



Piranha Solution Safety Sheet

About

Piranha solutions are mixtures of concentrated sulfuric acid and hydrogen peroxide (30%), usually in a ratio of 3:1, and are used to remove trace amounts of organic residues from substrates. The mixing procedure is an exothermic reaction that can generate significant heat. The reaction produces highly activated and oxidizing peroxymonosulfuric acid (H_2SO_5). Piranha should never be used for routine cleaning. Do not use Piranha unless it is necessary. Ensure that all personnel are fully trained on the laboratory specific SOP prior to using Piranha.

Preparation

You MUST create and train all employees in your specific Standard Operation Procedure (SOP) for this process.

- 1- Always wear the appropriate PPE
- 2- Use an uncluttered fumehood and do not leave unattended.
- 3- Use only glassware or Teflon containers, no plastic. Ensure all glassware is clean prior to use.
- 4- Hydrogen peroxide, 30% in water is generally used in the preparation and can be purchased for laboratories through chemical suppliers.
- 5- Mixtures of 50% peroxide or stronger should be avoided due to the possibility of explosion.
- 6- Mix the hydrogen peroxide solution with the sulfuric acid SLOWLY and expect the container to become hot. The sudden increase in temperature may lead to boiling or even splashing.
- 7- NEVER add any organics to piranha solution, it could cause an explosion.
- 8- Any batch made over 100 mL requires cooling in an ice bath when mixed.
- 9- Solution should be stored in a container with a vented cap, in the fumehood, and clearly labeled.

PPE

Face shield and safety glasses

Acid apron

Rubber/neoprene gloves- Nitrile is **not** sufficient.

Closed toed shoes

Lab coat

Emergency response

(An appropriate spill kit should be on hand) (Always contact ESH 5-2918 for spills of Piranha solution)

For inhalation- Move the affected person to an area with fresh, uncontaminated air. Seek medical attention.

For skin contact- Immediately rinse the affected area with large amounts of water for at least 15 min as the Piranha solution may cause skin burns. Seek medical attention.

For eye contact- Irrigate the eye for at least 30 minutes keeping the eyelids open during irrigation. Seek medical attention

For exposure over large area- Remove individual from the contaminated area and placed under a safety shower while 9-1-1 is contacted. All contaminated clothing should be removed immediately with appropriate gloves and safely discarded. Spills should be neutralized with an acid neutralizer (or base neutralizer in the case of NH₄OH/H₂O₂ solutions) before cleanup. Do **NOT** use paper towels, rags, or other organic material to absorb a spill as they may spontaneously ignite.

Storage and disposal

Due to its hazards and reactivity, piranha solution should be created for each use and not stored.

Leave hot piranha solution in an open (or preferably vented) glass or Teflon container within a fumehood until cool.

Ensure bottle is clearly labeled.

Contact ESH at 5-2918 or esh@umbc.edu to dispose of properly labeled and containerized piranha solution.

Always try to use less hazardous alternatives whenever possible.