

Piranha Solution

Piranha solution is a mixture of concentrated sulfuric acid and hydrogen peroxide. The solution is highly corrosive and a strong oxidizer. Contact with organic matter or storage in a closed container may result in a violent explosion!

Before using piranha solution check if less hazardous methods for cleaning (i.e. Plasma cleaner) are possible.

Preparing and handling piranha solution:

- Fill in the log sheet. Inform a second person (i.e. your local contact) that you are working with piranha acid and inform the laboratory users around you.
- Wear personal protection: Safety goggles/face shield, cotton lab coat and nitrile gloves in combination with thick, long acid resistant gloves.
- Use only the material available under this fume hood, i.e. the thick walled Pyrex beakers.
- Keep a big beaker of ice available in case of uncontrolled heating.
- All work must be conducted inside the fume hood.
- Put the "Piranha solution in use" sign in place.
- Use a mixture of the following stoichiometry: 5 H₂O : 4 H₂SO₄ : 1 H₂O₂
- Add the concentrated sulfuric acid slowly to the water. Monitor the temperature and add the hydrogen peroxide slowly to the diluted acid. The temperature must not exceed 85 °C! (Piranha solution may explode if the H₂O₂ concentration is higher than 50%. Thus the peroxide must always be added to the sulfuric acid. NEVER add concentrated H₂SO₄ to H₂O₂!). Rinse empty bottles of H₂SO₄ or H₂O₂ with water and dispose them.
- After mixing let the piranha solution cool down. Then use the heating plate to keep the temperature at around 80 °C for 20 minutes. Do not allow the temperature to exceed 85 °C! In case of uncontrolled heating switch off the plate and add ice.
- Never leave a piranha solution unattended while it is heating or hot!
- Ensure that your substrate (i.e. Si-wafer) is rinsed and dried before adding it to the piranha solution.
- After use let the solution cool down and leave it in the Pyrex beaker covered with a watch glass for several hours, preferably over night. Then dispose it into the provided container labeled "Piranha acid waste". NEVER seal the container cap tightly!
- Rinse the Pyrex beaker several times with distilled water and add it to waste container.
- If the waste container is filled up to half of its volume, contact the laboratory responsible to provide you with a new one.
- Remove the "Piranha solution in use" sign.

Cleaning up spills of piranha solution

- For smaller spills use a sodium carbonate solution and carefully neutralize the acid (control with pH paper). Then wipe away with a tissue.
- For larger spills use Trevor Pirovex absorbent provided in the laboratory, contact the laboratory responsible (David HESS 71 12).

Emergency procedures:

In case of an emergency contact the laboratory responsible (David HESS, 71 12).

First aid 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: 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.

Emergency numbers

- 11** Reactor control room
- 31** Health Physics
- 33** Medical service (08:00 to 12:15 and 13:15 to 16:30)
- 14** Reactor entrance
- 15** Site entrance

A **red telephone** with a direct line to CENG emergency service is situated **opposite the lab entrance**

First aider: Isabelle GRILLO, room 221, phone: 75 03