



ENVIRONMENTAL HEALTH & SAFETY

Perchloric Acid Use and Storage Restrictions

Perchloric acid is a strong oxidizing mineral acid. Perchloric acid mist and vapor can condense in ventilation systems to form metallic perchlorates that can be explosive. Work with perchloric acid should only be conducted inside specially designed fume hoods with the ability to wash down ductwork, particularly when the chemical will be heated. Unfortunately, there are currently no fume hoods at either the Anschutz Medical Campus or Denver campus with this type of ductwork.

Environmental Health and Safety (EHS) may approve the use of small amounts, infrequent use, and/or weak solutions of perchloric acid in a regular fume hood; such fume hoods are dedicated for the specific procedure and are not shared with other researchers using volatile organics. Each laboratory using perchloric acid is required to complete a Standard Operating Procedure (SOP) to be reviewed by EHS. Additionally, chemical testing of the fume hood ducts and surfaces is required in each laboratory where perchloric acid is used.

Contact EHS and request assistance from the Research Safety and Industrial Hygiene (RSIH) division prior to using this acid. Provide the frequency of use, amount, concentration, brief description of work, container materials/types, and temperatures of the acid.

If you have been using perchloric acid, particularly heated or concentrated solutions, contact EHS (303-724-0345) immediately to test for potential duct contamination.

Health Hazard

Perchloric acid is unstable at standard temperature and pressure, and can undergo explosive decomposition, releasing chloride fumes, especially at elevated temperatures or if allowed to dehydrate. Concentrated perchloric acid can cause a fire or explosion.

Incompatible materials include: combustible materials, cellulose materials (paper, cotton, wood, etc.), organic chemicals, strong dehydrating agents, reducing and oxidizing agents, benzene, calcium hydride, wood, acetic acid, acetic anhydride, anhydrous phosphorous pentoxide, charcoal, olefins, ethanol, sulfur and sulfuric acid, and many metals.

Prohibited

- Do not use perchloric acid > 60%; anhydrous perchloric acid (> 85% concentration) is particularly hazardous and its use is strictly forbidden.
- Do not work near sparking sources and open flames.
- Do NOT heat perchloric acid in fume hoods.
- Do not distill perchloric acid in a vacuum.
- Do not store perchloric acid near heat sources.

If perchloric acid will be heated, or if the concentration of perchloric acid necessary for the research is > 60%, a specially designed perchloric acid fume hood and duct/fan system is required under these conditions and coordination between EHS, Facilities Management, and the laboratory is necessary.

Precautions

- Review the laboratory specific SOP.
- Substitute less hazardous chemicals or more dilute solutions of perchloric acid when possible.
- Keep the quantities of perchloric acid handled to a strict required minimum amount.
- Locate the nearest eyewash and emergency shower and clear area around these emergency features *before* beginning work.
- Perform all operations using compatible chemically resistant surfaces.
- Clear area of incompatible materials before beginning work with perchloric acid.
- When mixing working solutions, **add acid to water** slowly.
- Use impact-resistant chemical goggles, a face shield, nitrile/chloroprene gloves, and a rubber apron when handling perchloric acid.
- Always wear closed-toe shoes and laboratory coat in the lab.



- Avoid generating vapors [vapor pressure at 20° C is 0.9 kPa].
- **Important:** Wet wipe all surfaces when finished with *each* procedure involving perchloric acid. Quickly wipe up spills using compatible materials. For larger and/or concentrated spills, call EHS for assistance.
- Wash hands and materials thoroughly after handling. Remove any contaminated clothing and wash before reuse.
- In wet digestions with perchloric acid, treat the sample first with nitric acid to destroy easily oxidizable matter.

Inventory Management

Mark date of receipt on container. Indicate the date of receipt and the expiration date on the [online chemical inventory](#).

Manage perchloric acid stock inventory appropriately, inspect acid solutions routinely to ensure they are not dehydrating. If the material has turned dark or formed crystals, do not move the container. Contact [EHS](#) for proper disposal by completing the waste disposal pick up request form (EHS.hazmat@ucdenver.edu). Make a note in the comments section that the material is unstable (change in color, presence of crystals, etc.).

Store perchloric acid in the original container with secondary containment. If stored in alternate container, ensure that container is made of compatible materials (glass or porcelain). Store with other inorganic acids.

Do not store near organics/flammables, strong dehydrating agents such as sulfuric acid and anhydrous phosphorus pentoxide, and combustible materials.

Dispose of material when it reaches the expiration date on the original container.

Quantity limits of this product apply and may differ by building or by chemical concentration. Contact Fire and Life Safety (303-724-0293) for additional information.

Spill Procedures

For large or concentrated spills (greater than 500 ml):

- Any spill which a researcher is unfamiliar with, or the quantity spilled is too large to cleanup will need to request outside assistance and the spill is considered an emergency response spill.
- If it can be done safely, place some absorbent material on top of the spill, and make sure the fume hood is working properly for appropriate ventilation.
- Evacuate all personnel from the space and shut the door. Call EHS (4-911 or on the campus phone system call (303) 724-4444) or 303-556-5000 at the Denver campus and report the spill.

For small incidental spills (500ml or less):

- Small spills which do not enter drains can be cleaned up by trained personnel who possess the correct PPE, clean up materials, and comfort level to perform the cleanup activities.
- Proper PPE must be worn when cleaning the spill. Absorb any freestanding liquid with absorbent material and clean the spill area with an appropriate detergent.
- Collect all contaminated materials in a bag or container, label with a hazardous waste sticker, place the material in an SAA, and contact the [HAZMAT group](#) to have the material picked up.
- If the laboratory personnel do not feel confident in their ability to safely clean up the spilled material, contact EHS (4-911 or on the campus phone system call (303) 724-4444) or 303-556-5000 at the Denver campus and report the spill.

Emergency Response/First Aid

Eyes: In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Get medical aid immediately.

Skin: Remove contaminated clothing and/or PPE and wash affected area with soap and water for 15 minutes and seek medical attention.

Ingestion: Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

Inhalation: Move person to fresh air. If not breathing, give artificial respiration. Consult a physician.