

# Handling Piranha Solutions

## Overview

**Piranha solutions** are used to remove organic residues from substrates, particularly in micro-fabrications labs. The traditional piranha solution is a 3:1 mixture of sulfuric acid and 30% hydrogen peroxide. The solution may be mixed before application or directly applied to the material, applying the sulfuric acid first, followed by the peroxide. Piranha solutions are extremely energetic and may result in explosion or skin burns if not handled with extreme caution.

Piranha Solutions are **OSHA Particularly Hazardous Substances (PHS)** and, per Carnegie Mellon Policy, all areas of use must have all PHS controls in place including, but not limited to:

- A written SOP for the work must be prepared by the individual laboratory
- The Principal Investigator (PI) must approve each employee for use with the PHS, with both parties signing the final sheet of the standard procedure.
- The PHS procedure format is located at <http://ehs-alert.fms.bap.cmu.edu/pdf/PHSformblank.pdf>
- Additional information on PHS use may be found in the Carnegie Mellon Chemical Hygiene Plan.

## Emergency Procedures

**In case of skin contact:** May cause skin burns. Flush the skin with copious amounts of water for at least 15 minutes. Seek medical attention.

**In case of eye contact:** Piranha is corrosive and irritating to the eyes. Flush contaminated eye(s) immediately with copious quantities of water for at least 15 minutes. Seek medical attention immediately.

**In case of inhalation:** May irritate 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.

**In case of ingestion:** Not a likely route of exposure.



Post explosion of Piranha Solution

## Handling

- ▶ Always use glass (preferably Pyrex) containers. Piranha will melt plastics.
- ▶ Mix the solution in a fume hood with the sash between you and the solution. Wear appropriate gloves, eye protection and an acid-resistant lab coat or similar body protection.
- ▶ When preparing the piranha solution, always add the peroxide to the acid.
- ▶ Piranha solution is very energetic and potentially explosive. It is very likely to become hot, more than 100°C. Handle with care.
- ▶ Leave the hot piranha solution in an open container until cool.
- ▶ Never use Piranha solution unless another, knowledgeable person is accompanying you, should an emergency situation occur.

# Handling Piranha Solution

## Handling, continued

- ▶ Never store piranha solutions. Piranha stored in a closed container will likely explode.
- ▶ Adding any acids or bases to piranha or spraying it with water will accelerate the reaction. This includes Photoresist, which is a strong base.
- ▶ Mixing hot piranha with organic compounds may cause an explosion. This includes acetone, photoresist, isopropyl alcohol, and nylon
- ▶ Aspirate the piranha and dispose via the drain when finished.

## Storage

**Do not store piranha solution. Mix fresh solution for each use, preparing only the amount expected for current use.** Excess solutions should be disposed via the drain, followed by flushing with copious amounts of water.

## Disposal

Do not collect for disposal. After the material has cooled, aspirate excess piranha and dispose via the drain, flushing the drain with copious amounts of water.



Remember:  
There is a reason this material is  
called

**Piranha Solution**

And not, say,

**Goldfish Solution!**



For further information contact Environmental Health and Safety  
at the numbers below.

## Our Mission:

**Environmental Health & Safety (EH&S) is committed to providing health and safety services that protect the University community and the environment.**