UC Center for Laboratory Safety

Standard Operating Procedure

Hydrochloric acid

This SOP is not complete until it has been signed and dated by the PI and relevant lab personnel.

Print a copy and insert into your
Laboratory Safety Manual and Chemical Hygiene Plan.
Refer to instructions for assistance.

Department:	CNSI Microfluidics Lab
Date SOP was written:	February 2019
Date SOP was approved by PI/lab supervisor:	
Principal Investigator:	David Bothman, Lab Manager
Internal Lab Safety Coordinator/Lab Manager:	
Lab Phone:	805-893-7186
Office Phone:	805-893-4125
Emergency Contact:	EHS 24 hour line: 805-893-3194 (Name and Phone Number)
Location(s) covered by this SOP:	Elings Hall, room 3430 (Building/Room Number)

Type of SOP: ☐ Process ■ Hazardous Chemical ☐ Hazardous Class

Purpose

Hydrochloric acid is a highly corrosive, strong inorganic/mineral acid. If not stored and handled properly, this can pose a serious threat to the health and safety of laboratory personnel, emergency responders and chemical waste handlers. Hence, it is important to follow safety protocols to handle this chemical. Hydrochloric acid is used in the chemical industry as a chemical reagent in the large-scale production of vinyl chloride for PVC plastic, and MDI/TDI for polyurethane. It has numerous smaller-scale applications, including household cleaning, production of gelatin and other food additives, descaling, and leather processing.

Physical & Chemical Properties/Definition of Chemical Group

CAS# 7647-01-0

Class: Corrosive

Molecular Formula: HCl

Form (Physical State):	Colorless liquid.
Boiling Point:	> 100 °C (> 212 °F) - lit.
Melting point:	-30 °C (-22 °F)
Density:	1.2 g/cm3 at 25 °C (77 °F)
Odor:	Pungent
Synonym:	Muriatic acid

Potential Hazards/Toxicity

Pictogram

Potential Health Effects

Inhalation May be harmful if inhaled. Material is extremely destructive to the tissue of the mucous membranes and upper respiratory tract.
Skin May be harmful if absorbed through skin. Causes skin burns.
Eyes Causes eye burns.
Ingestion May be harmful if swallowed.

Signs and Symptoms of Exposure
Burning sensation, cough, wheezing, laryngitis, shortness of breath, spasm, inflammation and edema of the larynx, spasm, inflammation and edema of the bronchi, pneumonitis & pulmonary edema. Material is extremely destructive to tissue of the mucous membranes and upper respiratory tract, eyes, and skin.

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

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

Type of gloves recommended for Hydrochloric acid: Nitrile

Note: Consult with your preferred glove manufacturer to ensure that the gloves you plan on using are compatible with Hydrochloric acid.

Refer to glove selection chart from the links below:
http://www.ansellpro.com/download/Ansell_8thEditionChemicalResistanceGuide.pdf OR
http://www.allsafetyproducts.biz/page/74172
OR
http://www.showabestglove.com/site/default.aspx
OR
http://www.mapaglove.com/

Eye protection
Splash goggles. If used in large quantities, please use appropriate face shield.

Skin and body protection
Lab coat, long pants, closed-toed shoes

Hygiene measures
Avoid contact with skin, eyes and clothing.
Wash hands before breaks and immediately after handling Hydrochloric acid.

Engineering Controls

- ./ All operations involving Hydrochloric acid must be carried out in a certified chemical fume hood (certified once every year by EH&S).

- ./ Laboratory rooms must be at negative pressure with respect to the corridors and external environment. To achieve this, the laboratory/room door must be kept closed at all times.

First Aid Procedures

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance. Move out of dangerous area.
If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.
In case of skin contact
Take off contaminated clothing and shoes immediately. Wash off with soap and plenty of water for at least 15 minutes. Consult a physician.
In case of eye contact
Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician. Continue rinsing eyes during transport to hospital.
If swallowed
Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

Special Handling and Storage Requirements

Precautions for safe handling
Avoid contact with skin and eyes.
Avoid inhalation of vapor or mist.
Always use inside a chemical fume hood.

Note: In case you need to dilute the concentration of HCl, always add acid to water.
Always transfer from container to the receptacle by using an appropriate funnel.
DO NOT mouth-pipette HCl.

Conditions for safe storage

Do not store in/with combustible packing material; such as cardboard, Styrofoam, plastic and paper.
Keep container upright & tightly closed in a dry and well-ventilated place.
Containers which are opened must be carefully resealed and kept upright to prevent leakage.
Always store HCl in a secondary container. Note: Nalgene/polypropylene tray or a tub is the best suited secondary containment.
Materials to avoid: Store segregated from – Organic Acids, Bases, Amines, Alkali metals, Metals, permanganates, e.g. potassium permanganate, sodium hypochlorite (bleach), Fluorine, metal acetylides, hexalithium disilicide.

Spill and Accident Procedure

Chemical Spill Dial 9-911 and EH&S (805-893-3194)

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 from campus phones (and 805-893-3446 from a cell phone) and EH&S (893-3194) 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 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 immediately.

Medical Emergency Dial 9-911

Life Threatening Emergency, After Hours, Weekends and Holidays – Dial 9-911 (or 805-893-3446 from a cell phone) or go to the Emergency Room of Goleta Valley Cottage Hospital at 351 South Patterson Avenue, Goleta (Phone number: 805-967-3411) Note: All Serious injuries must be reported to EH&S within 8 hours.

Non-Life Threatening Emergency – Go to the Student Health Building, Building 588 (phone number: 893-5361, hours: M, T, R, F 8am-4.30pm, W 9am - 4.30pm, R 5pm to 7pm by appointment). After hours go to the Emergency Room of Goleta Valley Cottage Hospital at 351 South Patterson Avenue, Goleta (Phone number: 805-967-3411) Note: All serious injuries must be reported to EH&S 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. Page the needle stick nurse \ and then enter your extension. After hours go to the nearest emergency room: the Emergency Room of Goleta Valley Cottage Hospital at 351 South Patterson Avenue, Goleta (Phone number: 805-967-3411). Note: All needle stick/puncture exposures must be reported to EH&S within 8 hours.

Decontamination/Waste Disposal Procedure

Wearing proper PPE, please decontaminate equipment and bench tops. Please dispose of the used hydrochloric acid as hazardous waste.

Label Waste

- Affix an on-line hazardous waste tag on all waste containers 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
- 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 for questions
- Empty Containers
    - Dispose as hazardous waste if it once held extremely hazardous waste (irrespective of the container size)
    - Consult waste pick-up schedule

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

Safety Data Sheet (SDS) Location

SDS can be found online: http://ehs.ucsb.edu/units/labsfty/labrsc/chemistry/lschemmsdsacc.htm

Protocol/Procedure

In our laboratory, concentrated hydrochloric acid (assay 37%) is stored in the designated 'Acid' ventilated cabinet and is mainly used to prepare diluted solutions.

Due to its corrosive properties, when handling concentrated hydrochloric acid, nitrile gloves have to be worn at all times, as well as safety goggles and a lab coat. Gloves have to be changed as soon as contaminated.

Concentrated hydrochloric acid cannot be handled out of the ventilated fume hood, and has to be used on a cleared space away from any strong base or metals.

Due to the exothermic nature of the reaction, dilution of hydrochloric acid has to be done by slowly adding the acid to water to limit the risk of splashing concentrated acid out.

Hydrochloric acid solutions have to be disposed as a hazardous waste in the appropriate acidic waste container.

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 hydrochloric acid, designated personnel, i.e. approved users listed below, 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 as required by EH&S.

I have read and understand the content of this SOP:

Name	Signature	Trainer	Date
David Bothman			
Shantonu Biswas			