2) hands at all times. If something does spill or fall, try to direct the material inside the hood.
Acid / Base Bench Specific Instructions and Restrictions

The following instructions and restrictions apply when using the acid / base benches:

- **Hydrofluoric Acid (or any HF containing chemical such as BOE 10:1 or BOE 6:1) are used in these benches.** Users need to follow the necessary precautions when working with or around HF.
- You must be signed into the portal to use a bench. Interlocks are installed on the power, water and nitrogen.
- Only one user is allowed per work area of the Acid/Base benches (two per bench)
- Solvents are NEVER to be used on the Acid / Base benches
- The Specialty Chemical Usage and Information Guide (Appendix A) details which chemicals are approved for each bench. If you don’t find the chemical you want to use in the Guide, please consult with the staff prior to use.
- Acids and Bases cannot be used at the same time on the same work area of the bench (each bench is petitioned into two work areas). There are exceptions to this rule when approved mixtures are to be used – please consult with the staff before use of any acid/base mixture)
- Surface of bench MUST be rinsed and dried with clean wipes after each use.
- All lab ware items must be rinsed, dried and placed back on the rack.
- **DO NOT LEAVE ITEMS ON THE BENCH!** The only item permitted to be left in the bench without prior staff approval is the provided funnel. **Put the funnel (Rinse First!) on the bench deck at the rear of the bench work space when not in use.**
- In general you should always be at the bench when in use. However, if you need to walk away from the bench for an extended period of time (>5 minutes) you need to follow the procedures and meet the requirements outlined in the policy in the General Wet Chemical Use Procedures, Appendix C of this manual
- Under no circumstances should Solvents be heated on hotplates! The GFCI Outlets on Acid/Base benches are on timers set for 15 minutes. In order to keep hotplates operational the **GFCI Timer On/Off** button on the bench head case must be activated.
- Do not place hot lab ware directly on bench tops, use provided hot mats.
- NEVER use a ultrasonic bath in the ACID / BASE benches
• Users are not permitted to mix their own solutions of sulfuric acid and hydrogen peroxide (often called piranha etch). Storage of the waste is dangerous.
• If you find the bench dirty when you log in please report it immediately to the staff. For off hours use if you feel the bench is unusable, please report it by submitting a trouble call on RIMS, place a DO NOT USE sign on the bench and move to another bench.

**NOTE:** By failing to report issues with benches you are assuming responsibility for the condition of the bench. Users will be charged staff time and bench time if staff needs to clean up the bench because the user failed to do so.

**Personal Protective Equipment (PPE)**

• Wet Bench Personal Protective Equipment (PPE) must be used at all times when in the Wet Chemistry Bay. Requirements for this bench are as follows:
  o Acid/Base Poly Benches (All chemicals) – Goggles, Chemical Gloves, Sleeved Apron, Face Shield
• Personal Protective Equipment must be **put on before you can enter** the wet chemistry bay. The PPE is found on racks just outside the bay.
• **Safety Tape installed on the floor** delineates two areas. The first is that area surrounding the PPE Rack and is the PPE staging area. In the PPE staging area PPE is put on prior to and removed after use. It is demarcated with Black/white tape on the floor. The Wet chemistry bay, where PPE MUST be worn at all times is demarcated with Black/yellow tape on the floor. **Please note that PPE cannot be worn outside of these two areas. It must be removed prior to entering the remainder of the cleanroom area.**
Eye Wash and Safety Shower
An Eye wash and Safety shower are available at the head of the Wet Bench Area. Additional Eye Washes and Safety showers are located through the exit door at the end of the Wet Chemistry Bay in the exterior hallway. See the location map in the Appendix of this document.

- If exposed, rinse for at least 15 minutes and yell for help from other users or staff while rinsing.

Buddy Policy
Buddy Policy Rules are in effect at all times when using the acid / base benches. For the Acid/Base benches you must have another trained user in the lab at all times in case you need assistance. If you are using the Acid/Base bench in off hours (6:00PM-8:00AM) both you and your buddy must sign in to the “Buddy” log in the cleanroom gowning area. Information on the laboratories “Buddy Policy” can be found in the Appendix G of this document as well as in the Laboratory Safety Manual.
Bench Layout

Figure 1.0 Acid / Base Bench Top

Figure 2.0 Acid / Base Bench Head case Controls (per work area)
**Bench Components**

**Acid/Base Bench Safety Interlocks and Alarms**

**Alarm Condition 1**
The Acid/Base benches have safety interlocks on the Exhaust, N2 and CDA. If any of these utilities are missing or out of the specified acceptable ranges then the bench will go into an alarm and the Alarm 1 indicator will be lit on the MPC-901 controller. If this situation occurs the power to the bench will be shut down preventing the bench from being used.

**Alarm Condition 2**
The Acid/Base benches have a safety interlock on the Head case door to shut down the bench if its opened during normal operation. If the door is opened the system will go into an alarm and the Alarm 2 indicator will be lit on the MPC-901 controller. If this situation occurs the power to the bench will be shut down preventing the bench from being used.

**Alarm Condition 3**
The Acid/Base benches have a Float switch on the bottom the bench to detect liquid on the floor of the bench. This switch will trip and turn the bench off if there is ~2in. of a liquid in the bottom of the bench and the Alarm 3 indication will be lit on the MPC-901 controller. This will again shut the bench down to prevent operation.

Adjacent to the MPC 901 controller there is an Alarm Silence button to mute the active alarm. If the alarm is active but silenced the bench will be non-operational. If you have silenced an active alarm on this bench please contact the staff immediately.
Photohelic

The photohelic differential pressure switch/gage measures the difference in pressure between the bench exhaust and the room. A low reading on this device indicates there is an improper condition for normal bench operation. The measured pressure differential is indicated by the black needle. The two red needle indicators represent the normal operating range of the bench exhaust.

NOTE: Users should NEVER adjust the set points of the photohelic as it can lead to personal injury and or death!

GFCI Receptacle

Each work area of each Acid/Base Bench is equipped with a 120V duplex GFCI receptacle mounted above the shelf at the rear of the working space as shown to the left. The receptacles are used primarily for powering hotplates for heated bath applications. Each receptacle has a safety turn off timer that must be activated every 15 minutes to keep the receptacles i.e. hotplates) powered. To activate and operate this receptacle use the following procedure:

1. Press the green (top) portion of the GFCI Timer n START/STOP push bottom located on the bench head case to turn on the power to the receptacle for a preset amount of time (15 minutes).

NOTE: Every time you press the green (top) portion of START/STOP button you reset the timer
to its maximum time (currently set to 15 minutes) and anytime you press the red (bottom) portion of the START/STOP button you will turn off the GFCI outlet.

2. About 5 minutes before the process timer time out, the “GFCI Timer warning” amber light located on the bench head case to the right of the photohelic exhaust flow detector will turn on.

3. When the process timer times out a “GFCI timer off “ red light located on the bench head case to the right of the amber warning light described above will turn on and the power to the receptacle will be cut off.

Vacuum Chuck
Each Acid/Base Bench work area is equipped with a vacuum chuck for securing the user work piece while drying with a nitrogen gun after rinsing. To operate, place your substrate on the chuck located at the front of the bench deck immediately in front of the sink and to the left of the Nitrogen and DI water guns. Activate the vacuum to secure your substrate by stepping down on and holding down the foot pedal located at the bottom of the bench on the floor. This is a momentary pedal so once it is released, the vacuum is turned off. There is a vacuum gauge mounted in the head case that indicates the level of vacuum you have on your sample. Ensure you have an adequate vacuum before drying your sample with nitrogen.

Gooseneck Sink (This is also referred to as the deepsink)
NOTE: Acid and base waste should NEVER be disposed of down the drain of the gooseneck sink. The sink is to be used for pouring waste into waste containers
and for rinsing containers and other lab ware after use. This will contain any spills and could prevent serious injury.

To operate the sink use the following procedures:

1. To turn on the goose neck sink turn the manual valve located at the base of the gooseneck that supplies the sink with water.

2. The gooseneck sink can be drained thru the bench plenum or directly to a dedicated drain by selection of drain valve and valve position. The valve toggle switches are located on the bench head case just to the left of the photohelic exhaust pressure indicator gauge.

**Process Timer**

A process (or count down) stand-alone timer is mounted on the head case over each work area of the Acid/Base Wet Bench. The timer is set in the MANUAL mode. In this operating mode, when holding down the timers STOP / RESET buttons, the UP and DOWN keys are used to simply set a time that is to be counted down to match user processing needs.

The timer equipped with four control keys and a read out in minutes and seconds.

1. The START key’s function is to start the timer either from the RESET or HOLD mode.
2. The STOP/RESET key is a multifunction key. It is used in the following ways:
   A. When the timer has counter down to 00:00 this key is used to reset it for the next run. It places the unit in the RESET mode and reloads the display with the previous time.
   B. If the timer is actively counting down, depressing the STOP/REST key once will place it in the HOLD mode.
C. If the timer is in the HOLD mode, depressing the key once will place it in the RESET mode and reloads the display with the previous time. Depressing the key and holding the key down will allow the UP and DOWN keys to be used to set a new value.

3. The UP key is a multifunction key. It is used in the following ways:
   A. In the RESET mode the key will adjust the time to be counted down as currently viewed in the display. Depressing the key once and releasing will allow the accurate setting of the least significant digit. Holding the key down will activate the automatic, rapid incrementing of the display.
   B. In the HOLD mode, when the STOP/RESET key is depressed and held down, this key advances the preset value.

4. The DOWN key is a multifunction key. It is used in the following ways:
   A. In the RESET mode the key will adjust the time to be counted down as currently viewed in the display. Depressing the key once and releasing will allow the accurate setting of the least significant digit. Holding the key down will activate the automatic, rapid incrementing of the display.
   B. In the HOLD mode, when the STOP/RESET key is depressed and held down, this key decreases the preset value.

**Acid / Base Bench System Requirements**

**DI Water:** 10 GPM at 35 psi

**Nitrogen:** 10 SCFM at 40-60 psig

**CDA:** 10 SCFH at 90-100 psig

**AC Power:** 208V 3Ф 35 Amp, 5 Wire

**Ventilation:** 125 CFM at 0.75-1.25in. WC

**Operation / Process**

**Creating a Waste Bottle**

Appendix D of this manual contains procedures that should be followed when creating a new waste bottle.
Pouring Chemicals into a Waste Bottle
Appendix D of this manual contains procedures that should be followed when disposing of chemical waste in waste bottles.

Working with Chemicals
Appendix C of this manual contains general procedures are to be followed when using chemicals on this bench.

Unattended Chemicals
Appendix C of this manual contains general procedures which are to be followed when chemicals on this bench are to be unattended.

Hot Plate Usage
Hot plate usage is allowed in the Acid Base benches. Appendix F contains instructions for using hotplates in the wet chemical benches.
## Appendices

### Appendix A: Specialty Chemicals Usage and Information Guide

<table>
<thead>
<tr>
<th>Trade Name</th>
<th>Actual Chemical Composition</th>
<th>Bench</th>
</tr>
</thead>
<tbody>
<tr>
<td>NMD-3</td>
<td>Tetramethyl Ammonium Hydroxide</td>
<td>TMAH Etch/Litho</td>
</tr>
<tr>
<td>T 111 Rinse</td>
<td>Mesitylene (Trimethylbenzene)</td>
<td>Solvent</td>
</tr>
<tr>
<td>1165</td>
<td>1-Methyl 2-Pyrrolidinone</td>
<td>Solvent</td>
</tr>
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<td>ACT 935</td>
<td>Monoethanolamine, Hydroxylamine, Water, Pyrocatechol</td>
<td>Solvent</td>
</tr>
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<td>ACT 970</td>
<td>2-Methylaminoethanol, Water, Benzotriazone, Gallic Acid</td>
<td>Acid Base</td>
</tr>
<tr>
<td>ACT AS-65</td>
<td>Monoethanolamine, Water, Soft Acid, Gallic Acid, Benzotriazole</td>
<td>Acid Base</td>
</tr>
<tr>
<td>Act NE-14</td>
<td>Dimethylacetimide, Ammonium Acetate, Acetic Acid, Ammonium Fluoride</td>
<td>Acid Base</td>
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<td>Adhesion Promoter AP3000</td>
<td>1- Methoxy, 2- Propanol, Water</td>
<td>Solvent</td>
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<tr>
<td>Aluminum Etch 16:1:1:2</td>
<td>Phosphoric Acid, Water, Acetic Acid, Nitric Acid</td>
<td>Acid Base</td>
</tr>
<tr>
<td>Aluminum Etch D</td>
<td>Phosphoric Acid, Sodium M Nitrobenzene Sulfonate, Acetic Acid, Water</td>
<td>Acid Base</td>
</tr>
<tr>
<td>AZ 400K</td>
<td>Water, Potassium Borate</td>
<td>Acid Base/Litho</td>
</tr>
<tr>
<td>AZ 422 MIF</td>
<td>Tetramethyl Ammonium Hydroxide</td>
<td>TMAH Etch/Acid Base/Litho</td>
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<td>BOE (10:1, 6:1)</td>
<td>Ammonium Fluoride, Hydrogen Fluoride, Water</td>
<td>Acid Base</td>
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<td>Branson EC</td>
<td>Morpholine, Monoethanolamine</td>
<td>Solvent</td>
</tr>
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<td>Branson MC</td>
<td>Monoethanolamine, D’Limonene, Tetrasodium salt of Ethylenediamine-Tetraacetic Acid</td>
<td>Acid Base</td>
</tr>
<tr>
<td>CD 26</td>
<td>Tetramethyl Ammonium Hydroxide</td>
<td>TMAH Etch/Acid Base/Litho</td>
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<td>Chrome Etch 1020</td>
<td>Ceric Ammonium Nitrate, Nitric Acid</td>
<td>Acid Base</td>
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<td>Concentrate Developer</td>
<td>Water, Alkaline-phosphate salt, sodium metasilicate pentahydrate</td>
<td>Acid Base/Litho</td>
</tr>
<tr>
<td>Trade Name</td>
<td>Actual Chemical Comp.</td>
<td>Bench</td>
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<td>-----------------------------------------------------------</td>
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<td>Copper Etchant 100/200</td>
<td>Hydrochloric Acid, Ferric Chloride, Water</td>
<td>Acid Base</td>
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<td>Copper Etch 49-1</td>
<td>Citric Acid, Hydrogen Peroxide, Water</td>
<td>Acid Base</td>
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<tr>
<td>Copper Electroplate</td>
<td>Copper Sulfate Pentahydrate, Sulfuric Acid</td>
<td>Electroplate</td>
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<td>Developer DS2100</td>
<td>Dipropylene glycol dimethyl ether, Naphtha (petroleum)</td>
<td>Solvent</td>
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<td>EKC 830</td>
<td>N-Methyl Pyrrolidinone, 2-2 Aminoethoxy Ethanol</td>
<td>Solvent</td>
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<td>Gold Etch TFA</td>
<td>Iodine Complex, Potassium Iodide, Water</td>
<td>Solvent</td>
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<td>MF 351</td>
<td>Sodium Hydroxide, Sodium tetraborate decahydrate, Inorganic borates</td>
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<td>MF 453</td>
<td>Potassium Hydroxide, Water, Inorganic Borates</td>
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<td>Acid Base/Litho</td>
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<td>Microposit Thinner Type P</td>
<td>Propylene Glycol Monomethyl Ether Acetate</td>
<td>Solvent</td>
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<td>NanoRemover PG</td>
<td>N-Methyl Pyrrolidinone, Surfactant</td>
<td>Solvent</td>
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<td>Nanostrip</td>
<td>Sulfuric Acid, Peroxymonosulfuric Acid, Hydrogen peroxide</td>
<td>Acid Base</td>
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<td>Nickel Etch I</td>
<td>Ferric Chloride, Water, Hydrochloric Acid</td>
<td>Acid Base</td>
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<td>Nickel Etch TFB</td>
<td>Nitric Acid, Potassium Perfluoroalkyl Sulfonate, Water</td>
<td>Acid Base</td>
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<td>Nickel Etch TFG</td>
<td>Thiourea, Sodium N-Nitro Benzene Sulfonate, Sulfuric Acid</td>
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<td>Nikelex</td>
<td>Nickel Chloride, Sodium Hypophosphite, Sodium Succinate, Water</td>
<td>Solvent</td>
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<td>PAD Etch</td>
<td>Acetic Acid, Ammonium Fluoride, Surfactant</td>
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<td>SU-8 Developer</td>
<td>1-Methoxy 2-Propyl acetate</td>
<td>Solvent/Litho</td>
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<td>Techni Gold 25</td>
<td>Sodium Gold Sulfite</td>
<td>Electroplate</td>
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<td>Titanium Etch TFTN</td>
<td>Hydrochloric Acid</td>
<td>Acid Base</td>
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Appendix B: MSC Cleanroom Eye Wash and Safety Shower Locations

Eye Wash

Eye Wash and Shower

Wet Chemical Bay
Appendix C: General Wet Chemical Use Procedures

Introduction

This document contains general procedures and guidelines for working with chemicals in lab wet chemical benches. Always be sure to review the required methods for using specific systems and wet benches prior to use to determine other specific instructions or restrictions.

Working with Chemicals:

The following procedures are to be followed when using chemicals in the wet chemical benches.

1. Ensure you are wearing all appropriate PPE.
2. Select and Rinse appropriate lab ware for your process
3. Create a “Chemical Use Label” for each chemical solution you are using
4. Retrieve chemicals from their designated chemical cabinets and transport them to the bench. Use proper secondary containment for transporting the chemicals to the bench.
5. Slowly pour the chemical(s) into your lab ware. When creating mixtures or dilutions be sure to determine the safest way to mix, such as which component should be poured first and added to.
   Example: a general rule of thumb is to always add Acid to Water, not the reverse!
6. When finished pouring the chemical(s), replace the chemical bottles into their appropriate chemical cabinet. When transporting the chemicals back to the cabinets you must use the appropriate secondary container.
7. In general you should always be at the bench when in use. However, if you need to walk away from the bench for an extended period of time (>5 minutes) you need to follow the procedures outlined in “Unattended Chemicals” below.
8. When you are finished processing with the chemicals you need to dispose of them into an appropriate waste bottle. Follow the procedures outlined in “General Waste Disposal Methods “ document.
9. Prior to leaving the bench you should clean the bench by rinsing it with DI water and drying it off completely with clean wipes.
Unattended Chemicals

If you need to leave your chemicals unattended during your process you must meet the following requirements:

1. Containers must be covered but still allow vapors to escape.
   NOTE: There are teflon covers, as well as pyrex lids that can be used as covers. Covers should not be air-tight, they are intended to provide protection against splashing or fuming of the chemical.

2. The Extra Information Section of the Chemical use label MUST be filled out completely.

3. Prior to logging out of the bench in RIMS, edit your reservation to indicate that the chemical will stay in the hood, please include: time present, removal time, chemical and concentration that is contained.
   NOTE: Any chemical left on the benches past the date / time in the Extra Information Section will be removed and samples thrown away!
Appendix D: General Wet Bench Waste Procedures

Introduction

The following procedures are to be used when chemical waste is to be handled manually. That is, when the user or the staff is to dispose of chemicals without the use of automated systems contained in some of the lab equipment. (carboys with built in pumping systems or pumping carts for example)

Procedures for Filling a Chemical Waste Bottle

1) Select an appropriate waste bottle for the chemical you are disposing of from the chemical storage cabinets.
   a. If no bottles are available for your chemical, or the bottle is full, you will need to create a new waste bottle. Follow the procedures below for creating a new waste bottle.
2) Place the bottle into the gooseneck sink (the deepsink) in the bench and then remove the vented cap.
3) Place a funnel into the bottle.
4) SLOWLY pour the chemical waste into the bottle.
   a. ENSURE the chemical is at room temperature before pouring it into a waste bottle
   b. Never over fill a waste bottle. Please refer to the waste bottle pictogram for the maximum fill line.
   c. Always rinse the funnel thoroughly after use.
5) Put the vented cap back on the bottle.
   a. Ensure you do not over tighten the caps, as the bottle can still become pressurized and potentially explode.
6) Get a clean wipe from the storage rack.
   Pick up bottle and wipe bottom of bottle. Make sure it is dry; do not place the bottle on the bench top.
7) Transport and place the bottle back in the appropriate chemical waste cabinet. Be sure to use appropriate secondary containment when transporting the waste containing bottle.

Creating a Waste Bottle
The following are the procedures that should be followed when creating a new waste bottle.

1. Retrieve an appropriate empty chemical bottle for the chemical you are disposing of and vented cap (these are located on the Labware Storage just outside the Wet Processing Bay).
2. Rinse 3 times and empty rinse water into sink.
3. Replace cap with new vented cap from storage shelf.
4. Completely fill out and apply waste label.
5. Follow steps listed above to add waste to the bottle.
6. Wastes are separated into different benches for isolation/safety.
7. **HF is only to be used and disposed of in the plastic labware and chemical waste bottles. This is due to the fact that HF etches glass (SiO₂) very well!**
8. **It is essential that solvents and acids be kept separate.**
9. **The empty bottles for chlorinated solvents (e.g. Methylene Chloride and Chlorobenzene) should NEVER be used as waste bottles.**
Appendix E: Wet Bench Troubleshooting

1) If power, water, and nitrogen are not working, ensure you have logged in to the bench on RIMS and that the BLUE light is on.
2) If you are logged in and utilities do not work, submit a trouble call using RIMS and find a staff member.

Appendix F: Hot Plate Usage with Wet Bench Timed GFCI Receptacles

Hot Plate Usage

If you are using a hotplate during your process you should do the following:

1) Locate an appropriate hotplate. The hotplates will either be on the storage shelf or stored in the back of the benchtop area of the bench in which they can be used.
   a. If you are using a hotplate that is already in the bench be extremely cautious as it may be hot from previous use. Always check hotplate temperature prior to attempting to move or use.
2) Once it is determined that the plate is not hot and safe to move, move it to the front of the bench and plug the hotplate into one of the GFCI receptacles on the bench. (The GFCI receptacles are housed in white boxes with covers.)
3) Pour your chemicals into the labware following the procedures outlined in the Appendix “General Wet Chemical Use Procedures”.
4) Place the labware on the hotplate BEFORE you turn on the hotplate
5) Turn on the hotplate by pressing the green portion of the START/STOP button on the bench headcase. This activates the GFCI outlet for 15 minutes.
   a. Reset the 15 minute timer as needed by pressing the green portion of the START/STOP button.
6) Set the hotplate temperature to the desired processing temperature and monitor the solution temperature with an appropriate measurement device. (typically a standard thermometer or thermocouple)
NOTE: You should NEVER leave a chemical on a hotplate unattended! To ensure that this cannot happen, the GFCI outlets have a timer that will turn off power if unattended for more than 15 minutes.

NOTE: If you are using a thermocouple to provide feedback to the hotplate for controlling the chemical solution temperature ensure that the thermocouple probe is submerged into the solution. If the thermocouple comes out of the solution, the hotplate temperature will ramp to its maximum temperature. This can result in a very dangerous situation resulting in personal injury or death.

7) Place a lid on the labware to prevent the chemical from evaporating.
   a. Be aware that during the process the chemical will condense on the lid due to a mismatch in temperature between the solution and lid. If you need to remove the lid during your process for any reason, ensure you don’t drip the chemical onto the hotplate.

8) Once the process is complete set the hotplate temperature back to 20°C.

9) Allow your labware and chemical to reach a temperature of 40°C or below and remove it from the hotplate.

10) Pour your chemical into the appropriate waste bottle following the procedures outlined in “General Chemical Waste Procedures”.

11) Press the red portion of the START/STOP button in the headcase to turn off the GFCI outlet.

12) Unplug the hotplate, allow sufficient time to cool and wipe it down with clean wipes.

13) Return the hotplate to the storage rack or push it to the back of the bench.

   NOTE: If you leave the hotplate on the bench top for any reason, place a “HOT SURFACE” sign on the hotplate before leaving the bench.
Appendix G: Buddy Policy

In order to meet the requirements of the Buddy Policy, certified cleanroom users who are working outside the normal business hours of 8AM-6PM must identify another certified user of the cleanroom who will be responsible for checking in on the user working in the cleanroom. That second certified user is required to check on their “Buddy” every 15 minutes to ensure they are safe or to call for assistance if there is an emergency.

Users and their Buddies must sign into the logbook after normal working hours (between 6 P.M. and 8 A.M weekdays, and all day on weekends and holidays).

An additional requirement of our buddy program is that when a certified user is working in the wet chemical bay, their “buddy” must also be in the clean room, aware of their situation, and close enough to be of assistance in case of an accident. The individual acting as your buddy does not need to be at your side constantly, just available and aware.

Use of standard lithography chemicals (i.e. resists, developers, and solvent based resist strippers) in the Lithography area without a buddy present inside the clean room is acceptable.