

Standard Operating Procedure Piranha Solution



S.O.P.:	# 500-10
Title of S.O.P.:	Piranha Solution
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The University of Texas at Austin

Purpose

To provide guidance on the safe use and handling of Piranha solution (or Piranha etch).

Overview

Piranha solution is used to remove organic residues from substrates, particularly in microfabrication or for cleaning metal or glassware. Piranha solution is normally prepared as a 1:1 to 7:1 mixture of concentrated sulfuric acid and 30% hydrogen peroxide.

Piranha solution is highly corrosive and a powerful oxidizing agent. Preparation of piranha solution is exothermic and may result in skin burns if not handled with extreme caution. If you add fuel (e.g. acetone or isopropyl alcohol), it will generate significant quantities of heat and gas.

Alternatives

Solutions should only be prepared and used when necessary. Try to avoid using if a less reactive reagent will work. Piranha solution is not recommended for routine cleaning of glassware. Contact EHS lab safety staff at 471-3511 for possible alternatives.

Emergency Procedures

Keep spill cleanup materials at locations where solutions are prepared.

Spills: Notify personnel in the area and your supervisor.

Small spills may be absorbed with wet paper towels. Keep towels wet and collect for chemical waste disposal. Contact EHS for spill assistance if needed.

Large spills: Immediately call 911 to report a piranha solution spill that is health threatening and contact EHS for spill assistance if needed.

In case of eye or skin contact: Piranha is corrosive and irritating to the skin and eyes. Flush the contaminated area with large amounts of water for at least 15 minutes. Seek medical attention.

In case of inhalation: May irritate or burn the respiratory tract. Conscious persons should be assisted to an area with fresh, uncontaminated air. Seek medical attention in the event of respiratory irritation, cough, or tightness in the chest. Symptoms may be delayed.

PPE and Engineering Controls

When using highly corrosive solutions, wear appropriate personal protective equipment:

- Safety glasses or goggles
- Full-face shield (along with safety glasses or goggles) – depending on sash position
- Acid resistant gloves
- Laboratory coat and acid apron over lab coat
- A safety/blast shield is recommended when the container is heated or reaction is taking place – depending on sash position.

No open-toed shoes or bare legs when working with these solutions. Work in a clean, properly working fume hood with sash down at working height when reactions are in progress. Leave the sash closed if the hood is unattended. It is essential that anyone working with such corrosives have unimpeded access to an emergency eyewash and safety shower.

Training and Documentation

As with all other site-specific hazards, the PI is responsible for developing and documenting training in the safe use of these solutions and emergency procedures for their laboratory. Training performed prior to working with the solution and should be documented in accordance with: http://www.utexas.edu/safety/ehs/forms/lab_training_checklist_training_record.pdf Researchers should have a written research protocol for working with this solution.

Safe Handling

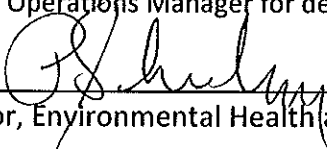
- Two persons should be in lab when solutions are in use and notify other lab staff.
- Prepare only the amount needed for immediate use. Old solutions should be disposed.
- Always use glass (Pyrex, Teflon or quartz) containers capable of sustaining at least 240C. Piranha will melt plastics such as polyethylene and polypropylene. Do not use old organic bottles that have been rinsed as they may contain residue.
- Containers must be clearly labeled and a visible warning sign posted on the fume hood.
- Mix the solution in a hood with the sash between you and the solution. Keep the sash down. Do not remove solution from hood where prepared.
- If H₂O₂ concentration is 50% or greater, an explosion may occur.
- Use a hot plate with stir capability that incorporates over-temperature protection to prevent overheating and subsequent boil-over.
- Leave the hot piranha solution in an open container until cool.
- Mixing piranha with organic compounds e.g. acetone, photoresist, isopropyl alcohol, and nylon may cause an explosion.

Storage

- Due to its highly reactive nature, Piranha should not normally be stored. Mix fresh solution for each use.

Disposal

Normally Piranha should not be stored for later disposal, but instead should be rendered harmless as part of the written research protocol. Please contact the EHS Environmental Operations Manager for details.



 Director, Environmental Health and Safety

1/20/10

 Date