

Standard Operating Procedure

Hydrochloric acid

Department:	Chemical Engineering
Date SOP was written:	10/1/2020
Date SOP was approved by PI/lab supervisor:	<i>Michelle O'Malley</i> 4/12/21 <small>Click here to enter a date.</small>
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Emergency Contact:	Michelle O'Malley <ul style="list-style-type: none"> • 805-403-7607 (cell) • 805-893-4769 (office)
Location(s) covered by this SOP:	Elings Hall, #2436

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

Overview

Hydrochloric acid is an extremely corrosive 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.

Acids are corrosive to eyes, skin, and mucous membrane and are generally immediately painful. Corrosive effects can occur not only on the skin and eyes, but also in the respiratory tract and, in the case of ingestion, in the gastrointestinal tract as well. The international symbol (GHS system) for a corrosive to skin/eyes (acid or base) is:

The pH range of acids is 0 to 6.9 (water = 7.0 = neutral). A pH of approximately 0 to 3 represents a strong acid. Some inorganic acids fall within this range. Weak acids (pH of 3 to 7) include diluted acetic acid solutions and boric acid. Weak acids irritate the skin with short contact and can cause burns with prolonged contact.

Heat is released when strong acids are mixed with water. When water is added to acid, an extremely concentrated solution of acid is initially formed and the solution may boil very violently, splashing concentrated acid. When acid is added to water, the solution formed is dilute and the small amount of heat

released is not significant to vaporize and spatter it. Always add acid to water, and never the reverse. Aqueous solutions of inorganic acids are not in themselves flammable. Acids also react with many metals, resulting in the liberation of hydrogen, a highly flammable gas.

Some acids like nitric and perchloric are strong oxidizing agents and can react destructively and violently when in contact with organic solvents and organic acids like acetic. Due to the unique and highly reactive nature of oxidizing acids, there are separate UCSB SOP templates for nitric and perchloric acids that labs should adopt. Numerous accidents have occurred on campus via the mishandling of nitric acid. There is also a separate SOP for hydrofluoric acid given its unique hazards

Protocol/Procedure

Measure out concentrated hydrochloric acid in the fume hood using full protective gear. Do not work with amounts >25 ml concentrated hydrochloric acid except in the fume hood. REMEMBER: dilute by adding the acid to water, not the other way around. Always store larger volumes (>25ml) in the acid storage cabinet with a secondary storage container to contain spills in the event of an earthquake etc.

Gloves, labcoat, safety glasses, long pants and close-toed shoes must be worn at all times during the handling of hydrochloric acid containing solutions.

NOTE

Any deviation from this SOP requires approval from PI.

Physical & Chemical Properties/Definition of Chemical Group

CAS#	7647-01-0
Class:	<u>Corrosive</u>
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/cm ³ 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)

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.

Eye protection

Type of eye protection used to handle the chemical: Splash goggles . *If used in quantities > 25 ml of concentrated hydrochloric acid, please use appropriate face shield.*

Skin and body protection

A lab coat, long pants, closed-toed shoes and goggles must be worn.

Hygiene measures

Avoid contact with skin, eyes and clothing; hydrochloric acid is *extremely corrosive*.

Wash hands immediately after handling this material and, as always, immediately before breaks.

Engineering Controls

All operations involving >25ml concentrated Hydrochloric acid must be carried out in a fume hood.

Work at least 6" inside the hood, never place your head in the hood, set the sash at the lowest position possible (if using the horizontal sliding sashes do not open past the labeled positions).

As always, safety shower and eye wash stations should be easily accessible.

First Aid Procedures

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 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 measure out inside a chemical fume hood.

Note: In case you need to dilute HCl or any other caustic material, always add the caustic to water, *not the other way around*.

DO NOT mouth-pipette HCl.

Conditions for safe storage

Do not store in/with combustible packing material; such as cardboard, Styrofoam, plastic and paper. Store segregated from organic acids, bases, amines, alkali metals, metals, permanganates, e.g. potassium permanganate, sodium hypochlorite (bleach), fluorine, metal acetylides, hexalithium disilicide.

Keep container upright & tightly closed in the ACID storage cabinet.

Containers which are opened must be carefully resealed and kept upright to prevent leakage.

Always store HCl in a secondary container to contain potential spills. Nalgene/polypropylene tray or a tub is the best secondary containment.

Spill and Accident Procedure

Life Threatening Emergency– Dial **9-911**. Nearest phone (landline) is located in the O'Malley lab Elings Hall #2416. Contact PI and EH&S as soon as practical. *Note: All serious injuries must be reported to EH&S at x3194 within 8 hours.*

Non-Life Threatening Emergency – Go to Student Health, building 588, **x5361**, Hours: M, T, R, F 8 a.m. to 4:30 p.m, W 9 a.m. to 4:30 pm and R 5 to 7 p.m. by appointment. At all other times report to Goleta Valley Cottage Hospital (emergency room) at 351 South Patterson Avenue, **805-967-3411**. Contact PI and EH&S as soon as practical. *Note: All serious injuries must be reported to EH&S at x3194 within 8 hours.*

Personal precautions

Use Personal Protective Equipment (PPE).

Avoid breathing vapors, mist or gas.

Ensure adequate ventilation.

Evacuate personnel to safe areas.

Environmental precautions

Do not let concentrated hydrochloric acid enter drains.

Spill – Help contaminated or injured persons and evacuate the spill area. Avoid breathing vapors. Eliminate sources of ignition if the chemical is flammable. If this can be done safely, 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 893-3194 for assistance.

Chemical Spill on Body or Clothes – Remove clothing and rinse body thoroughly in emergency shower until emergency responders have arrived and for at least 15 minutes. Seek medical attention. *Notify supervisor and EH&S as soon as practical.*

Chemical Splash Into Eyes – Immediately rinse eyeball and inner surface of eyelid with water until emergency responders have arrived and for at least 15 minutes by forcibly holding the eye open. Seek medical attention. *Notify supervisor and EH&S as soon as practical.*

Decontamination/Waste Disposal Procedure

Wearing proper PPE, please decontaminate equipment and bench tops using water. Please dispose of the spent hydrochloric acid and disposables contaminated with hydrochloric acid as hazardous waste.

General hazardous waste disposal guidelines:

NOTE: Segregate acid waste containers from base waste containers.

Label Waste

- Affix a 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
- 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 for questions and for pick-up
- Empty Containers: Dispose as hazardous waste irrespective of the container size

Prepare for transport to pick-up location

Check waste tag

Use secondary containment

Safety Data Sheet (SDS) Location

A hard copy of the SDS is available in the Chemical Hygiene Plan folder.

Online SDS can be accessed at <http://msds.ehs.ucla.edu>.

Documentation of Training (signature of all users is required)

- 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 of this SOP:

Name	Signature	Identification	Date