

**LABORATORY SAFETY GUIDELINE****Perchloric Acid [CAS No. 7601-90-3]**

Perchloric acid is an incredibly strong inorganic acid that poses many hazards. All individuals at Harvard who use perchloric acid must review this document. Users of anhydrous perchloric acid or concentrations greater than 85% should contact their EHS Lab Safety Advisor and department/lab safety officer, as these can be explosive. Users planning to heat perchloric acid must also contact EH&S and their safety officer as perchlorate salts can accumulate in the ductwork of a standard fume hood and lead to an explosion hazard. A special hood with a wash down system will be needed for work involving heated perchloric acid.

HAZARDS

	Strong oxidizer and may cause or intensify a fire when in contact with combustible materials and flammable liquids. Dry forms and concentrations over 85% can be explosive.
	Prolonged or repeated exposure to can damage the thyroid. It is harmful when swallowed.
	Corrosive to metals, and severely corrosive to skin and eyes. It is a very strong mineral acid.

PRECAUTIONS**Incompatibilities**

Strong bases, Strong acids, Amines, Phosphorus halides, Alcohols, Organic materials, Powdered metals, Strong reducing agents (i.e. sulfuric acid), Dimethyl sulfoxide

Before starting work:

- Determine if you can use a less hazardous substance in place of perchloric acid;
- Review manufacturer's Safety Data Sheet and additional chemical information at <http://www.ehs.harvard.edu/safety-data-sheets-sds>;
- Ensure that a written experimental protocol including safety information is available;
- Be familiar with general University emergency procedures in the [EHS Lab Emergency Response Guide](#);
- Order the most dilute solutions available that will meet experimental needs. Order only the quantity that you need;
- Identify the location of the nearest eyewash and shower and verify that they are accessible;
- Locate and verify that appropriate perchloric acid spill cleanup materials are available, including the following:
 - [Amphomag Universal Spill Neutralizer](#) (solid) or [Ansul Spill-X-A Acid Neutralizer/Solidifier](#) (solid)
 - Dust pan and broom
 - **Never** use organic material (e.g., paper towels) to clean up a perchloric acid spill
- Ensure another person who knows perchloric acid emergency procedures is in the area.

During work:

- AVOID INHALATION! Perform all operations in a certified chemical fume hood. Sash lowered. Always work at least 6 inches into the fume hood;
- If heating perchloric acid, either use a condensing apparatus or use a fume hood designed for such work (e.g., a washdown hood) to prevent the buildup of shock-sensitive perchlorates in the exhaust system. Contact your Lab Safety Advisor as necessary;
- AVOID CONTACT! Use appropriate personal protective equipment (PPE):
 - Wear a lab coat, acid resistant apron, long pants and shirt, and closed-toed shoes;
 - Chemically protective goggles (safety glasses are not adequate);
 - Nitrile gloves, doubled is suggested for extra protection. When splash potential is high, neoprene is recommended.
 - Always consult Safety Data Sheet for proper glove selection.

- Gloves must be thoroughly inspected prior to each use. Do not use damaged gloves;
- Change gloves (outer and inner) at least once an hour and immediately whenever you suspect perchloric acid has contacted your gloves;
- Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with perchloric acid;
- Wash hands and forearms thoroughly with soap and water each time gloves are removed.
- Always work behind fume hood sash;
- Use materials and containers appropriate for perchloric acid use and remain aware of potential incompatibilities. Glass, ceramic, polyethylene or propylene work well with perchloric acid. **Do not use metal.**
- Keep all containers tightly closed when not in use and during transport.

After completing the work

- Dispose of perchloric acid waste following Harvard University [Hazardous Waste Procedures](#)
 - Hazardous Waste Classification: Corrosive, Oxidizer
- Return container to storage area following Harvard University [Lab Chemical Storage Guide](#)
 - Storage Group IA (Inorganic Acids)
 - Store in original containers or other appropriate containers.
 - Store primary container in designated secondary containers (glass, ceramic, polyethylene or polypropylene). **Do not use metal.**
 - Store perchloric acid in a dedicated secondary containment bin.
 - Do not store in the same cabinet with organic chemicals including Organic Acids.
- Wash hands and forearms thoroughly with soap and water before leaving the lab.

EMERGENCY PROCEDURES

First Aid

SKIN CONTACT

- Wash with plenty of tepid water for at least 15 minutes using the closest available sink, safety shower or drench hose. Remove any exposed clothing as well as any jewelry that may be trapping perchloric acid;
- Call 911 for medical assistance;

EYE CONTACT

- Using eyewash, flush eyes while holding eyelids open;
- Call 911 for medical assistance;
- Continue flushing eyes with water until emergency medical personnel arrive.

INHALATION

- If perchloric acid is inhaled, immediately move to get fresh air;
- Call 911 for medical assistance;

INGESTION

- Do not induce vomiting;
- Call 911 for medical assistance;
- Never give anything by mouth to an unconscious person

Spill Response

IMPORTANT! DO NOT USE ORGANIC MATERIALS ON A PERCHLORIC ACID SPILL.

OUTSIDE FUME HOOD OR VENTILATED ENCLOSURE

- Alert others and evacuate to a safe distance and prevent entry.
- Contact the University Operations Center at (617) 495-5560 [HMS/HSDM (617) 432-1901]
- Remain in a safe location until EHS or other response personnel arrive.

INSIDE FUME HOOD OR VENTILATED ENCLOSURE (< 500 ml)

- If trained and confident, you may assist in the clean-up effort of small amounts, wearing PPE described above and using appropriate spill supplies.
 - Apply an appropriate spill neutralizer (listed on first page of this guideline);
 - Once neutralizer is applied/mixed in, check the pH of the residual material to ensure a neutral pH (if there is broken glass, once neutralized, safely pick up using tongs and place into a rigid container);
 - Collect all other neutralized spill material using dust pan and broom. Place material into a plastic bag or container for pickup.
 - Label with appropriately completed hazardous waste tag and leave in your SAA. Request a waste pickup.
- Otherwise close the fume hood sash and await support.
- Contact the University Operations Center at (617) 495-5560 [HMS/HSDM (617) 432-1901] if you need support or technical assistance.