UCSF Lab Standard Operating Procedure

Chemical Process, Name or Hazard Class:

Hydrochloric Acid

Please fill out the form completely.
Insure all users have access to this SOP.
Refer to instructions for assistance.

Department:	Bioengineering and Therapeutic Sciences
Date SOP was written:	July 30,2013
This lab specific SOP has been reviewed and approved by:	
Principal Investigator Name:	Xin Chen
Principal Investigator Signature	
Lab Manager/Supervisor:	Li Che

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

Describe Process, Hazardous Chemical or Hazard Class:

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.

Color: colorless liquid.

Boiling point: > 100 °C (> 212 °F) - lit.

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. (http://map.ais.ucla.edu/go/1004655)

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 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 from campus phone or 415-476-1414 from cell phone or 415-206-8522 (SFGH only)

Spill – Assess the extent of danger. Assist 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 phone or 415-476-1414 from cell phone or 415-206-8522 (SFGH only)** 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 415-476-1300 immediately.*

Chemical Splash Into Eyes – Immediately rinse eyeball and inner surface of eyelid with water for 15 minutes by forcibly holding the eye open. Seek medical attention. *Notify supervisor and EH&S at 415-476-1300 immediately.*

Medical Emergency Dial 9-911 or 415-476-1414

*Note: All serious injuries must be reported to EH&S at **415-476-1300** within 8 hours.*

Non-Life Threatening Emergency– Go to Occupational Health Programs (OHP) Clinic, 415-885-7580**, 2330 Post Street, Suite 460 Hours of Operation for Appointments: Monday - Friday 7:30 a.m. - 4:00 p.m. (except Holidays).**

*Note: All serious injuries must be reported to EH&S at **415-476-1300** 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 by dialing **415-353-7842 (STIC).**

Decontamination/Waste Disposal Procedure

Clean contaminated surfaces with soap and water and paper towels. Dispose of the paper towels as hazardous waste.

Safety Data Sheet (SDS) Location

Online SDS can be accessed at http://or.ucsf.edu/ehs/7241-DSY/msds.html

Protocol/Procedure

Preparation of 1M and 0.1M Hydrochloric acid

1.1. Hydrochloric acid:

36% HCl → 1M HCl. Add 83.5 mL of 36% hydrochloric acid to about 600 mL of

distilled water in a 1 litre measuring cylinder and make up to 1L.

32% HCl → 1M HCl. As above, except use 96 mL of 32% hydrochloric acid.

1.2. 0.1M HCl-Alcohol solution

1) prepare 75% alcohol solution.

2) The 37 percent HCl is 12M, transfer 4ml of 36% HCl solution to 480ml 75% alcohol solution, and then get 0.1M HCl-Alcohol solution.

Note:

The 37 percent HCl is 12M. That's because 100 mL of 37 percent HCl doesn't weigh 100 grams.

Wear gloves and protect the eyes with safety goggles or even better, a face shield. Dilution of concentrated acid should always be done in a fume cupboard. Add concentrated acid to water slowly. Never add water to a concentrated acid.

NOTE

Any deviation from this SOP requires approval from the Principal Investigator.

UCSF Lab Standard Operating Procedures (SOP)

What is SOP? A Standard Operating Procedure (SOP) is a written document or instructions detailing all steps and activities of a process. The SOP should provide safety, health, and environmental information to perform the process safely.

Where Can I Find SOPs? See the Laboratory Safety SOP Development Resources for SOP templates of common chemicals and chemical-groups.

What is the type of SOP? Type of SOP for this purpose is either: Process, Hazardous Chemical or Hazard Class. A process SOP is an SOP for processing such as distillation, synthesizer, etc., Hazardous Chemical SOP is a SOP for a specific chemical such as formaldehyde, nitric acid, diethyl ether, etc., and a Hazard Class SOP is a SOP for a specific hazard class of a chemical such as corrosive, flammable, reactive, etc.

Instructions: Customize the chemical-specific Standard Operating Procedures (SOPs) to match your laboratory chemical-specific operations. Please refer to the chemical manufacturer's Safety Data Sheet (SDS) to add important information into the SOPs.

- All sections on the SOP template must be completed.
- All SOPs must address health and safety issues including but not limited to use of personal protective equipment (PPE) and safety equipment/devices.
- All SOPs must be accessible to lab members.
- All SOPs must be reviewed and approved by the PI.
- All lab users must be trained on applicable SOPs. Training must be documented.
- All SOPs and documentation of training must be submitted to your DSA.

DO NOT cut and paste contents or certain sections from other SOPs without careful review, as the SOPs in the library are chemical-specific.

Note: The Laboratory Safety SOP Development Resources does not cover all chemicals in UCSF's inventory.

How to write a lab specific research protocol/procedure:

- Give a general range of quantities that can be used in a safe and consistent manner. If necessary, provide two procedures to cover a wider range of quantities.
- Outline the conditions under which the procedure applies.
- Provide a step-by-step explanation of a general experimental process covered within the range of quantities. Provide details on engineering controls and hazards associated with the process.
- Include a specific example procedure describing in detail the experiment. This could be an experimental procedure from your lab notebook.
- If quantities or conditions significantly deviate from the SOP be sure to obtain approval from the PI, and include any changes to an updated SOP.

Example,

Protocols/Procedures must include the following components, as illustrated in the example below:

Quantities and conditions that the SOP covers, a summary covering each type of use, and an example of the actual use.

Protocol /Procedure

Quantities covered by this SOP:

0 - 40 g

Conditions covered by this SOP:

0 oC – 50 oC

General:

Sodium hydroxide pellets are used to make aqueous solutions that range in concentration from 0.01M to 1M and volume of 10mL to 1L.

The sodium hydroxide pellets are weighed and then slowly added to a beaker of water that is cooled in an ice bath. Caution: Dissolution of sodium hydroxide is exothermic! The solution is then stirred until all the sodium hydroxide is dissolved. It is then allowed to warm to room temperature. The final concentration is determined by titration with potassium hydrogen phthalate. (See SOP on Titrations).

Example:

To make 1L of a 1M sodium hydroxide solution:

40g of NaOH pellets was weighed out in a plastic weigh boat. Slowly, only a few pellets at a time was added to 1L of water in a 2L beaker equipped with a magnetic stir bar in an ice bath. After the last of the sodium hydroxide was added and dissolved, the 2L beaker was removed from the ice bath and allowed to warm to room temperature before being titrated with potassium hydrogen phthalate. The plastic weigh boat was triple rinsed with water (the first wash being disposed as hazardous waste) before being disposed of in the trash.

NOTE

Any deviation from this SOP requires approval from PI.

Sodium Hydroxide (pellets) 5 Date: 10/18/2012

For additional assistance in developing SOPs, contact EH&S at 415-476-1300