Chemical Standard Operating Procedure

All work involving materials classified as Particularly Hazardous requires the completion of Section 6.

Procedure Name	Nitric Acid Uses				
Procedure Author					
Name of Responsible Person					
Location to be Performed	Room 305				
Creation Date		**Review Date(s)**		**Revision Date(s)**	

1. THIS STANDARD OPERATING PROCEDURE (SOP) IS FOR A:

☐Specific laboratory procedure or experiment
- Examples: synthesis of chemiluminescent esters

☐Generic laboratory procedure that covers several chemicals
- Examples: distillation, chromatography

☒Generic use of a specific chemical or class of chemicals with similar hazards
- Examples: Organic azides, mineral acids, hydrofluoric acid

2. DESCRIPTION: *Briefly describe how the chemical will be used.*

How to safely handle concentrated nitric acid (65-70%) for various procedures.

3. RISK IDENTIFICATION: *Identify potential safety hazards – refer to Section 2 of the SDS.*

☐Explosive	☐Carcinogen
☐Pyrophoric	☐Sensitizer (respiratory and/or skin)
☐Flammable (liquid, solid, gas or aerosol)	☐Irritant (skin and/or eye)
☐Self-Reactive	☒Corrosive (skin and/or eye damage)
☐Peroxide Forming	☒Acute Toxicity (oral, dermal and/or inhalation)
☐Organic Peroxide	☐Germ Cell Mutagen
☒Oxidizing (liquid, solid or gas)	☐Reproductive Toxicity
☐Water-Reactive	☐Target Organ Systemic Toxicity: Single Exposure
☐Compressed Gases	☐Target Organ Systemic Toxicity: Repeated Exposure
☐Cryogen	☐Other: Click or tap here to enter text.
☒Corrosion to Metals	
☐Radionuclides	
☐Other: Click or tap here to enter text.	

Notes (include chemicals that will be used, additional cautions, permissible exposure limits, etc.):
- May intensify fire; oxidizer
- May be corrosive to metals
- Causes severe skin burns and eye damage

	• Toxic if inhaled • PEL = 2 ppm (TWA) If you prepare Aqua regia (mixture of HNO3: HCl at 1:3 ratio), **a separate SOP is required.**
4.	**WHAT ENGINEERING CONTROLS WILL BE USED TO MINIMIZE EXPOSURES TO THESE HAZARDS?** *select all that apply*
	☒Fume Hood ☐Snorkel ☐Glove Box ☐Clean Room ☐Explosion Shielding ☐Splash Shielding ☐Beta Shielding ☐Safety Storage Cabinet ☐Flammable Storage Refrigerator ☐Other: Click or tap here to enter text.
5.	**WHAT PERSONAL PROTECTIVE EQUIPMENT IS REQUIRED TO MINIMIZE THESE HAZARDS?** *select all that apply*
	☒Safety Glasses ☒Lab Coat ☐Fire-Resistant Lab Coat ☒Gloves - specify type: Ansell neoprene for handling concentrated acid, Ansell nitrile for solutions < 20% nitric. ☐Acid Resistant Gloves ☐Acid Resistant Apron ☐Face shield ☐Other: Standard nitrile gloves (≥4 mil) resist incidental drops of diluted solutions. If you **notice some nitric acid on your glove, change it right away.** Butyl rubber or neoprene gloves offer additional protection (e.g., immersion in nitric acid).
6.	**STEP-BY-STEP OPERATING PROCEDURE** *Provide a sequential description of work, including as much detail as possible such as designated work area(s), chemical concentrations ranges and amount used (mass, volume) and when special safety equipment is to be utilized. Include temperature, pressure, and other experimental conditions if possible. Pictures and schematics are recommended for complex setups.* ***Highlight the steps with the highest hazards.***
	AVOID INHALATION! Perform all operations in a certified chemical fume hood, wet bench or other approved ventilated enclosure. AVOID CONTACT! Use appropriate personal protective equipment PPE,

The protocols listed below utilize nitric acid. Please ensure this sheet is attached to each protocol.

- C1.07.05.17.05: Acid Bath for Glassware Cleaning
- A1.05.03.17.01: Sample Digestion for Atomic Absorption Analysis
- P1.12.01.17.02: Purification of Carbon Nanotubes

7. **TRANSPORT, RECEIVING AND STORAGE REQUIREMENTS**

Describe transport, receiving and storage requirements. Include secondary containment, transport devices (carts, carriers, etc.), segregation requirements, any special temperature or atmospheric requirements, and container compatibility requirements. Information may be included in Section 6.

Keep container tightly closed in a dry and well-ventilated area, away from direct sunlight. Opened containers must be carefully resealed and stored upright to prevent leakage. Always store nitric acid in secondary containment. Containers holding nitric acid need to be stored below eye level. Store nitric acid away from flammable and combustible materials. Incompatibles include reducing agents, bases, alkali metals, cyanides, powdered metals, and organic materials (including organic acids). It's advisable to further segregate nitric acid from other inorganic acids.

Chemical name	*Storage location/requirement*
Nitric Acid	Acid cabinet next to the fume hood

8. **WASTE DISPOSAL**

Type of waste generated by this procedure/process (*check all that apply*):
☐Solid ☒Liquid

Waste hazard determination (*check all that apply*):

Type of Waste	*Hazard Determination*
Solid	☐Flammable ☐Oxidizer ☒Corrossive ☐Reactive ☒Toxic
Liquid	☐Flammable ☐Oxidizer ☐Corrossive ☐Reactive ☐Toxic

Expected waste generation per experiemntal run (mass/volume): 5 mL – 5 L (see protocol)

Disposal procedure and location of Satellite Accumulation Area:

The SAA is located under the benchtop on the left-hand side of the room (as you enter). Nitric acid waste should never be combined with organics or reducing agents. The best

	practice is to store all nitric acid-containing waste streams in a dedicated container segregated from all other waste streams if possible. • Containers must be closed at all times except when physically adding waste • Containers must be labelled with all chemical constituents (and their approximate % by volume), including water • Segregate liquid waste from solid wastes • Use secondary containment (tray or tub) • Leave adequate headspace in liquid containers (~1" is sufficient for a 4L container; leave more or less depending on the size of your waste container)
9.	**EMERGENCY PROCEDURES** *Indicate how spills, personnel exposure/injury, and other accidents should be handled and by whom.* **Exposure:** • Skin or Eye Contact: remove contaminated clothing and accessories; flush affected area with water for 15 minutes. If symptoms persist, get medical attention. • Inhalation: move person into fresh air. If symptoms persist, get medical attention. • Ingestion: rinse mouth with water. If symptoms persist, get medical attention. **Life-threatening emergencies** (*fire, explosion, large-scale spill or release, compressed*) • **ACTIVATE THE BUILDING'S FIRE ALARM SYSTEM IF THE SPILL REPRESENTS A THREAT TO HUMAN LIFE OR MAY CAUSE A FIRE OR EXPLOSION.** • Notify all persons in the workspace that a spill has occurred and evacuate all personnel from the workspace to a safe location. • Isolate the work space to prevent inadvertent entry: lock any access doors, place signs on doors reading "DO NOT ENTER-CHEMICAL SPILL" • **Call EHS at 392-8400 for clean-up assistance. If the emergency occurs outside of normal work hours, contact the University Police Department at 392-1111.** **For small spills/local clean-up (< 50 mL concentrated, < 500 mL diluted)** In the event of a minor spill or release that can be cleaned up by local personnel: 1. Notify personnel in the area and restrict access. 2. If trained and confident, apply acid neutralizer wearing PPE described above including face shield. Otherwise contact EHS at 392-8400. 3. Absorb with polypropylene, vermiculite, or pearlite absorbent after neutralization. The spill kit is located under the sink. 4. Collect spill cleanup materials in a closed container. Manage spill clean-up debris as hazardous waste. 5. Submit online waste pickup. Emergency contact numbers: Lab manager xxx-xxx-xxxx

	Building Manager	xxx-xxx-xxxx
	Principal Investigator	xxx-xxx-xxxx
	Poison Control Center	800-222-1222
	Emergency	911
	EHS	352-392-1591