Lab 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:

* + Boric acid (CAS No. 10043-35-3)
	+ Chromic acid (CAS No. 1333-82-0)
* 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)

Does not include hydrofluoric acid (CAS No. 7664-39-3), which is addressed by a separate guideline.

**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

**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.

**REQUIRED PERSONAL PROTECTIVE EQUIPMENT**

(Refer to your lab’s PPE Assessment Report, supplemented with information here)

* 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.

**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.

**SAFETY REFERENCES**

Additional chemical safety information, including MSDSs and other information, is available electronically as tools at [ehs.harvard.edu/programs/safe-chemical-work-practices](http://ehs.harvard.edu/programs/safe-chemical-work-practices).

**WASTE DISPOSAL**

Refer to the *Laboratory Waste Guide* posted at [ehs.harvard.edu/node/7699](http://ehs.harvard.edu/node/7699).

**EMERGENCY PROCEDURES**

(Refer to the [Emergency Response Guide](http://www.ehs.harvard.edu/programs/emergency-guidance) posted in each lab, supplemented with information here)

* + 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. Once the absorbent has been removed, wash the contaminated area with sodium bicarbonate and water.
* For a large spill, vacate the lab, deny further entry, and call EH&S for assistance.
* In the event of fire, evacuate and bar further entry. Activate fire alarm and leave the building. May emit toxic fumes under fire conditions.