

STANDARD OPERATING PROCEDURE: MINERAL ACIDS

PI: _____ Room & Building: _____
Department: _____ Research Group: _____
Date: _____ Pertains to Lab Protocol: _____

DESCRIPTION

A mineral acid is defined as a water-soluble acid derived from inorganic minerals by chemical reaction as opposed to organic acids (e.g. acetic acid, formic acid). Chemicals that fall under, but are not limited to, this SOP include:

- Hydrochloric acid (CAS No. 7647-01-0)
- Nitric acid (CAS No. 7697-37-2)
- Phosphoric acid (CAS No. 7664-38-2)
- Sulfuric acid (CAS No. 7664-93-9)
- Hydrofluoric acid (CAS No. 7664-39-3)
- Boric acid (CAS No. 10043-35-3)
- Chromic acid (CAS No. 1333-82-0)

USE & PROCEDURE

Attach the experimental protocol(s) that involve the use of mineral acid(s).

POTENTIAL HAZARDS

- Corrosive – causes severe eye and skin burns; can cause digestive and respiratory tract burns
- Irritant – eye, skin, respiratory tract, digestive tract

Additional Comments:

- *Nitric acid* – strong oxidizer
- *Sulfuric acid* – water reactive; strong inorganic acid mists containing sulfuric acid can cause cancer
- *Hydrofluoric acid* – causes severe burns, which may not be immediately painful or visible - symptoms may be delayed 8 hours or longer

ENGINEERING/VENTILATION CONTROLS

All operations involving concentrated mineral acids should be carried out in a chemical fume hood with the sash in the down position, between your chest and what you are handling in the hood.

- If the hood's sash cannot be adjusted horizontally, protective eyewear is required (see "Recommended Personal Protective Equipment")

RECOMMENDED PERSONAL PROTECTIVE EQUIPMENT

- ✓ Chemical splash goggles
- ✓ Face shield
 - Only applicable if not working in a fume hood or if hood's sash is not down.
- ✓ Double nitrile, neoprene, or PVC (vinyl) gloves
 - Immediately replace with new gloves when splash occurs.
- ✓ Chemical resistant apron/smock/lab coat (rubber, neoprene or PVC), reusable or disposable.
 - Avoid using the traditional cotton-polyester white lab coat, which readily collects/absorbs compounds.
- ✓ Protective clothing (e.g. impervious sleeves, closed-toed impervious footwear)

ADDITIONAL PRECAUTIONS

- When diluting, the acid should *always* be added slowly to water and in small amounts. *Never* use hot water and *never* add water to the acid. Water added to acid can cause uncontrolled boiling and splashing.
- Reaction with certain metals generates flammable and potentially explosive hydrogen gas.
- Avoid mixing nitric acid with organics. This can result in an explosion or fire.
- Stock fresh calcium gluconate, in a tube, to counter immediate effects of hydrofluoric acid on skin, tissue, then seek immediate medical attention.

MATERIAL SAFETY DATA SHEETS

MSDSs are available electronically via EHS Department's Web page:

<http://www.uos.harvard.edu/ehs/msds/>. An option, but consider collecting in a binder the MSDSs that arrive with each order.

STORAGE

- Bottles of mineral acids should be stored together in an acid (corrosive) cabinet.
- Nitric acid, a strong oxidizer, should be stored separately in a chemically resistant secondary container within an acid cabinet. This could be a polyethylene, PYREX or Nalgene tray or pan. It can also be stored in its own acid cabinet.
- Mineral acids should be stored separately from oxidizing agents, organic materials, and combustible materials.
- Avoid storing ammonium hydroxide and strong mineral acids in the same cabinet.
- Containers of hydrochloric acid and sulfuric acid should be stored in secondary plastic trays to avoid corrosion of metal storage shelves due to drips or spills; containers of hydrofluoric acid should be stored in secondary containers made of polyethylene.

WASTE

Refer to the *Harvard Longwood Laboratory Waste Guide* at

<http://www.uos.harvard.edu/ehs/longwood/HarvardLongwoodLabWasteGuide.pdf>

EMEGENCY PROCEDURES

Refer to the emergency flip chart titled “*EHS Procedures and Response Guidelines*,” posted in each laboratory and found on EHS’s webpage at <http://www.uos.harvard.edu/ehs/longwood/>

Chemical Spill:

- For small spills, follow chemical spill response guidelines above. Don protective clothing and carefully apply acid-neutralization powder or liquid, whichever is most appropriate, to the spill. Allow time to neutralize, and then apply liquid absorbent pellets or powder.
- For a large spill, vacate the lab, deny further entry, and call EHS for assistance.
- For small spills, once the absorbent has been removed, wash the contaminated area with sodium bicarbonate and water.