Standard Operating Procedure

Using Hydrochloric Acid, 6 M HCl (6N)

Department: Chemistry & Chemical Biology
Date SOP was written: July 1, 2014
Date SOP was approved by PI/lab supervisor: Andy LiWang
Reviewed by: Andy LiWang
Principal Investigator: Andy LiWang
Internal Lab Safety Coordinator/Lab Manager:
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Location(s) covered by this SOP: Castle 1201
Suite 920

Type of SOP: X Process X Hazardous Chemical □ Hazardous Class

Purpose
This SOP covers the use of strong acid – Hydrochloric Acid.

Table of Hazard Properties of Materials Used in This SOP:

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>CAS #</th>
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<tr>
<td>Hydrochloric Acid</td>
<td>7647-01-0</td>
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Summary of Significant Health and Physical Hazards
- May be corrosive to metals.
- Harmful if swallowed.
- Fatal if inhaled.
- Causes severe skin burns and eye damage.

**Personal Protective Equipment (PPE)**

**Respiratory Protection**

Respirators should be used only under any of the following circumstances:

- As a last line of defense (i.e., after engineering and administrative controls have been exhausted).
- When Permissible Exposure Limit (PEL) has exceeded or when there is a possibility that PEL will be exceeded.
- Regulations require the use of a respirator.
- An employer requires the use of a respirator.
- There is potential for harmful exposure due to an atmospheric contaminant (in the absence of PEL).
- As PPE in the event of a chemical spill clean-up process

For non-emergency situations, if an air purifying respirator is used it must be a full-facepiece style mask with high-efficiency filters (HEPA) except for the part of the process when nitric acid is involved where an air purifying respirator cannot be used. There is no commercially available air purifying respirator cartridge rated for protection against nitric acid and the off-gassing products that are oxides of nitrogen, NOx.

A full-facepiece style respirator is required to protect the eyes from contact with the aerosolized corrosive materials.

Lab personnel intending to use/wear a respirator mask must be trained and fit-tested by EH&S. This is a regulatory requirement.

**Hand Protection**

Chemical protective gloves must be worn when handling this material. Nitrile, butyl rubber, or viton/butyl rubber gloves are the materials of choice. Gloves are worn for splash protection only and not for extended contact with these materials. No latex gloves are allowed.

**NOTE:** Consult with your preferred glove manufacturer to ensure that the gloves you plan on using are compatible with the chemicals listed above.

Refer to glove selection chart from the links below:

- [http://www.allsafetyproducts.biz/page/74172](http://www.allsafetyproducts.biz/page/74172)
- [http://www.showabestglove.com/site/default.aspx](http://www.showabestglove.com/site/default.aspx)
- [http://www.mapaglove.com/](http://www.mapaglove.com/)
Eye Protection

Wear chemical face shield over chemical splash goggles or safety glasses with side shields.

Skin and Body Protection

- Flame resistant lab coats must be worn and be appropriately sized for the individual and buttoned to their full length as isopropyl alcohol and ethanol are flammable solvents. Laboratory coat sleeves must be of sufficient length to prevent skin exposure while wearing gloves. Personnel should also wear full length pants, or equivalent, and close-toed shoes. Full length pants and close-toed shoes must be worn at all times by all individuals that are occupying the laboratory area. The area of skin between the shoe and ankle should not be exposed.

Hygiene Measures

- Avoid any contact with these materials. Wash hands after working with the substance.
- Wash thoroughly and immediately after handling.
- Remove contaminated clothing in accordance with approved procedures and dispose of waste in specially designated containers.

Engineering Controls

This SOP should be conducted in a dedicated location with dedicated spill containment provisions.

First Aid Procedures

If inhaled

- If fumes or combustion products are inhaled remove from contaminated area.
- Lay patient down. Keep warm and rested.
- Prostheses such as false teeth, which may block airway, should be removed, where possible, prior to initiating first aid procedures
- Apply artificial respiration if not breathing, preferably with a demand valve resuscitator, bag-valve mask device, or pocket mask as trained. Perform CPR if necessary.
- Transport to hospital, or doctor, without delay.
- Inhalation of vapours or aerosols (mists, fumes) may cause lung oedema.
- Corrosive substances may cause lung damage (e.g. lung oedema, fluid in the lungs).
- As this reaction may be delayed up to 24 hours after exposure, affected individuals need complete test (preferably in semi-recumbent posture) and must be kept under medical observation even if no symptoms are (yet) manifested.
- Before any such manifestation, the administration of a spray containing a dexamethasone derivative or beclomethasone derivative may be considered. This must definitely be left to a doctor or person authorized by him/her.

In case of skin contact

- Immediately remove all contaminated clothing, including footwear.
- Flush skin and hair with running water (and soap if available).
- Seek medical attention in even of irritation.
In case of eye contact

- Immediately hold eyelids apart and flush the eye continuously with running water
- Ensure complete irrigation of the eye by keeping eyelids apart and away from eye and moving the eyelids by occasionally lifting the upper and lower lids.
- Continue flushing until advised to stop by a doctor, or for at least 15 minutes.
- Transport to hospital or doctor without delay.
- Removal of contact lenses after an eye injury should only be undertaken by skilled personnel.

In case of ingestion:

- IF SWALLOWED, REFER FOR MEDICAL ATTENTION, WHERE POSSIBLE, WITHOUT DELAY. For advice, contact a doctor.
- Urgent hospital treatment is likely to be needed.
- In the mean time, qualified first-aid personnel should treat the patient following observation and employing supportive measures as indicated by the patient’s condition.
- If the services of a medical officer or medical doctor are readily available, the patient should be placed in his/her care and a copy of the MSDS should be provided. Further action will be the responsibility of the medical specialist.
- If medical attention is not available on the worksite or surroundings send the patient to a hospital together with a copy of the MSDS.

Where medical attention is not immediately available or where the patient is more than 15 minutes from a hospital or unless instructed otherwise:

- INDUCE vomiting with fingers down the back of the throat, ONLY IF CONSCIOUS. Lean patient forward or place on left side (head-down position, if possible) to maintain open airway and prevent aspiration.

NOTE: Wear a protective glove when inducing vomiting by mechanical means.

Special Handling and Storage Requirements

Handling: Storage in sealed containers may result in pressure buildup causing violent rupture of containers not rated appropriately.

- Check for bulging containers.
- Vent periodically
- Always release caps or seals slowly to ensure slow dissipation of vapours
- DO NOT allow clothing wet with material to stay in contact with skin
- Avoid all personal contact, including inhalation.
- Wear protective clothing when risk of exposure occurs.

Storage:

- Store in original containers.
- Keep containers securely sealed.
- Store in a cool, dry, well-ventilated area.
- Store away from incompatible materials and foodstuff containers.

Spill and Accident Procedure
Chemical Spill Dial 9-911 and 228-7864

**Spill** – Assess the extent of danger. Help contaminated or injured persons. Evacuate the spill area. Avoid breathing vapors. If possible, confine the spill to a small area using a spill kit or absorbent material. Keep others from entering contaminated area (e.g., use caution tape, barriers, etc.).

**Small (<1 L)** – If you have training, you may assist in the clean-up effort. Use appropriate personal protective equipment and clean-up material for chemical spilled. Double bag spill waste in clear plastic bags, label and take to the next chemical waste pick-up.

**Large (>1 L)** – Dial 9-911 and EH&S at 228-7864 for assistance.

**Chemical Spill on Body or Clothes** – Remove clothing and rinse body thoroughly in emergency shower for at least 15 minutes. Seek medical attention. *Notify supervisor and EH&S at 228-7864 immediately.*

**Chemical Splash Into Eyes** – Immediately rinse eyeball and inner surface of eyelid with water from the emergency eyewash station for 15 minutes by forcibly holding the eye open. Seek medical attention. *Notify supervisor and EH&S at 228-7864 immediately.*

**Medical Emergency Dial 9-911 or 228-7864**

**Life Threatening Emergency, After Hours, Weekends and Holidays** – Dial 9-911 *Note: All serious injuries must be reported to EH&S at 228-7864 within 8 hours.*

**Non-Life Threatening Emergency** – Go to the Olivewood Meadows Occupational Health 374 Olive during regular business hours. All other times report to Mercy Medical Center 315 Mercy Ave. *Note: All serious injuries must be reported to EH&S at 228-7864 within 8 hours.*

**Needle stick/puncture exposure** (as applicable to chemical handling procedure) – Wash the affected area with antiseptic soap and warm water for 15 minutes. For mucous membrane exposure, flush the affected area for 15 minutes using an eyewash station. Go to the Olivewood Meadows Occupational Health 374 Olive during regular business hours. All other times report to Mercy Medical Center 315 Mercy Ave. *Note: All needle stick/puncture exposures must be reported to EH&S at 228-7864 within 8 hours.*

**Decontamination/Waste Disposal Procedure**

- Using proper personal protective equipment as outlined above, decontaminate equipment and bench tops using soap and water and properly dispose of all contaminated disposables as hazardous waste following the guidelines below.

General hazardous waste disposal guidelines:

**Label Waste**
- Affix an on-line hazardous waste tag on all waste containers using the Online Tag Program [http://otp.ucop.edu/](http://otp.ucop.edu/) as soon as the first drop of waste is added to the container

**Store Waste**
- Store hazardous waste in closed containers, in secondary containment and in a designated location
• Double-bag dry waste using transparent bags
• Waste must be under the control of the person generating & disposing of it

Dispose of Waste
• Dispose of regularly generated chemical waste within 90 days
• Call EH&S at 228-7864 for questions
• Empty Containers
  o Dispose as hazardous waste if it once held extremely hazardous waste (irrespective of the container size) A list can be found at http://ehs.ucla.edu/Pub/ExtremelyHazardousWaste.pdf

Prepare for transport to pick-up location
  - Check on-line waste tag
  - Use secondary containment

Safety Data Sheet (SDS) Location

Online SDS can be accessed at http://ehs.ucmerced.edu/material-safety-data-sheets.
Risk Assessment

The overall health and safety risk for use of this material in accordance with the procedure and protocol in the following section is considered **LOW** based on:

- The total quantity of any potentially hazardous material handled/transfered any one time is small – milliliter quantities or less.

- Personnel wear protective clothing to prevent skin contact from splashes and for proper clean up practices.

- The primary hazard is a spill or splash from improper or poor handling practices.
Protocol/Procedure

Preparatory Steps:

- Review MSDS; special handling, decontamination, and waste disposal information in this SOP; and the emergency information contained in this SOP.

- Visually verify that access to the emergency eyewash/shower unit and the fire extinguisher are not blocked.

- Visually verify that access to the emergency exit door is free obstructions.

- Don the appropriate protective equipment.

Laboratory Procedure

Use Hydrochloric Acid (6N)

1. Review MSDS again – all sections; pay special attention to ACCIDENTAL RELEASE MEASURES, HANDLING AND STORAGE, EXPOSURE CONTROLS/PERSONAL PROTECTION
2. Don elbow length LAMINATE FILM gloves and goggles
3. Use in a well-ventilated area
4. Take the original Hydrochloric Acid container from the storage place
5. Transfer enough hydrochloric acid into a smaller container by decanting
6. Seal the Hydrochloric Acid container securely
7. Seal the smaller container securely
8. Place the original Hydrochloric Acid back in the storage place
9. Place the smaller container for hydrochloric acid in another larger open container to avoid spill
10. Use plastic pipette to take hydrochloric acid from the container
11. Seal the hydrochloric acid container securely after usage

NOTE

Any deviation from this SOP requires approval from PI.
Documentation of Training *(signature of all users is required)*

- Prior to conducting any work with the chemicals listed above, designated personnel must provide training to his/her laboratory personnel specific to the hazards involved in working with this substance, work area decontamination, and emergency procedures.

- The Principal Investigator must provide his/her laboratory personnel with a copy of this SOP and a copy of the SDS provided by the manufacturer.

- The Principal Investigator must ensure that his/her laboratory personnel have attended appropriate laboratory safety training or refresher training within the last one year.

I have read and understand the content, requirements, and responsibilities of this SOP:

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