

Hydrochloric Acid – Operating Procedure

Updated on 11/16/2018 by IC

Warnings and Notes

- Hydrochloric Acid is a corrosive (it can burn your flesh, eyes, lungs, and mucous membranes) and otherwise harmful liquid.
- In UDNF it can **only** be mixed with **water** and **phosphoric acid**.
- All mixing ratios of the solutions you would like to make and use must be pre-approved by UDNF management in writing.
- You must read the safety data sheets of all ingredients before you make and use a solution; the SDSs are available in the yellow binders located in the cleanroom, on the UNDF-Tools shared drive, and in the “Current Users” section of the website (udnf.udel.edu).
- Use only glass beakers for Hydrochloric Acid solutions.
- Hydrochloric Acid may only be used in the wet bench labeled **Acids #1** in Bay 2 of the UDNF cleanroom.
- You must have a safety buddy to use Hydrochloric Acid. The safety buddy does not have to stand by you nor wear the PPE listed in the next section. However, the safety buddy: (1) must be present in the cleanroom at all times while you use Hydrochloric Acid and while you clean up and (2) must check on you at least every 10 minutes.
- Identify the closest eye wash and safety shower before you start work.
- You must report all chemical spills and exposures to UDNF staff.
- Hydrochloric Acid may be used only during staffed hours (typically 08:30-17:00, M-F while the University is open). Unstaffed hours will be announced via email and will be posted on the UNDF Calendar in FOM.
- You must log into the “Chem – Hydrochloric Acid” tool in FOM before you start work and log out once you are done using the chemical. You must make reservations in advance in FOM.
- You should expect to find the working area clean and dry and are required

to leave the working area clean and dry. Please ask for staff assistance as needed.

Emergency Procedures

- In case of **skin contact**: Flush the affected area(s) while removing all contaminated clothing with large amounts of water for at least 15 minutes. Seek immediate medical attention.
- In case of **eye contact**: Flush the affected eye(s) with large amounts of water for at least 15 minutes. Seek immediate medical attention.
- In case of **inhalation**: Remove the exposed person to fresh air – only if it is safe to do so. Seek medical attention for symptoms such as respiratory irritation, cough, or tightness of chest; please keep in mind that symptoms may be delayed.

Personal Protective Equipment and Tools

- In addition to the normal UDNF cleanroom suit, the following safety PPE must be worn when making and handling Hydrochloric Acid solutions:
 - Chemical apron
 - Face shield
 - Heavy duty chemical resistant gloves
- The PPE must be inspected before you start any work:
 - If the chemical resistant gloves have any cracks, tears, holes, etc. please do not use them; ask staff for a new pair of gloves.
 - If the apron is not completely dry, please do not use it; please notify staff.
- Only use plastic tweezers or the blue locking forceps when working with Hydrochloric Acid solutions.

Use Procedure

- Identify your safety buddy.
- Inspect PPE; if anything is not right with the PPE, please **STOP** and notify UDNF staff.
- Log into “Chem – Hydrochloric Acid” tool in FOM. Enter the name of your safety buddy in the “Comment” section on the pop up window.
- Bring the following items into the wet bench:
 - Graduated cylinder
 - Glass beaker to mix the solution in
 - Glass beaker to rinse your sample(s) in
- All beakers containing Hydrochloric Acid solutions or its ingredients must be placed in the white secondary containment tray located in the wet bench.
- Use one of the pre-formatted labels available in the file folder in Bay 2 to write the name of the chemicals that are part of the solution and their mixing ratios, date and time, your name, and contact info. Place the note under the clean, dry glass beaker that will contain the Hydrochloric Acid solution.
- Bring a number of cleanroom wipers into the wet bench and separate them; you will need them to dry the chemically resistant gloves if they get wet and to clean up when you are done using the chemicals.
- Attach you sample(s) to blue locking forceps and bring them into the wet bench.
- Put on the additional PPE in the following order:
 - Apron
 - Face shield
 - Chemical resistant gloves
- Fill a glass beaker with DI water for rinsing your sample(s).
- Move the bottles with fresh chemicals (one at a time, please follow the sequence outlined below) from the acid cabinet into the wet bench. Use both hands to carry the bottles.

- When mixing Hydrochloric Acid with water, please pour water into the beaker first, then the Hydrochloric Acid.
- Place the bottles with the fresh chemicals (one at a time) into the chemical cabinet located in front of the wet benches. Use both hands to carry the bottles.
- Place the sample into the beaker containing the freshly made solution.
- Start the timer.
- Remove the sample from the Hydrochloric Acid solution beaker and place it into the DI water beaker for rinsing.
- Dry the sample with nitrogen.

Waste Disposal

- Identify the proper waste bottle for Hydrochloric Acid solutions; disposing of Hydrochloric Acid in the incorrect waste bottle can lead to dangerous chemical reactions.
- Allow the Hydrochloric Acid solution to cool to room temperature; use the thermometer located in the white tray to measure temperature. **Hot solutions will melt the plastic waste bottle** causing a chemical spill – they can also cause an explosion.
- Once the solution has cooled down, rinse the funnel with water over the sink.
- Remove the cap of the waste bottle and set it aside.
- Very slowly pour the Hydrochloric Acid solution into the appropriate waste bottle using the funnel; do not overfill.
- **Note:** When you start a new waste bottle, make sure it is dry on the inside and outside.
- Place the cap on the waste bottle.
- Rinse the funnel with water over the sink.

Cleanup and Final Steps

- Remove the label and dispose of it into the white “acid” trash can located in front of the wet bench.
- Wash all beakers with DI water three times over the sink.
- Place the beakers in the designated location.
- Wipe off any liquids from the bench, and dispose of the wipers into the white trash can located in front of the wet bench.
- While still wearing them, wash the chemical resistant gloves with DI water over the sink.
- Dry the chemical resistant gloves with wipers, and dispose of the wipers into the white “acid” trash can located in front of the wet bench. Pay attention to the under the forearm areas of the gloves.
- Wipe off any liquids from the apron, and dispose of the wipers into the white trash can located in front of the wet bench.
- Dry the chemical resistant gloves with wipers, and dispose of the wipers into the white “acid” trash can located in front of the wet bench. Pay attention to the under the forearm areas of the gloves.
- Remove PPE in the following order:
 - Remove gloves and place them in the wet bench.
 - Remove face shield.
 - Remove apron.
- Log out of “Chem – Hydrochloric Acid” tool in FOM.