Standard Operating Procedure

Chemical name and concentration: **Nitric Acid, 7697-37-2, 70%**

*This is an SOP template. It is not complete until:*

1. *Lab specific information is entered into the box below.*
2. *Lab specific protocol and procedure is added to the protocol and procedure section.*
3. *SOP has been signed and dated by the PI and relevant lab personnel.*
4. *All italicized/red text has been removed/replaced with information specific to the chemical.*

Print a copy and insert into your **Laboratory Safety Manual and Chemical Hygiene Plan**. Refer to instructions for assistance.

|  |  |
| --- | --- |
| **School and department:** | Click here to enter text. |
| **SOP preparation date:** | Click here to enter a date. | **SOP approval date:** | Click here to enter a date. |
| **Principal investigator:** | Click here to enter text. |
| **Lab manager name:** | Click here to enter text. |
| **Laboratory phone:** | Click here to enter text. | **Office phone:** | Click here to enter text. |
| **Emergency contact:** | Click here to enter text. | **Contact phone:** | Click here to enter text. |
|  |  |  |  |
| **Laboratory locations covered by this SOP – building and room number** |
| Click here to enter text. |

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| **Type of SOP** |[ ]  Process |[x]  Hazardous chemical |[ ]  Hazardous class |

Hazards Identification

**GHS Classification**

Oxidizing liquids (Category 3), H272

Corrosive to Metals (Category 1), H290

Acute toxicity, Inhalation (Category 3), H331

Skin corrosion (Category 1A), H314

Serious eye damage (Category 1), H318

**GHS Label Information**

**Pictogram**

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**Signal Word**

Danger

**Hazard Statement(s)**

H272 May intensify fire; oxidizer.

H290 May be corrosive to metals.

H314 Causes severe skin burns and eye damage.

H331 Toxic if inhaled.

**Precautionary Statement(s)**

P210 Keep away from heat.

P220 Keep/Store away from clothing/ combustible materials.

P221 Take any precaution to avoid mixing with combustibles.

P234 Keep only in original container.

P261 Avoid breathing dust/ fume/ gas/ mist/ vapors/ spray.

P264 Wash skin thoroughly after handling.

P271 Use only outdoors or in a well-ventilated area.

P280 Wear protective gloves/ protective clothing/ eye protection/ face

protection.

P301 + P330 + P331 IF SWALLOWED: Rinse mouth. Do NOT induce vomiting.

P303 + P361 + P353 IF ON SKIN (or hair): Take off immediately all contaminated

clothing. Rinse skin with water/ shower.

P304 + P340 + P310 IF INHALED: Remove person to fresh air and keep comfortable for breathing. Immediately call a POISON CENTER/ doctor.

P305 + P351 + P338 + P310 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Immediately call a POISON CENTER/ doctor.

P363 Wash contaminated clothing before reuse.

P370 + P378 In case of fire: Use dry sand, dry chemical or alcohol-resistant

foam to extinguish.

P390 Absorb spillage to prevent material damage.

P403 + P233 Store in a well-ventilated place. Keep container tightly closed.

P405 Store locked up.

P406 Store in corrosive resistant container with a resistant inner

liner.

P501 Dispose of contents/ container to an approved waste disposal

plant.

**Hazards not otherwise classified (HNOC) or not covered by GHS**

Corrosive to the respiratory tract.

Physical and Chemical Properties

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| --- | --- | --- | --- |
| CAS | 7697-37-2 | Melting Point/Range | 41 °C, -41.8 °F |
| Molecular Formula | HNO3 | Boiling Point/Range | 120.5 °C, 248.9 °F |
| Molecular Weight | 63.01 g/mol | Flash Point | Not flammable |
| Physical State, Color | Colorless liquid | Upper flammability/ explosion limit | No data available |
| Odor | Strong acid | Lower flammability/ explosion limit | No data available |
| Odor Threshold | No data available | Autoignition Temp. | No data available |
| Evaporation Rate | No data available | Decomposition Temp | No data available |

First Aid Procedures

**If inhaled,** move to fresh air. If the person is not breathing, give artificial respiration. Avoid mouth to mouth contact. Call 911. Then call EHS at 480-965-1823.

**In case of skin contact,** immediately remove all contaminated clothing and flush affected area for 15 minutes. Call 911. Then call EHS at 480-965-1823.

**In case of eye contact,** use nearest emergency eyewash immediately. Remove any contact lenses. Call 911. Then call EHS at 480-965-1823.

**If swallowed,** do not induce vomiting. Never give anything by mouth to an unconscious person. Call 911. Then call EHS at 480-965-1823.

Spill and Accident Procedure

**Personal precautions**

* Avoid breathing vapors, mist or dust.
* If the spill happened outside of a fume hood and poses a respiratory threat, evacuate the lab and call EHS (480-965-1823).
* Do not attempt clean-up without the required PPE (see below).

**Environmental precautions**

Prevent further leakage or spillage – if safe to do so. Do not allow product to enter drains.

**Methods and materials for containment and clean-up**

* Consider material compatibility prior to clean-up.
	+ Verify the spill is not releasing hazardous fumes outside of a fume hood.
	+ Verify EHS-provided chemical spill kit is available.
	+ Verify correct PPE is being worn.
* Immediately assess amount spilled, follow posted ASU Emergency Response Guide procedures for hazardous materials incidents.
* If a chemical exposure has occurred, follow First Aid Procedures above. A fellow lab worker shall call 9-1-1 and seek immediate medical attention. Then call EHS at (480) 965-1823.
* Secure / restrict access to the area of the spill to prevent spread of the chemical.
* Use the available spill kit to stop and contain the spill. Bag the collected material.
* Label and tag as hazardous waste and submit a pick-up request to EH&S using EHS Assistant. <https://ehsaweb.asu.edu/>

Personal protective equipment (PPE) & Engineering Controls

**Respiratory protection**

* Nitric acid fumes are corrosive.
* Use nitric acid and its dilutions inside a properly-functioning fume hood.
* If any spills outside the fume hood result, evacuate the lab and call EHS at 480-965-1823.

**Hand protection**

* Handle with appropriate glove type.
* Use proper glove removal technique to avoid skin contact with this product.
* Neoprene/chloroprene (18 mil or more thick), fluorinated rubber (Viton), and butyl rubber gloves are sufficient protection options for handling nitric acid and dilutions.
	+ For nitric acid dilutions below 30%, thinner (disposable) neoprene/chloroprene gloves are adequate.
	+ Nitrile, latex, and natural rubber gloves are NOT recommended.

**Eye protection**

* Wear chemical splash goggles to protect from splash hazards and chemical vapors.
	+ Chemical splash goggles must meet ANSI Z87.1 D3 certification. Goggles must be properly-fitted to the face to provide an adequate seal against splashes.
* Goggles must be worn at all times by all lab personnel within splash range of the work performed if the work involves any liquids that are not plain water.

**Skin and body protection**

* Lab coat
* If working with more than 200mL of nitric acid, an apron is required, and a face shield is recommended (the fume hood sash can be a substitute for a face shield).
* Full-length pants (avoid polyester)
* Fully-enclosed rubber or leather shoes

**Hygiene measures**

Avoid contact with skin, eyes, and clothing. Wash hands before breaks and immediately after handling the product.

Storage

* Ensure the container is tightly closed at all times with a lid that will not come loose in the event that the container tips over (parafilm is not a substitute).
* Store in original container.
* Protect from direct sunlight.
* Keep in a cool, dry, well-ventilated area away from incompatible materials and conditions.
* Segregate from the following incompatible materials:
	+ flammable or combustible materials
	+ alkali metals
	+ powdered metals
	+ reducing agents
	+ organic materials
	+ bases
	+ cyanides
	+ aldehydes
	+ ammonia
	+ acetic anhydride
	+ acetonitrile
	+ alcohols
	+ acrylonitrile
	+ Never add water to acid; always add acid to water.
* A secondary container – preferably ETFE, FEP, TFE, or PFA plastic – may be used to segregate nitric acid.
* Inspect periodically for damage or evidence of leaks or corrosion.

Handling Requirements

* The lab where the material is being handled must have an approved / certified emergency eyewash and safety shower.
* Ensure you are wearing the required PPE and using appropriate engineering controls as stated above.
* Lab emergency contact information must be readily posted. Easy access to a cellular phone or land line is readily available.
* Handle only inside a fume hood.
* Avoid contact with skin, eyes, and clothing.
* Never add water to acid (it could violently fume or boil).
* Always add acid to water. Add it slowly, watching carefully for fuming/steaming.
* Nitric acid may react with metal or plastic tools.

Protocol and procedure

***Laboratory-specific procedures***

*Add your lab’s specific procedures in this section. Write out separate steps in a list format for easy reading. Please include photos whenever possible. Be descriptive – future generations of researchers in your lab may need to learn the procedure from this document.*

 Click here to enter text.

**Important note:** Any deviation from this SOP requires advance PI approval.

Cleanup and Waste Disposal Procedure

**Label waste**

* Attach a completed ASU Hazardous Waste tag to all waste containers as soon as the first drop of waste is added to the container.

**Store waste**

* Never pour nitric acid waste into a waste container that has the following incompatible materials:
	+ flammable or combustible materials
	+ alkali metals
	+ powdered metals
	+ reducing agents
	+ organic materials
	+ bases
	+ cyanides
	+ aldehydes
	+ ammonia
	+ acetic anhydride
	+ acetonitrile
	+ alcohols
	+ acrylonitrile
	+ Never add water to (waste) acid; always add acid to water.
* Store hazardous waste in closed containers, in secondary containment and in a designated location.
	+ Do not store waste inside a fume hood. Clutter inside a fume hood will block the air flow and prevent the fume hood from working properly.
* Separate waste container from any incompatible materials.
* Double-bag dry waste (kimwipes, gloves, etc.) using sealable transparent bags.
* Any waste objects that can penetrate bags (pipettes, swabs, razor blades, or syringes) must be placed inside a leak-proof container made out of a material that will resist cuts or punctures from those objects.
* If the chemical gives off hazardous vapors, the waste container must be brought inside the fume hood whenever waste is being added to it.
* Waste must be under the control of the person generating and disposing of it.

**Dispose of waste**

* Dispose of regularly generated chemical waste within 90 days or less (even if the container is not full).
* Use EHS Assistant online hazardous waste pick-up request system: <https://ehsaweb.asu.edu/>
* Contact ASU EH&S at (480) 965-1823 with questions.

Documentation of training

* Prior to conducting any work with this material, Principal Investigator or designee must provide to his or her laboratory personnel specific to the hazards involved in working with this substance, work area decontamination, and emergency procedures.
* The Principal Investigator must provide his/her laboratory personnel with a copy of this SOP and a copy of the Safety Data Sheet or SDS provided by the manufacturer.
* The Principal Investigator must ensure that his/her laboratory personnel have attended appropriate/required laboratory safety training or refresher training within the last one year.

**I have read and understand the content of this SOP.**

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| --- | --- | --- | --- |
| **Employee name** | **ASU affiliate no.** | **Signature** | **Date** |
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