

Tetramethylammonium Hydroxide (TMAH) Operating Procedure

Updated on 08/04/2025 by IC

Warnings and Notes

- TMAH is a **toxic** liquid. The tetramethylammonium ion affects nerves and muscles, causing difficulties in breathing, muscular paralysis and possibly death. Its effects may be delayed.
- TMAH is also corrosive; it can burn your flesh, eyes, lungs, and mucous membranes.
- Exposure to even small quantities of TMAH can be life threatening.
- Several TMAH-related fatalities have been reported in the semiconductor industry.
- You must read its safety data sheet (SDS) before you use the solution; the SDSs are available in the yellow binders located in the cleanroom, on the UNDF-Tools shared drive, and in the "User Resources" section of the website (udnf.udel.edu).
- Use only glass beakers for TMAH.
- TMAH may only be used in the BASES wet bench in Bay 1 of the UDNF cleanroom.
- You must have a safety buddy to use TMAH. The safety buddy does not have to stand by you, nor wear the PPE listed in this document. However, the safety buddy: (1) must be present in the cleanroom at all times while you use TMAH and while you clean up and (2) must check on you at least every 10 minutes.
- You must log into the "Chem – TMAH" 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.
- Identify the closest eye wash and safety shower before you start work.
- You must report all chemical spills and exposures to UDNF staff.

- TMAH may be used only during staffed hours (typically 08:30-17:00, M-F while the University is open). Unstaffed hours within these time windows will be announced via email and will be posted on the UNDF Calendar in FOM. Extended hours are unstaffed hours.
- 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 handling TMAH:
 - 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

TMAH.

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 – TMAH” tool in FOM. Enter the name of your safety buddy in the “Comment” section of the pop up window.
- Bring the following beakers into the wet bench:
 - Glass beaker to pour the solution in
 - Glass beaker to rinse your sample(s) in
- All beakers containing TMAH 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 1 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 TMAH.
- 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).
- Bring the bottle with fresh chemical into the wet bench. Use both hands to carry the bottle.
- Dispense the necessary amount of TMAH into the glass beaker.
- Return the bottle with the fresh chemical to its storage location. Use both

- hands to carry the bottle.
- Place the sample into the beaker containing the TMAH solution.
 - Start the timer.
 - Remove the sample from the TMAH beaker and place it into the DI water beaker for rinsing.
 - Dry the sample with nitrogen.

Waste Disposal

- Remove the cap from the waste bottle.
- Rinse the funnel with water over the sink.
- Pour the TMAH into the appropriate waste bottle using the funnel; do not overfill.
- **Note:** If 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

- Wash all beakers with DI water three times over the sink.
- Place the beakers in the designated location.
- Remove the label and dispose of it into the white “base” trash can located in front of the wet bench.
- Wipe off any liquids from the bench, and dispose of the wipers into the white trash can located in front of the wet bench.
- 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 “base” 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 “base” 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.
 - Remove face shield.
 - Remove apron.
- Log out of “Chem – TMAH” tool in FOM.