



Acutely Toxic Chemicals (ATCs)

H300 H301 H304 H310 H311 H330 H331 H370 H372



Areas with blue text indicate that information must be provided or modified by researcher prior to the SOP approval.

This SOP is not a substitute for hands-on training.

Print a copy and insert into your laboratory SOP binder.

Department:	[Chemistry]
Date SOP was written:	[Tuesday, September 20, 2016]
Date SOP was approved by PI/lab supervisor:	[]
Principal Investigator:	[Name: R. Cohen]
	[Signature: _____]
Internal Lab Safety Coordinator or Lab Manager:	[Name: Tamara Sparks]
	[Lab Phone: 303-921-9783]
	[Office Phone:]
Emergency Contact:	[Name: Tamara Sparks]
	[Phone Number:]
Location(s) covered by this SOP:	[Hildebrand B49,B70,B74,B76]

1. Purpose

This SOP covers the precautions and safe handling procedures for the use of Acutely Toxic Chemicals (ATCs).

For a list of ATCs covered by this SOP and their use(s), see “List of Chemicals”. Procedures described in Section 12 apply to all materials covered in this SOP.

If you have questions concerning the applicability of any recommendation or requirement listed in this procedure, contact the Principal Investigator/Laboratory Supervisor or the campus Chemical Hygiene Officer at ucbcho@berkeley.edu.



2. Acutely Toxic Chemicals Information

Acute toxicity refers to those adverse effects occurring following oral or dermal administration of a single dose of a substance, or multiple doses within 24 hours, or an inhalation exposure of 4 hours as defined by the Globally Harmonized System (GHS).

3. Potential Hazards/Toxicity

Substances can be allocated to one of five hazards categories based on acute toxicity by oral, dermal or inhalation route according to the numeric cut-off criteria as shown in the table *Acute Toxicity Hazard Categories* (Appendix 1). Acute toxicity values are expressed as (approximate) LD₅₀ (oral, dermal) or LC₅₀ (inhalation) values.

The Globally Harmonized System of Classification and Labeling of Chemicals (GHS) designates acutely toxic chemicals by one or more of the following H codes:

- H300** Fatal if swallowed
- H301** Toxic if swallowed
- H304** May be fatal if swallowed and enters airways
- H310** Fatal in contact with skin
- H311** Toxic in contact with skin
- H330** Fatal if inhaled
- H331** Toxic if inhaled
- H370** Causes damage to organs (single exposure)
- H372** Causes damage to organs through prolonged or repeated exposure

ATCs may also have other hazardous properties in addition to toxicity. Safe use requires assessing all potential hazards.

It is the Principal Investigator's responsibility to ensure activity-specific laboratory procedures and/or processes are taken into account when using this Chemical Class SOP.

Please, review the SDS of any chemical before use (see Section 11 – SDS Location).

4. Engineering Controls

Use the engineering controls listed below unless other lab-specific information is included in the Protocol/Procedure section.

- Work with ATCs – the work must be conducted in a fume hood unless other controls are designated in the lab-specific Protocol/Procedure section. Sash height must be kept as low as possible to avoid escaping fumes and provide a physical barrier.
- Laboratories and rooms where ATCs are used must have general room ventilation that is negative pressure with respect to the corridors and external environment. The laboratory/room door must be kept closed at all times.

5. Personal Protective Equipment

At a minimum, the following PPE must be worn at all times.



Eye and Face Protection

- A. ANSI Z87.1-compliant safety glasses with side shields, or chemical splash goggles.
 - Ordinary prescription glasses will NOT provide adequate protection unless they also meet ANSI standard and have compliant side shields.
- B. If the potential for explosion/splashing exists, and adequate coverage is not provided by the hood sash, a face shield must be worn.

Skin and Body Protection

- A. Gloves are required when handling hazardous chemicals.
 - Refer to specific chemical SDS for information on glove selection.
 - For additional information on glove selection, go to:
<http://ehs.berkeley.edu/hs/63-laboratory-safety/94-glove-selection-and-usage.html>
- B. Lab coats are required when handling hazardous chemicals in the lab. Select the type of lab coat according to the hazards at the specific workplace.
- C. Long pants, closed-toe/closed-heel shoes, covered legs, and ankles.

Respiratory Protection

Respiratory protection is normally not required for UC Berkeley laboratory activities. Any lab personnel considering the use of a respirator (e.g. N-95 respirator, dust mask) must contact EH&S for a workplace assessment.

6. First Aid Procedures and Medical Emergencies

In the event of an injury, notify your supervisor immediately and EH&S within 8 hours.



Go to the Occupational Health Facility (Tang Health Center, on campus); if after hours, go to the nearest emergency room (Alta Bates, 2450 Ashby Ave in Berkeley); or



Call 911 (from a cell phone: 510-642-3333) if:

- ***it is a life threatening emergency; or***
- ***you not are confident in your ability to fully assess the conditions of the environment and/or the condition of the contaminated/injured person, or you cannot be assured of your own safety; or***
- ***the contaminated/injured person is not breathing or is unconscious.***

Please remember to provide a copy of the appropriate manufacturer SDS (if available) to the emergency responders or physician. At a minimum, be ready to provide the identity/name of any hazardous materials involved.

In case of skin contact

If skin contact occurs, and/or skin or clothing are on fire, immediately drench in the safety shower with copious amounts of water for no less than 15 minutes to remove any remaining contaminants. If possible to do so without further injury, remove any remaining jewelry or clothing.

In case of eye contact

Rinse thoroughly with plenty of water using an eyewash station for at least 15 minutes, occasionally lifting the upper and lower eyelids. Remove contact lenses if possible.

If swallowed



Do NOT induce vomiting unless directed otherwise by the SDS. Never give anything by mouth to an unconscious person. Rinse mouth with water.

If inhaled

Move into fresh air.

Needle stick/puncture exposure

Wash the affected area with antiseptic soap and warm water for 15 minutes.

7. Special Handling, Storage, and Disposal Requirements

Lab-specific information on handling and storage may be included in Section 12-Protocol/Procedure.

Precautions for Safe Handling

- Eliminate or substitute for a less hazardous material when possible.
- Design your experiment to use the least amount of material possible to achieve the desired result.
- Do not exceed the scale of procedures specified in Protocol/Procedure section without approval of the PI.
- Verify your experimental set-up and procedure prior to use.
- Know the location of the nearest eyewash, safety shower and fire extinguisher before beginning work.
- Upon leaving the work area, remove any personal protective equipment worn and wash hands.
- At the end of each project, thoroughly decontaminate the work area according to the material being handled.

Conditions for Safe Storage

- Store non-flammable ATCs within secondary containment.
- Chemicals that require refrigeration must be stored appropriately.
- Store flammable ATCs within flammable storage cabinet.

Disposal

- Waste materials generated must be treated as a hazardous waste.
- The empty container must be rinsed three times with a COMPATIBLE solvent; leave it open in the back of the hood overnight. Solvent rinses and water rinse must be disposed of as hazardous waste.
- As an alternative, unrinsed empty containers can be disposed of through EH&S as hazardous waste. The unrinsed empty containers must be capped.
- Do not mix with incompatible waste streams.

8. Chemical Spill

Spill – Assess the extent of danger; if necessary request help by calling **911** (from a cell phone: **510-642-3333**) for emergency assistance or 510-642-3073 for non-life threatening situations. If you cannot assess the conditions of the environment well enough to be sure of your own safety, do not enter the area. If possible help contaminated or injured persons. Evacuate the spill area. Avoid breathing vapors from spill. If possible, confine the spill to a small area using a spill kit or absorbent material. Keep others from entering contaminated area (e.g., use caution tape, barriers, etc.).



- **Minor Spill** – In the event of a minor spill, if there is no potential for hazardous chemical exposure, report the spill to 510-642-3073 and if you are trained, proceed to clean it. Use appropriate personal protective equipment and clean-up material for chemical spilled. Double bag spill waste in clear plastic bags, label and request pick-up.
- **Major Spill** – Any hazardous chemical spill that involves chemical exposure, any chemical spill that due to size and/or hazard requires capabilities beyond your training, or any chemical spill that gives the perception (because of odor, for example) that there has been a hazardous release. Call **911** or 510-642-3073 for assistance.

9. Cleaning and Decontamination

Lab-specific information on decontamination may be included in Section 12 - Protocol/Procedure.

- Wearing proper PPE, laboratory work surfaces must be cleaned at the conclusion of each procedure and at the end of each work day.
- Decontaminate all equipment before removing from a designated area.

10. Hazardous Waste Disposal

Label Waste

- Label all waste containers. See the EH&S Fact Sheet, “Hazardous Waste Management” for general instructions on procedures for disposing of hazardous waste.

Dispose of Waste

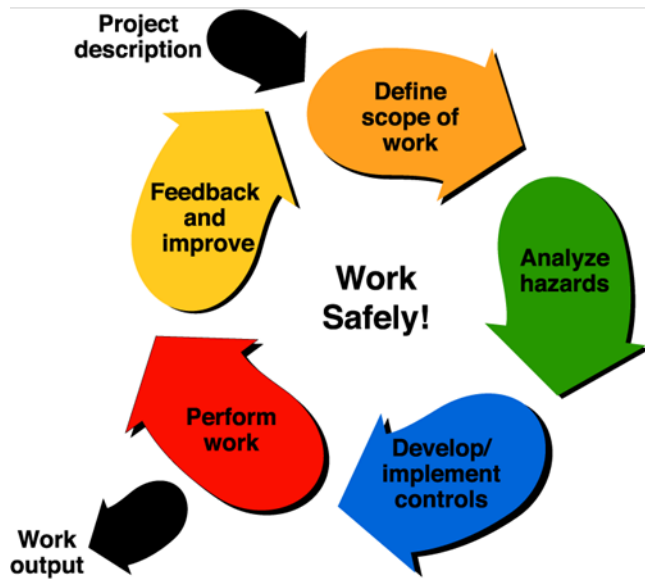
- Dispose of regularly generated chemical waste within 6 months.
- Contact EH&S at 642-3073 if you need assistance.

11. Safety Data Sheet (SDS) Location

SDS can be accessed online at <http://ucsd.com>



-Take Ownership of Your Safety-



Before starting any work, ask yourself:

- 1- **What will I be doing?**
- 2- **Do I know what the hazards are?**
- 3- **Do I have everything I need to do the job safely?**
- 4- **Am I doing the job safely?**
- 5- **What can we do better?**



12. Protocol/Procedure for– Acutely Toxic Chemicals

Section 12 must be customized to your specific needs. Delete any procedure that does not apply to your laboratory.

Procedure/Use	Scale	Engineering Controls/Equipment	PPE (eye, face, gloves, clothing)	Procedure Steps and Special Precautions for this Procedure
1. Using Acutely Toxic chemicals as reagents in the synthesis of hydroxy nitrates	Up to 2 g or less as supplied in the reagent bottle. Remember to obtain PI approval if higher scale is necessary.	All reactions using these materials must be performed in a properly operating fume hood with the sash as low as possible.	<p>Eye protection: Wear ANSI Approved tight-fitting safety goggles or safety glasses with side shields.</p> <p>Face Protection: Face shields are to be used when there is no protection from the hood sash.</p> <p>Hand Protection: Confirm compatibility of glove material with chemical being used. General guidance (unless otherwise specified in the specific SDS): Nitrile gloves must be used to prevent incidental contact. For spill handling or for potential contact with larger quantities, use double nitrile or heavier gauge nitrile or neoprene gloves. Gloves must be inspected prior to use. Wash and dry hands after use.</p> <p>Clothing: Wear lab coat; full length pants or equivalent; and close-toed, close-heeled shoes.</p>	Follow literature procedure of Helv. Chim. Acta 90, 110-113, 2007. Avoid the formation of dusts with solids. Carefully weigh reagent in an enclosed or vented area. If this is not possible use the tared vessel method and cap the vessel during transport to and from the balance. Use a secondary container for transport of the tared vessel. Immediately move all operations to the fume hood when weighing is complete. In a properly functioning fume hood, add reagent to the reaction vessel. For liquid reagents, add to the reaction vessel dropwise using a syringe.
Notes	Any deviation from this SOP requires approval from PI.			



Procedure/Use	Scale	Engineering Controls/Equipment	PPE (eye, face, gloves, clothing)	Procedure Steps and Special Precautions for this Procedure
2. Using Acutely Toxic Chemicals as solvents in reactions, for extractions, for NMR, or for cleaning glassware/machine parts	Up to 500 mL as supplied in the reagent bottle. Remember to obtain PI approval if higher scale is necessary.	All reactions using these materials must be performed in a properly operating fume hood with the sash as low as possible.	<p>Eye protection: Wear ANSI Approved tight-fitting safety goggles or safety glasses with side shields.</p> <p>Face Protection: Face shields are to be used when there is no protection from the hood sash.</p> <p>Hand Protection: Confirm compatibility of glove material with chemical being used. General guidance (unless otherwise specified in the specific SDS): Nitrile gloves must be used to prevent incidental contact. For spill handling or for potential contact with larger quantities, use double nitrile or heavier gauge nitrile or neoprene gloves. Gloves must be inspected prior to use. Wash and dry hands after use.</p> <p>Clothing: Wear lab coat; full length pants or equivalent; and close-toed, close-heeled shoes.</p>	<p>Avoid inhalation of these materials.</p> <p>If a rotary evaporator is used, use an open cold trap system to condense the solvent.</p> <p>Pressure can be built up when these solvents are used in closed reaction vessels. Adequate ventilation (e.g. pressure bubbler on Schlenk manifold, or an equilibrating balloon) must be used to prevent dangerous over pressurization.</p> <p>Pressure may be built up when performing extractions. Adequate ventilation (open the valve frequently during the extraction) has to be used to prevent dangerous over pressurization. The vapor in such a process must be released in a fume hood.</p> <p>If heated, the reaction apparatus has to be fitted with an adequately sized condenser and an adequate flow of cooling water has to be provided to prevent evaporation. Cooling hoses have to be secured with hose clamps to the condenser and the outlet.</p> <p>When used to clean glassware or machine parts, leave the cleaned glassware in the fume hood until the solvent has evaporated off.</p>
Notes	Any deviation from this SOP requires approval from PI.			



Procedure/Use	Scale	Engineering Controls/Equipment	PPE (eye, face, gloves, clothing)	Procedure Steps and Special Precautions for this Procedure
3. Using Acutely Toxic Chemicals as solvents in column chromatography (CC) or thin layer chromatography (TLC).	Up to 2 L as supplied in the reagent bottle. Remember to obtain PI approval if higher scale is necessary.	See procedure.	<p>Eye protection: Wear ANSI Approved tight-fitting safety goggles or safety glasses with side shields.</p> <p>Face Protection: Face shields are to be used when there is no protection from the hood sash.</p> <p>Hand Protection: Confirm compatibility of glove material with chemical being used. General guidance (unless otherwise specified in the specific SDS): Nitrile gloves must be used to prevent incidental contact. For spill handling or for potential contact with larger quantities, use double nitrile or heavier gauge nitrile or neoprene gloves. Gloves must be inspected prior to use. Wash and dry hands after use.</p> <p>Clothing: Wear lab coat; full length pants or equivalent; and close-toed, close-heeled shoes.</p>	Avoid inhalation of these materials. Thin Layer Chromatography: allow the plate to dry in the fume hood after removal from the development bath. Column Chromatography: collect fractions of interest and concentrate as needed. If a rotary evaporator is used, use an open cold trap system to condense the solvent. After use in the column, allow the solvent to evaporate from the packing material prior to proper disposal of the packing material.
Notes	Any deviation from this SOP requires approval from PI.			



Procedure/Use	Scale	Engineering Controls/Equipment	PPE (eye, face, gloves, clothing)	Procedure Steps and Precautions
4. Using Acutely Toxic Chemicals as analytic standards	Up to 100mg or 1mL as supplied in the reagent bottle Remember to obtain PI approval if higher scale is necessary.	See procedure.	<p>Eye protection: Wear ANSI Approved tight-fitting safety goggles or safety glasses with side shields.</p> <p>Face Protection: Face shields are to be used when there is no protection from the hood sash.</p> <p>Hand Protection: Confirm compatibility of glove material with chemical being used. General guidance (unless otherwise specified in the specific SDS): Nitrile gloves must be used to prevent incidental contact. For spill handling or for potential contact with larger quantities, use double nitrile or heavier gauge nitrile or neoprene gloves. Gloves must be inspected prior to use. Wash and dry hands after use.</p> <p>Clothing: Wear lab coat; full length pants or equivalent; and close-toed, close-heeled shoes.</p>	Avoid inhalation of these materials Use as small amount of these compounds as possible for standards. Exhaust from instruments sampling these compounds must not exhaust inside the room (connect to house vacuum or exhaust vacuum pump into the fume hood). For instruments that require a gas-phase standard, evaporate a known quantity of the compound in a sealed container in a properly operating fume hood. If instrument cannot sample directly from hood, maintain final concentrations below recommended exposure limits as specified in SDS. Have instruments sample directly from the container.
Notes	Any deviation from this SOP requires approval from PI.			



Procedure/Use	Scale	Engineering Controls/Equipment	PPE (eye, face, gloves, clothing)	Procedure Steps and Special Precautions for this Procedure
5. In-line generation of trace level ClNO ₂ (using Cl ₂ + NaNO ₂)	1 g or less NaNO ₂ (as supplied in the reagent bottle) Cl ₂ trace levels in carrier gas from permeation device	All reactions using these materials must be performed in a properly operating fume hood with the sash as low as possible.	<p>Eye protection: Wear ANSI Approved tight-fitting safety goggles or safety glasses with side shields.</p> <p>Face Protection: Face shields are to be used when there is no protection from the hood sash.</p> <p>Hand Protection: Confirm compatibility of glove material with chemical being used. General guidance (unless otherwise specified in the specific SDS): Nitrile gloves must be used to prevent incidental contact. For spill handling or for potential contact with larger quantities, use double nitrile or heavier gauge nitrile or neoprene gloves. Gloves must be inspected prior to use. Wash and dry hands after use.</p> <p>Clothing: Wear lab coat; full length pants or equivalent; and close-toed, close-heeled shoes.</p>	<p>Procedure: In the hood, mix approx. 0.2 g of NaNO₂ with 2 g of NaCl. Place this in a horizontal 1/2" dia by 8" long teflon tube and moisten the bed until almost a slurry. Install adapter fittings to connect to 1/4" or 1/8" tubing. At the experiment location run a small flow of carrier gas containing trace level Cl₂ (a few parts-per-million mixing ratios) over the NaNO₂/NaCl bed.</p> <p>The resultant gas stream containing a trace amount of ClNO₂ is then diluted to parts-per-billion levels and delivered to the analyzer.</p> <p>Permeation devices contain less than one gram of the pure substance, are permanently sealed, virtually unbreakable, and safe to handle. Our Cl₂ device delivers 260 nanograms/minute at 40 degrees C. The device is contained in a gas-tight tube with a small amount of N₂ gas continuously flowing.</p>
Notes	Any deviation from this SOP requires approval from PI.			



Procedure/Use	Scale	Engineering Controls/Equipment	PPE (eye, face, gloves, clothing)	Procedure Steps and Special Precautions for this Procedure
6. In-line generation of trace level HONO (using HCl + NaNO ₂)	1 g or less NaNO ₂ (as supplied in the reagent bottle) 200mL of >8 M HCl diluted	All reactions using these materials must be performed in a properly operating fume hood with the sash as low as possible.	<p>Eye protection: Wear ANSI Approved tight-fitting safety goggles or safety glasses with side shields.</p> <p>Face Protection: Face shields are to be used when there is no protection from the hood sash.</p> <p>Hand Protection: Confirm compatibility of glove material with chemical being used. General guidance (unless otherwise specified in the specific SDS): Nitrile gloves must be used to prevent incidental contact. For spill handling or for potential contact with larger quantities, use double nitrile or heavier gauge nitrile or neoprene gloves. Gloves must be inspected prior to use. Wash and dry hands after use.</p> <p>Clothing: Wear lab coat; full length pants or equivalent; and close-toed, close-heeled shoes.</p>	<p>Trace level HCl in carrier gas stream is from a gas-tight glass flask (the generating cell) containing a coiled Teflon tube (1/16" dia., 30" long). The cell is filled with a concentrated (above 8 M) aqueous solution of hydrochloric acid, possessing a gaseous pressure of hydrogen chloride. A carrier gas (nitrogen or clean air) is flown through the Teflon tube to pick up HCl that has diffused through the teflon.</p> <p>In the hood, prepare a filter cartridge with a thin layer of NaNO₂ sandwiched between two teflon filter discs. At the experiment location run a flow of carrier gas containing trace level HCl (parts-per-billion mixing ratios) through the NaNO₂ filter cartridge.</p> <p>The resultant gas stream containing a trace amount of HONO (parts-per-billion level) is then delivered to the analyzer.</p> <p>Preparation of the HCl solution: Always add acid to water to avoid spattering. Do not add water to acid. Ensure that all glassware is clean and dry before beginning procedure. Determine the amounts of acid and water required for the dilution. Concentrated HCl reagent with a nominal concentration of 12 M (37% by weight) will require only a small amount of</p>



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				<p>water. Measure the concentrated acid, and slowly add it to the water. A pipettor, or other means can be used to control the flow of acid, to slowly add the acid into a container of water until the acid has been diluted. Note: if temperature becomes too warm, stop addition immediately. Wait for the solution to cool down before proceeding with addition. When finished, neutralize any remaining acid and dispose of waste following appropriate procedures.</p>
Notes	Any deviation from this SOP requires approval from PI.			



Procedure/Use	Scale	Engineering Controls/Equipment	PPE (eye, face, gloves, clothing)	Procedure Steps and Special Precautions for this Procedure
7. Laser dye used for the laser induced fluorescence instrument	1g dye (as supplied in the reagent bottle) in 4 L isopropanol Remember to obtain PI approval if higher scale is necessary.	See procedure.	<p>Eye protection: Wear ANSI Approved tight-fitting safety goggles or safety glasses with side shields.</p> <p>Face Protection: Face shields are to be used when there is no protection from the hood sash.</p> <p>Hand Protection: Confirm compatibility of glove material with chemical being used. General guidance (unless otherwise specified in the specific SDS): Nitrile gloves must be used to prevent incidental contact. For spill handling or for potential contact with larger quantities, use double nitrile or heavier gauge nitrile or neoprene gloves. Gloves must be inspected prior to use. Wash and dry hands after use.</p> <p>Clothing: Wear lab coat; full length pants or equivalent; and close-toed, close-heeled shoes.</p>	Pour the 1g vial of dye into a 4 L bottle of isopropanol. Store solution in flammable cabinet. Follow laser SOP procedures when changing dye in the laser.
Notes	Any deviation from this SOP requires approval from PI.			



Procedure/Use	Scale	Engineering Controls/Equipment	PPE (eye, face, gloves, clothing)	Procedure Steps and Precautions
8. Use as thinner (xylene) for ALION MH2200 Optical Flat Black Absorber Coating (black paint for stray light reduction in optical systems)	Up to 300 mL of xylene as supplied in the reagent bottle Remember to obtain PI approval if higher scale is necessary.	See procedure.	<p>Eye protection: Wear ANSI Approved tight-fitting safety goggles or safety glasses with side shields.</p> <p>Face Protection: Face shields are to be used when there is no protection from the hood sash.</p> <p>Hand Protection: Confirm compatibility of glove material with chemical being used. General guidance (unless otherwise specified in the specific SDS): Nitrile gloves must be used to prevent incidental contact. For spill handling or for potential contact with larger quantities, use double nitrile or heavier gauge nitrile or neoprene gloves. Gloves must be inspected prior to use. Wash and dry hands after use.</p> <p>Clothing: Wear lab coat; full length pants or equivalent; and close-toed, close-heeled shoes.</p>	If paint is too thick to apply, in a properly functioning fume hood add xylene to the can and stir vigorously (but carefully to avoid splashing) until the viscosity is judged to be appropriate.
Notes	Any deviation from this SOP requires approval from PI.			



Procedure/Use	Scale	Engineering Controls/Equipment	PPE (eye, face, gloves, clothing)	Procedure Steps and Special Precautions for this Procedure
9. Using Sodium nitroferricyanide dihydrate to prepare NH ₄ ⁺ Nitroprusside Reagent (good for two weeks; light sensitive)	Up to 1g, 0.125g per reagent sample	See procedure, always handle in the hood and keep any storage containers wrapped in foil because of light sensitivity.	<p>Eye protection: Wear ANSI Approved tight-fitting safety goggles or safety glasses with side shields.</p> <p>Hand protection: Confirm compatibility of glove material with chemical being used. General guidance (unless otherwise specified in the specific SDS): Nitrile gloves must be used to prevent incidental contact. For spill handling or for potential contact with larger quantities, use double nitrile or neoprene gloves. Gloves must be inspected prior to use. Wash and dry hands after use.</p> <p>Clothing: Wear lab coat; full-length pants or equivalent; and close-toed, close-heeled shoes.</p> <p>Respiratory protection: Wear respirator if handling outside of hood. Should not handle outside of hood. Keep sash low to prevent from breathing in dust particles.</p>	<p>Avoid skin contact, eye contact, indigestion and inhalation. Avoid formation of dust and aerosols. Wash skin thoroughly after handling. Consult a physician if skin contact or inhalation occurs.</p> <p>Under the hood!!! Dissolve 0.125 g of sodium nitroprusside and 7.813 g of sodium salicylate in 100 mL of millipore water. Sodium salicylate is very flaky and toxic. The best way to do this is to add the sodium nitroprusside to the flask first outside of the hood, then to wet a weighing dish with a layer of Millipore water, tare the dish, and add the sodium salicylate to the dish. This will cut down on the flyaway particles of sodium salicylate. Be careful not to overshoot the mass of chemical added, because you cannot remove wet chemical from the dish.</p> <p>Wrap volumetric flask in foil (for light sensitivity) and store in the refrigerator.</p>



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				Keep in closed containers for disposal. If there is a spill avoid sweeping and forming dust particles.
Notes	Any deviation from this SOP requires approval from PI.			



13. Documentation of Training (signature of all users is required)

- Prior to conducting any work with ATCs, designated personnel must provide training to his/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 relevant SDSs provided by the manufacturer(s).

I have read and understand the content of this SOP:

Name	Signature	Identifier	Date
[]	[]	[]	[]
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Appendix 1 – Acute Toxicity Hazard Categories and acute Toxicity estimate (ATE) Values
Defining the Respective Categories*

<u>Exposure Route</u>	<u>Category 1</u>	<u>Category 2</u>	<u>Category 3</u>	<u>Category 4</u>	<u>Category 5</u>
Oral (mg/kg bodyweight)	5	50	300	2000	5000
Dermal (mg/kg bodyweight)	50	200	1000	2000	
Gases (ppmV)	100	500	2500	20000	-
Vapors (mg/l)	0.5	2.0	10	20	
Dusts and Mists (mg/l)	0.05	0.5	1.0	2	

(*) Globally Harmonized System of Classification and Labelling of Chemicals, Fifth Revised Edition



List of Chemicals

Chemical(s)	Chemical(s)	Chemical(s)
(R)-(+)-LIMONENE	1,2-Epoxybutane	1,3-butadiene diepoxide
Sodium nitroferricyanide dihydrate	B-pinene	
CARBON MONOXIDE,CYL.	CARENE, 3	CHLORINE
Chloroform, deuterated		COUMARIN 440
	HEPTANE	HYDROCHLORIC ACID
	METHACROLEIN	METHANOL
METHYL VINYL KETONE, TECH.	M-Xylene	NITRIC OXIDE
Nitrobenzene	Nitrogen dioxide	Nitrogen dioxide (<1%) /Nitrogen
	N-TRIDECANE	
Petroleum Ether		Sodium nitrite