

Piranha Solutions

Piranha solutions are strong oxidizers used to remove organic residues from substrates. As such, piranha solutions are extremely corrosive, reactive, and potentially explosive. Most commonly used is the acid piranha, typically a 3:1 mixture of Sulfuric Acid (H_2SO_4) and Hydrogen Peroxide (H_2O_2).

Exposure Controls

- Engineering Controls: All work involving piranha solution must be done inside a chemical fume hood to prevent inhalation exposures. Label fume hoods with signage such as “Caution, Piranha solution in fume hood, highly energetic and corrosive”.
- Personal Protective Equipment: Wear proper laboratory attire (lab coat, pants, and closed-toe shoes), neoprene or rubber gloves, neoprene apron, safety goggles and a face shield.

Safe Handling

- Consult with PI/laboratory supervisor prior to initial use of piranha solutions. Consultation should include discussion regarding special hazards, and safety precautions.
- Develop a written Standard Operating Procedure (SOP) relevant to health and safety for laboratory activities involving piranha solutions. For instructions on creating an SOP, refer to [Planning a Safe Experiment](#).
- Only use glass or Pyrex containers; piranha solutions are not compatible with plastic.
- Piranha solution is very energetic and reactive:
 - When preparing acid piranha solution, always slowly add the peroxide to the acid.
 - Mix/prepare small batches of fresh solutions for each application. Do not store solution for reuse.
 - Handle with care, solution may reach up to 100 degrees Celsius.
- To prevent potential explosion:
 - Ensure H_2O_2 concentration is less than 50%. Concentrations greater than 50% are potentially explosive.
 - Avoid mixing with incompatible materials such as acids, bases, and organic solvents (acetone, isopropyl alcohol, etc.).
 - Ensure all substrates are rinsed and dried before placing them in a piranha solution.
 - Avoid using airtight containers.

Waste Storage and Disposal

- After use, a cool down solution in an open container inside a labeled fume hood. Solution should be cooled down to room temperature prior to waste storage.
- Do not store piranha waste in an airtight container, explosion can occur. Store solutions in a labeled glass bottle with vented cap. - Ensure waste bottle is clearly labeled “For Piranha Solution Disposal Only, Do Not Add Other Types of Chemicals”.

Emergency Procedure

- Ensure detailed emergency procedures are included in the SOP.

- Eye/Skin Contact: Flush contamination from eyes/skin using the nearest emergency eyewash/shower for a minimum of 15 minutes. If one eye is contaminated, be careful not to flush contaminated water into the other eye.
 - Remove any contaminated clothing.
 - If medical attention is required, immediately call 911.
 - When seeking medical attention, bring along a copy of this fact sheet and your lab's SOP.
 - Notify your supervisor and EH&S.
- Spills: Notify personnel in the area and your supervisor. Restrict access and eliminate all sources of ignition.
 - *Small spills* (<30mls) may be absorbed with wet paper towels. Keep towels wet and collect for disposal.
 - *Large spills*: Immediately call EH&S at 644-6895 to report a piranha solution spill that is health threatening, or is greater than 30 mls, or if it will take longer than 15 minutes to clean up.

Adapted from guidelines provided by EH&S at Stanford University