

Standard Operating Procedure
for work with

Chemical name/class: Acids and Bases CAS #: _____
PI: Mark Walters Date: March 1, 2021
Building: Fitzpatrick CIEMAS Room #: Cleanroom and Sample Prep
Designated Work: Chemical processing with Acids and Bases

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).
- Never mix acids and bases together as they are incompatible with each other.
- 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> 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*