# Standard Operating Procedure
for work with

<table>
<thead>
<tr>
<th>Chemical name/class:</th>
<th>Acids and Bases</th>
<th>CAS #:</th>
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</thead>
<tbody>
<tr>
<td>PI:</td>
<td>Mark Walters</td>
<td></td>
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<tr>
<td>Building:</td>
<td>Fitzpatrick CIEMAS</td>
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<tr>
<td>Date:</td>
<td>December 19, 2017</td>
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<tr>
<td>Room #:</td>
<td>Cleanroom and Sample Prep</td>
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<tr>
<td>Designated Work:</td>
<td>Chemical processing with Acids and Bases</td>
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1. **Circumstances of Use:**

   Acids and bases are typically used in SMIF for wet chemical etching or cleaning. Many photoresist developers are base solutions.

2. **Potential Hazards:**

   Consult the Safety Data Sheet (SDS) for the particular acid you are using.
   Be aware of these specific hazards:
   - Acids and bases can react explosively with organics. Never mix acids with solvents or with Acetic Acid.
   - Acids and bases are corrosive and cause severe skin burns and serious eye damage. They can also burn mucosal membranes, and the respiratory tract.
   - Sulfuric Acid is considered particularly hazardous because it is a carcinogen.

3. **Engineering Controls:**

   - Always work with acids and bases in a designated acid fume hood in the Clean Room or Sample Preparation Lab.
   - An eyewash and safety shower are available in the immediate area.

4. **Work Practice Controls:**

   - Use only in a designated acid chemical hood. (Note: Acetic Acid is different – it should only be used in a solvent hood – see separate SOP for Acetic Acid).
   - Keep containers closed as much as possible. Only open a container when it is inside a designated acid chemical hood and you are wearing the proper PPE (section 5).
   - When diluting, add acid to water slowly, in small amounts. (Never add water to acid!)
   - Contaminated items are to be disposed of properly as hazardous waste, following SMIF’s hazardous waste policy (see section 7).

5. **Personal protective equipment (PPE):**

   - Wear chemical gloves
     - Always first check chemical gloves for holes or damage
       - If damaged, dispose of the gloves and get a new pair
     - Never purposefully touch a chemical even while wearing the chemical gloves. If a glove does come in contact with a chemical
       - Remove the exposed glove and dispose of it.
       - Get a new pair of gloves
     - Wear gloves to open chemical cabinets.
     - Wash and remove gloves before touching anything else (door knobs, notebooks, phone, microscopes, etc.)
   - Wear chemical splash goggles (safety glasses are not sufficient).
   - Wear a face shield.
   - Wear a chemical-protective gown with sleeves.

6. **Transportation and Storage:**

   - Acid and base solutions must be in sealed shatter-resistant containers and stored in an exhausted chemical cabinet designated for acids. (Acetic Acid should be stored in an exhausted solvent cabinet – See acetic acid SOP).
   - Wear the designated PPE (section 5) when transporting an acid bottle or container to a chemical hood.
7. **Waste Disposal:**

**Liquid Waste**
Pour all acid waste into the acid hood sink drain for proper disposal. These drains lead into a house acid waste neutralization system.
- Press the Drain button to open the drain
  - The drain will not open if chemicals are above 50°C
  - The drain has a water dilution in it to reduce the chemical waste concentration
- Rinse the sink with water from the gooseneck or water sprayer after draining chemicals to wash out any residues
- Press the Drain button to close the drain. *Do not leave the drain open if it is not needed.*

**Solid Waste**
Solid materials that are contaminated with chemical acid waste (such as wipes, dispensers, etc.) should be packed into a zip lock bag and properly labeled with the type of waste, your name, and date. The waste bag should be completely sealed.
- Bagged and labeled solid acid waste can be left in the back of the hood for pickup by SMIF staff
- Empty acid bottles should be rinsed in the sink and left in the hood for pickup by SMIF staff

8. **Exposures/Unintended contact:**

Contact Employee Occupational Health and Wellness (EOHW) at 919-684-3136 for medical advice on occupational chemical exposures. For an actual chemical exposure
- Flush exposed eyes or skin with water for at least 15 minutes.
- If there is respiratory irritation associated with exposure, remove all persons from the contaminated area and contact the OESO spill team.
- Exposed persons should seek immediate medical attention at the nearest emergency department/
  - Call 911 from a campus phone or 919-684-2444 from any phone to request assistance if needed. Contact Employee Occupational Health and Wellness at 919-684-8115 for exposure-related advice.

The work-related injury or illness report found at: [http://www.hr.duke.edu/benefits/medical/workcomp/report.php](http://www.hr.duke.edu/benefits/medical/workcomp/report.php) should be completed within 24 hours. Follow-up medical attention should be sought through Duke Employee Occupational Health and Wellness (919-684-3136).

9. **Spill Procedure:**

In the event of a spill, follow SMIF spill procedures and immediately contact SMIF staff. Only SMIF staff and/or appropriate OESO personnel should clean up spills

**Spills Contained Inside a Chemical Hood**
- Avoid breathing vapors from the spill and leave the immediate area of the chemical hood
- Alert people in the immediate area of the spill
- Notify SMIF immediately by calling emergency numbers posted near the phone
- Wait for instructions from SMIF or for SMIF personnel to arrive to complete the clean-up of the affected area.

**Spills Outside of a Chemical Hood**
- Attend to injured or contaminated persons and remove them from exposure
- Press the closest manual alarm button (blue box) and evacuate the lab
- Make yourself available to the SMIF staff and/or emergency responders and be prepared to tell the following: What chemical(s) are involved, how much was spilled, where the spill is located, nature of any injuries

10. **Training of personnel:**

- All personnel are required to complete the SMIF General Lab Safety session and the SMIF Chemical Safety and Wet Hood training session.
- All personnel shall read and fully adhere to the *Wet Hood Operating Procedure* and the *SMIF Lab Safety and Procedures Manual*