



Procedure: Handling and Using Piranha Solution

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Introduction

Piranha solution is used as an agent to remove organic residues from substrates. Piranha solution is typically made in the lab as a Sulfuric acid and Hydrogen peroxide mixture in a 3:1 ratio. It is often heated to >60 degrees Celsius for effectiveness.

Piranha solution is a strong oxidizer. Both liquid and vapour forms are extremely corrosive to skin and respiratory tract. Explosion can occur when Piranha generates gas to pressurize closed containers or when Piranha reacts with organic material.

Due to its extreme hazards, before you work with Piranha, you should:

1. Consider less hazardous alternatives to be used to achieve the desired goal
2. Obtain approval from your principal investigator (PI) before using Piranha solution
3. Have completed Piranha safety training prior to start of work involving Piranha. Training should cover the hazards and risks of handling piranha solution and how to control exposure and respond to emergency situations.
4. Ensure the area where piranha solution is handled must have a spill kit with acid-neutralizing material to neutralize accidental spills.

Personal Protective Equipment

When working with Piranha solution, in addition to the appropriate attire (specified in the Laboratory Protective Clothing Standard, found [HERE](#)), one must wear the following personal protective equipment (PPE):

- Lab Coat;
- Safety glasses or safety goggles;
- Neoprene or rubber gloves;
- Neoprene apron; and
- A face shield.

Safe Handling Procedures

1. Individuals working with Piranha solution must utilize a “buddy system” – i.e. a second individual must be:



- a. Informed of the start and finish of use of the Piranha solution;
 - b. Capable of receiving instant communication from the Piranha solution user; and
 - c. No more than 2 minutes walking distance from the lab in which the Piranha solution is being used.
2. All work involving piranha solution should be conducted inside a chemical fume hood.
 3. Piranha solution should be contained in glass or Pyrex containers. Piranha solution is not compatible with plastic.
 4. Always add hydrogen peroxide to sulfuric acid slowly. Never vice versa.
 5. The hydrogen peroxide component should typically be kept to below 30%, never to exceed 50%.
 6. Prepare small amounts of solutions to be used up for each application. Do not store Piranha solution in stock.
 7. Do not mix Piranha solution with incompatible materials such as organic acids, bases and organic solvents
 8. Ensure containers and substrates are rinsed and dried before coming into contact with Piranha solution
 9. Do not seal containers containing Piranha solution
 10. Piranha solution can be heated to high temperatures due to the enthalpy of solution: Handle with care. Heat insulated gloves may be necessary.

Waste Handling

1. Cool solution to room temperature and open container cap to vent in a certified fume hood for 12 hours before disposal as waste.
2. Label the container carefully indicating "Caution, Piranha solution. May explode in closed container" and the Piranha waste solution disposal date.
3. Do not mix Piranha waste with other waste.
4. Do not store piranha waste in an airtight container.
5. Store waste solutions in either a glass bottle with vented cap or a bubbler



6. Call EHS Environmental Protection Services at 416-978-7000 for waste pick-up

Emergency Procedures

In the event of an exposure:

1. Flush body area for a minimum of 15 minutes:
 - a. Contaminated skin should be washed with copious amounts of soap and water; and
 - b. Contaminated eyes and mucous membranes should be irrigated using normal saline or water
2. Notify the supervisor, if immediately available. Supervisor to fill out and submit an online incident/accident/occupational disease form. The online form and detailed instructions can be found [HERE](#).
3. Seek medical attention as soon as possible
4. If in doubt, call EHS Occupational Hygiene & Safety at 416-978-4467 to determine further steps.

In the event of a small spill (<500mL):

Only employees trained in the handling of Piranha should clean up spills.

1. Eliminate all sources of ignition
2. Notify personnel from the immediate area to stay away from area
3. Notify supervisor
4. Wear appropriate PPE to clean spill
5. If spill kit is present, use acid neutralizing material to neutralize piranha solution. Test with litmus paper or colour-indicating solution until the spilled material is within the neutral range of pH 6-8.
6. Clean the area with absorbent materials. The area should be soaked with detergent, the rinsed with water. Discard contaminated materials in hazardous waste glass vented bottles and label the bottles with the appropriate waste tag
7. If in doubt, call EHS Environmental Protection Services at 416-978-7000



In the event of a large spill (>500mL):

1. Eliminate all sources of ignition
2. Evacuate people from the immediate area and notify supervisor
3. During business hours, call EHS Environmental Protection Services at 416- 978-7000
4. During off-hours, contact the Campus Police.