UC | Center for Laboratory Safety

Standard Operating Procedure

Settlement Class: Potentially explosive

Nitrates

This SOP is not complete until it has been signed and dated by the PI and relevant lab personnel.

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

Department:	Chemistry & Biochemistry – Chemical Engineering
Date SOP was written:	December 14, 2012
Date SOP was approved by PI/lab supervisor:	February 4, 2013
SOP reviewed by:	Alessandro Moretto, Chem. Lab. Safety Officer
Principal Investigator:	Prof. Susannah Scott
Internal Lab Safety Coordinator/Lab Manager:	Stephanie Goubert-Renaudin
Lab Phone:	805-893-8941
Office Phone:	805-893-7403
Emergency Contact:	EH&S 24 hour line: 805-893-3194 *(Name and Phone Number)*
Location(s) covered by this SOP:	ESB 3324 and 3328. *(Building/Room Number)*

Type of SOP: ☐ Process ☐Hazardous Chemical ☒ Hazardous Class

Purpose

Nitrate compounds are a class of potentially explosive chemicals containing the nitrate anion (NO_3^-). These chemicals can release a destructive amount of pressure, gas, or heat when subjected to certain conditions such as high temperatures or sources of ignition. These compounds also tend to be strong oxidizers. Contact with other material may cause and/or intensify fires. They may be harmful if ingested, inhaled, or absorbed through the skin. Some nitrate compounds are potentially carcinogenic. Nitrate compounds, such as ammonium nitrate, sodium nitrate, and potassium nitrate, are often used as agricultural fertilizers. Nitrate compounds may also be used as oxidizing agents, especially in explosives.

SOP Template developed by The UC Center for Laboratory Safety

Examples of nitrates

Ammonium nitrate, Barium nitrate, Cerium nitrate, Cesium nitrate, Cobalt nitrate, Copper nitrate, Iron nitrate, Lanthanum nitrate, Magnesium nitrate, Manganese nitrate, Mercury nitrate, Palladium nitrate, Potassium nitrate, Silver nitrate, Sodium nitrate, Ytterbium nitrate, Zirconyl nitrate

Physical & Chemical Properties/Definition of Chemical Group

CAS#: various

Class: **Potentially explosive, oxidizer, carcinogen**

Molecular Formula: R_x-$(NO_3)_y$

Form (physical state): solids

Color: various

Boiling point: various

Potential Hazards/Toxicity

Nitrate compounds are generally strong oxidizers. Contact with other material may cause and/or intensify a fire. They are harmful by ingestion, inhalation or skin absorption. Exposure to some nitrate compounds may result in methemoglobinemia. They may cause irritation to the gastrointestinal tract, respiratory tract, skin, and eyes. Nitrate compounds may be carcinogenic.

Personal Protective Equipment (PPE)

Respirator Protection
Use a full-face respirator with multi-purpose combination (US) respirator cartridges.

Respirators should be used only under any of the following circumstances:

- As a last line of defense (i.e., after engineering and administrative controls have been exhausted).
- When Permissible Exposure Limit (PEL) has exceeded or when there is a possibility that PEL will be exceeded.
- Regulations require the use of a respirator.
- An employer requires the use of a respirator.
- There is potential for harmful exposure due to an atmospheric contaminant (in the absence of PEL)
- As PPE in the event of a chemical spill clean-up process

Lab personnel intending to use/wear a respirator mask must be trained and fit-tested by EH&S. This is a regulatory requirement.

Hand Protection
Handle with gloves. ***Nitrile*** gloves are recommended.

NOTE: Consult with your preferred glove manufacturer to ensure that the gloves you plan on using are compatible with nitrates.

Refer to glove selection chart from the links below:
http://www.ansellpro.com/download/Ansell_8thEditionChemicalResistanceGuide.pdf
OR
http://www.allsafetyproducts.biz/page/74172

OR
http://www.showabestglove.com/site/default.aspx
OR
http://www.mapaglove.com/

Eye Protection
Safety goggles.

Skin and Body Protection
A labcoat.

Hygiene Measures
Avoid contact with skin, eyes, and clothing. Wash hands before breaks and after handling.

Engineering Controls

When not in the glove box, work in a ventilated fume hood while handling the nitrate powder to limit dust inhalation.

First Aid Procedures

If inhaled
Move person into fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Consult a physician.

In case of skin contact
Flush with plenty of water for at least 15 minutes while removing contaminated clothing. Consult a physician.

In case of eye contact
Flush eyes with plenty of water for at least 15 minutes lifting upper and lower eyelids and removing contact lenses. Consult a physician.

If swallowed
Do not induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

Special Handling and Storage Requirements

Precautions for safe handling: Avoid contact with skin, eyes, and clothing. Avoid inhalation and ingestion. Avoid dust formation. Provide adequate ventilation. Ensure normal measures for preventative fire protection. Keep heat and other sources of ignition away. Keep away from organics, heat and ignition sources, strong acids, strong reducing agents, powdered metals, alkali metals, alkaline earth metals, cyanides, and thiocyanates.

Conditions for safe storage: Keep container tightly closed in a cool, dry, and well-ventilated area. Opened containers must be carefully resealed and kept upright to prevent leakage. Store segregated from incompatible chemicals.

Spill and Accident Procedure

Chemical Spill Dial 9-911 and EH&S (805-893-3194)

Spill – Assess the extent of danger. Help contaminated or injured persons. Evacuate the spill area. Avoid breathing vapors. 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.).

Small (<1 L) – If you have training, you may assist in the clean-up effort. Use appropriate personal protective equipment and clean-up material for chemical spilled. Double bag spill waste in clear plastic bags, label and take to the next chemical waste pick-up.

Large (>1 L) – Dial 9-**911** **from campus phones (and 805-893-3446 from a cell phone)** and EH&S (893-3194) for assistance.

Chemical Spill on Body or Clothes – Remove clothing and rinse body thoroughly in emergency shower for at least 15 minutes. Seek medical attention. *Notify supervisor and EH&S immediately.*

Chemical Splash Into Eyes – Immediately rinse eyeball and inner surface of eyelid with water from the emergency eyewash station for 15 minutes by forcibly holding the eye open. Seek medical attention. *Notify supervisor and EH&S immediately.*

Medical Emergency Dial 9-911

Life Threatening Emergency, After Hours, Weekends and Holidays – Dial 9-**911** (or 805-893-3446 from a cell phone) or go to the Emergency Room of Goleta Valley Cottage Hospital at 351 South Patterson Avenue, Goleta (Phone number: 805-967-3411) *Note: All Serious injuries must be reported to EH&S within 8 hours.*

Non-Life Threatening Emergency – Go to the Student Health Building, Building 588 (phone number: 893-5361, hours: M, T, R, F 8am-4.30pm, W 9am - 4.30pm, R 5pm to 7pm by appointment). After hours go to the Emergency Room of Goleta Valley Cottage Hospital at 351 South Patterson Avenue, Goleta (Phone number: 805-967-3411) *Note: All serious injuries must be reported to EH&S within 8 hours.*

Needle stick/puncture exposure (as applicable to chemical handling procedure) – Wash the affected area with antiseptic soap and warm water for 15 minutes. For mucous membrane exposure, flush the affected area for 15 minutes using an eyewash station. Page the needle stick nurse \ and then enter your extension. After hours go to the nearest emergency room: the Emergency Room of Goleta Valley Cottage Hospital at 351 South Patterson Avenue, Goleta (Phone number: 805-967-3411) *Note: All needle stick/puncture exposures must be reported to EH&S within 8 hours.*

Decontamination/Waste Disposal Procedure

Wearing proper PPE, decontaminate equipment and bench tops. If solid, sweep up or shovel spills avoiding dust formation. If liquid, absorb spills with inert material. Dispose of the used chemical and contaminated disposables as hazardous waste following the guidelines below. Call EH&S if assistance is needed.

General hazardous waste disposal guidelines:

Label Waste

- Affix an hazardous waste tag on all waste as soon as the first drop of waste is added to the container

Store Waste

- Store hazardous waste in closed containers, in secondary containment and in a designated location

Dispose of Waste

- Dispose of regularly generated chemical waste within 90 days
- Call EH&S for questions
- Empty Containers
    - Dispose as hazardous waste if it once held extremely hazardous waste

Safety Data Sheet (SDS) Location

MSDS can be found online: http://ehs.ucsb.edu/units/labsfty/labrsc/chemistry/lschemmsdsacc.htm

Protocol/Procedure

Refer to the MSDS of the chemical for appropriate and safe handling.

In the laboratory, nitrate compounds are mainly used dissolved in aqueous and organic solutions (typically at mM concentrations).

Nitrate containers are kept sealed at all times when not in use, away from moisture and heat.

Nitrate salts are always handled wearing nitrile gloves, as well as safety goggles and a lab coat. Gloves are disposed as soon as they are contaminated.

To limit dust inhalation, the nitrate powders are handled in the fume hood, when not in the glove box.

Nitrate solutions have to be disposed as hazardous waste in the appropriate waste container, kept closed at all times.

NOTE: Any deviation from this SOP requires approval from PI.

Documentation of Training (signature of all users is required)

- Prior to conducting any work with nitrate compounds, designated personnel, i.e. approved users listed below, 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 SDS provided by the manufacturer.
- The Principal Investigator must ensure that his/her laboratory personnel have attended appropriate laboratory safety training or refresher training as required by EH&S.

I have read and understand the content of this SOP:

Name	Signature	Trainer	Date
Prof. Susannah Scott			
Stephanie Goubert-Renaudin			
Gary Kwanyi Ng			
Alessandro Gallo			
Anthony Crisci			
Haibo Yu			
Taeho Hwang			
Bethany Wigington			
Daniel Coller			
Zachary Jones			
Youhong Wang			
Jinghong Zhou			
Jason Fendi			
