



## ENVIRONMENTAL AND OCCUPATIONAL HEALTH AND SAFETY SERVICES

### STANDARD OPERATING PROCEDURES

#### Safe Work Practices for the use of Strychnine in the Laboratory

Effective Date: September 6, 2006

Revision Date:

**INSTRUCTIONS:** Please have each staff member who will be working on this project review this Standard Operation Procedure (SOP). In Section 6 – Signatures, list each of the personnel assigned to the project, and have them initial in the box provided to indicate that he/she has read and understands this SOP. Send a completed copy to your campus' EOHSS.

### PHYSICAL AND HEALTH HAZARD SUMMARY

- **Extremely toxic** and may be fatal if inhaled, swallowed or absorbed through skin. Estimates vary on the **lethal dose for man; doses as low 5 to 15 mg have been reported to cause death.**
- **Irritating** to eyes and skin.
- **Symptoms of over-exposure include** painful muscle cramps and spasms; seizures; hyperthermia; metabolic and respiratory acidosis; rhabdomyolysis (breakdown of muscle tissues); renal failure; and death due to respiratory failure and subsequent cardiac arrest. Any sound or movement may elicit seizure activity. May also cause nausea, vomiting, diarrhea, and stiffness.
- **Rapidly oxidized in the liver;** however, up to about 20% of the dose can be excreted unchanged in the urine.
- **Incompatible** with strong oxidizers, alkalis, alkali carbonates and bicarbonates, benzoates, bromides, iodides, dichromates, salicylates, tannic and picric acids, borax, gold chloride and other alkaloid precipitants, piperazine, and potassium-mercuric iodide (not if acacia is present).
- When heated to decomposition, the fumes and vapors can result in respiratory tract irritation, bronchitis, pneumonitis, or pulmonary edema.

### REQUIRED WORK PRACTICES

- Purchase strychnine in the smallest practical amount.
- All of the UMDNJ minimum safety requirements for laboratories, as detailed in the 2004 version of the UMDNJ-NJMS Laboratory Safety Plan, should be implemented.
- **Work should take place in a chemical hood** that has been inspected within the past twelve (12) months. Work with the sash lowered. Check the hood monitor to

verify hood function before beginning work. If the hood does not have a monitor, contact EOHSS for assistance.

- **Wear two pairs of nitrile gloves, lab coat, and safety glasses when working with strychnine.**
- All general **safe work practices**, (i.e. No eating, drinking, chewing gum, or pipetting by mouth), are expected to be followed when working with **strychnine**.
- **Store in tightly closed containers** in a cool, well-ventilated area away from **HEAT, AIR, LIGHT and MOISTURE**. **Strychnine and all other acutely toxic materials should be stored in a secondary container and locked in a cabinet or drawer.**
- **In the event of an emergency (spills, personal injury) involving strychnine, follow the instructions on the Laboratory Emergency Response Guide.**
- **Drain disposal of neat strychnine or its solutions is not permitted.**
- **Extreme caution must be taken when working with syringes.**

## 1. PURPOSE

This policy establishes procedures for safe handling, transport and storage of strychnine, strychnine nitrate, strychnine phosphate, strychnine sulfate.

Alternate and trade names include, but are not limited to: Certox, EPA Pesticide Chemical Code: 076901, Nux vomica, Strychinos, Strychnidin-10-one, Strychnin, and Strychnos.

Strychnine is highly acutely toxic, and extremely irritating to skin and eyes. It produces toxic effects by inhalation, ingestion and absorption through the skin. Health effects can include violent convulsions, sometimes beginning within a few minutes of ingestion, seizures, nausea, vomiting, diarrhea, muscular cramps and stiffness.

## 2. SCOPE

This SOP addresses the use of strychnine in a research laboratory. This SOP assumes that all of the UMDNJ minimum safety requirements, as detailed in the latest version of the UMDNJ Laboratory Safety Plan have been implemented.

### **3. RESPONSIBILITY**

- 3.1. All staff engaged in the use or handling of strychnine, or working within a laboratory using strychnine, are responsible for understanding all hazards associated with its use, first aid procedures, and for using appropriate personal protective equipment (PPE).
- 3.2. The Principal Investigator is responsible for ensuring that his/her staff has been trained in the use, storage, handling and first aid procedures for strychnine.
- 3.3. Strychnine use is restricted to the specific staff members who have had prior training in proper use, handling and storage, and first aid procedures. Each staff member's name must appear on the listing in Section 6 of this document, and each staff member must initial by his/her name.

### **4. PROCEDURES**

#### **4.1. Training**

4.1.1. Prior to conducting any work with strychnine, the Principal Investigator must provide training to all laboratory personnel in his/her laboratory specific to the hazards involved in working with this substance, work area decontamination, and first aid and emergency procedures.

At a minimum, the training program shall consist of the following topics:

- A description of the hazards associated with strychnine.
- Emergency procedures, including how to contact UMDNJ Public Safety.
- The location of first aid equipment on site.
- A description of the initial first aid measures.
- How/where to get further medical attention.
- A description of the delayed onset of symptoms associated with strychnine.

- A description of the personal protective equipment available, and a description of its use and limitations.
- The location of Material Safety Data Sheets and other safety, health & environmental information.
- The correct response to involvement in a strychnine incident.
- The importance of cleaning up and decontaminating surfaces and equipment when work is complete.
- Decontamination procedures including the most effective way to decontaminate tools, equipment, and personal protective equipment.
- The importance of labeling samples, waste and contaminated equipment.
- The importance of reporting all incidents or near misses so that recurrences are prevented.
- A practical demonstration showing how to put the personal protective equipment on.
- A practical demonstration of the decontamination procedures.
- Validation of the understanding of each part of the procedure.
- The importance of reporting any symptoms that may be related to exposure to strychnine, detected either while at work or home.

4.1.2. The Principal Investigator must provide his/her laboratory personnel with a copy of this SOP and a copy of the strychnine MSDS provided by the manufacturer.

4.1.3. The Principal Investigator must ensure that his/her laboratory personnel have attended initial laboratory safety training or refresher training within the last two years.

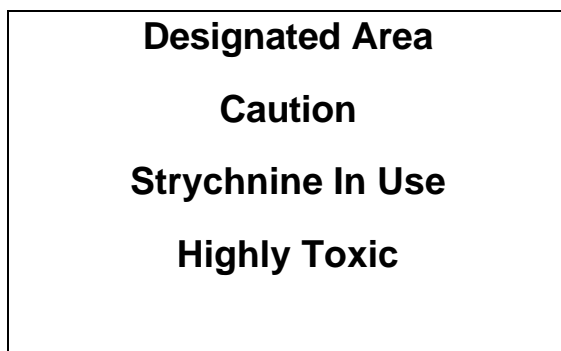
**NOTE:** EOHSS is available to assist in the education and/or training of personnel concerning safe work practices.

## 4.2. Signage

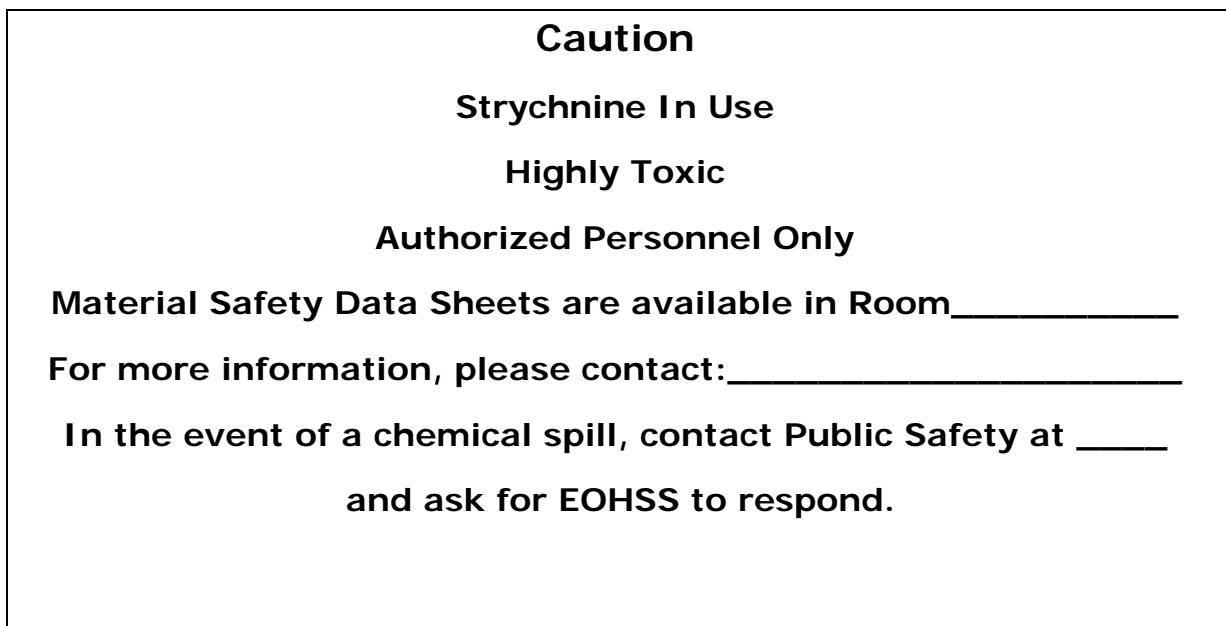
4.2.1. When strychnine is in use, warning signs must be posted on the chemical hood and laboratory door until the strychnine has been returned to storage.

4.2.2. Signs will include the information shown in the following sample:

### Sample Chemical Hood Sign



### Sample Door Sign for When Strychnine Is In Use



### **4.3. Storage**

- 4.3.1. Strychnine must be stored in a location that is secure to unauthorized access. Examples are a locked cabinet, or within a laboratory that is locked when authorized personnel are not present. A cabinet containing strychnine must be labeled with a caution sign noting the presence of strychnine and its hazards (extremely toxic).
- 4.3.2. Store strychnine and its solutions in appropriate, labeled, sealed containers within an unbreakable compatible secondary containment (i.e., a polyethylene tub or tray). Strychnine should be stored in a well-ventilated, cool, dry area.
- 4.3.3. Strychnine is incompatible with strong oxidizers, alkalis, alkali carbonates and bicarbonates, benzoates, bromides, iodides, dichromates, salicylates, tannic and picric acids, borax, gold chloride and other alkaloid precipitants, piperazine, and potassium-mercuric iodide (except when acacia is present). Store strychnine separate from these materials.
- 4.3.4. Label all containers, including secondary containment, with the chemical name and hazard warning.

### **4.4. Handling and Solution Preparation**

- 4.4.1. Strychnine should be purchased in the smallest practical amount, and in no instance should bottle size exceed 10g.
- 4.4.2. Strychnine must be opened and handled only in a chemical hood that has been certified within the last 12 months. Benchtop use of strychnine is prohibited. The operation of the chemical hood must be verified by the use of a chemical hood monitoring device, a smoke test using a smoke generating tube, or a mechanical or electronic device that indicates airflow. If there is any reason to believe the chemical hood is not operating properly (e.g., unusual noise or low flow) contact EOHSS to have the hood checked before using the hood. During use, the sash must be lowered to operating height or below.
- 4.4.3. Strychnine should not be heated. When heated, highly toxic decomposition products are release, and the fumes and vapors can result in respiratory tract irritation, bronchitis, pneumonitis, or pulmonary edema.
- 4.4.4. A minimum of two individuals trained per Section 4.1 must be present whenever strychnine is used. Each individual

must be familiar with the applicable first aid procedures, maintain visual contact with the other, and be ready to assist in the event of an accident.

4.4.5. Containers of strychnine must always be closed when not in use.

4.4.6. Work with strychnine should take place over polyethylene secondary containers or spill trays.

4.4.7. Wash hands thoroughly immediately after working with any concentration of strychnine.

**4.5. The following minimum Personal Protective Equipment must be worn during operations involving strychnine:**

4.5.1. Splash-proof chemical goggles. Plastic face shields should be worn when handling large amounts or when the potential for splashing is greater.

4.5.2. Disposable nitrile gloves can be used when working with small amounts of strychnine. Double-gloving is required when working with strychnine. Inspect gloves frequently. Change gloves frequently and immediately whenever contaminated, punctured or torn. Do not reuse gloves. If research involves manipulation of a larger amount of material, contact EOHSS for assistance in selecting the appropriate gloves.

4.5.3. Wash hands immediately after removing gloves.

4.5.4. A standard or disposable laboratory coat or disposable coveralls. A standard laboratory coat may be reused before laundering if it has not been contaminated with strychnine.

4.5.5. A chemical-resistant apron with attached sleeves should be worn over the laboratory coat if working with larger amounts of solution or if there is a greater potential for splashing during the procedure.

4.5.6. Closed-toed, leather shoes (not fabric or mesh). Alternatively, boots made of polyvinyl alcohol (PVA) may be worn.

## 5. EMERGENCIES

### 5.1 Spill of strychnine Outside of the Chemical Hood:

- 5.1.1 Alert personnel in the immediate area to evacuate.
- 5.1.2 Attend to any injured personnel.
- 5.1.3 Phone the Public Safety Emergency number (Newark: 2-4490; Piscataway/New Brunswick: 5-4000; Camden and Stratford: 7-7777) immediately. Ask them to have EOHSS respond. DO NOT attempt to clean up the spill.
- 5.1.4 Isolate the area to prevent the spread of contamination (e.g., close doors to affected area and post a warning sign).
- 5.1.5 Have someone knowledgeable about the incident available at a safe location to direct and provide information regarding the spill to EOHSS.
- 5.1.6 Direct the EOHSS response team to the location of the spill and strychnine spill cleanup materials.

NOTE: Personnel must not attempt to clean up a spill of strychnine that occurs outside of a chemical hood.

### 5.2 Spill of strychnine Inside the Chemical Hood:

- 5.2.1 Alert personnel in the immediate area to evacuate.
- 5.2.2 Attend to any injured personnel.
- 5.2.3 Phone the Public Safety Emergency number (Newark: 2-4490; Piscataway/New Brunswick: 5-4000; Camden and Stratford: 7-7777) immediately.
- 5.2.4 Don the personal protective equipment specified in Section 4.5.
- 5.2.5 **If it is a powder:** Use water-dampened paper towels to clean up spill. Afterwards, clean the area three (3) times with a detergent solution and paper towels.
- 5.2.6 **If it is a liquid:** Use absorbent pads or paper to mop up the spill. Afterwards, clean the area three (3) times with a detergent solution and paper towels.
- 5.2.7 Collect waste from spill (including absorbent pads and personal protective equipment) into an appropriate

labeled, sealable, container for disposal as hazardous waste.

- 5.2.8 Notify EOHSS of the spill and the amount of waste ready for disposal.
- 5.2.9 If the spill is large or you are unsure of your ability to thoroughly address it, call the Public Safety Emergency number (above, Section 5.1.3) and ask EOHSS to respond.

### **5.3. Accidental Exposure to Strychnine**

- 5.3.1. Strychnine exposure requires immediate and specialized first aid and medical treatment. Prompt first aid is essential, even if the victim does not exhibit any signs or symptoms, or feel any pain. **First aid must be followed by treatment by a physician as soon as possible.**
- 5.3.2. Arrangements with local medical resources should be made ahead of time to ensure that medical personnel are familiar with the toxicity and treatment of Strychnine exposure.
- 5.3.3. If strychnine has been inhaled, move the victim to fresh air immediately. If breathing is difficult, oxygen should be administered. If breathing has stopped, artificial respiration using oxygen and a suitable mechanical device such as a bag or mask should be provided. Speed is essential, medical attention must be obtained immediately. Staff must know how to obtain medical assistance quickly. Medical emergency responders must be advised that person was exposed to strychnine so that intravenous anticonvulsant therapy can begin.
- 5.3.4. If Strychnine has been spilled on skin or clothing, immediately rinse the affected area with water using a safety shower for a minimum of 15 minutes until medical treatment is provided. During washing, remove all contaminated clothing, including shoes, while wearing protective gloves. Remove goggles last. A disposable laboratory coat or jumpsuit should be available for the exposed individual to wear after using a safety shower. Colleagues should wear personal protective equipment (lab

coat, safety glasses and gloves) and must be careful not to become contaminated while assisting the victim. Victim should receive medical follow-up treatment as for inhalation.

- 5.3.5. If Strychnine has contacted the eyes, immediately flush for at least 30 minutes without stopping (Note: extensive flushing is required). Hold upper and lower eyelids open and away from the eyes during irrigation. Do not allow victim to rub eyes or keep eyes closed. Remove contact lenses if possible (Note: contact lenses should not be worn when working with this material). If necessary, continue flushing with personal eyewash or apply ice water compresses during transport to medical facility or eye specialist. Avoid rubbing of the eyes. Seek medical attention immediately.
- 5.3.6. If Strychnine is ingested, do not induce vomiting; do not use emetics or baking soda.
- 5.3.7. For immediate medical attention, call Public Safety to have an ambulance respond to the scene. Newark: 2-4490; Piscataway/New Brunswick: 5-4000; Camden and Stratford: 7-7777.
- 5.3.8. In all cases of exposure, notify the victim's supervisor, if immediately available. The supervisor, a co-worker, or the victim must contact the campus Employee Health or Occupational Medicine Program to advise them of the exposure and to determine what additional steps should be taken. Newark: Occupational Medicine Services (973) 972-2900; Piscataway/New Brunswick: EOHSI Employee Health Services (732) 445-0123; Stratford: Kennedy Hospital (856) 346-7816; Camden: Cooper Occupational Health Services (856) 342-2990.
- 5.3.9. If the incident occurs off-hours, contact Public Safety to advise them of the medical emergency and to request medical assistance. Newark: 2-4490; Piscataway/New Brunswick: 5-4000; Camden and Stratford: 7-7777

**6. SIGNATURES**

Principal Investigators: Use the following table to list all personnel who will handle Strychnine. The staff member's initials indicate that the staff member has read this SOP and understands the hazards and safe work practices as detailed in this therein.

Name	Job Title	Lab Staff Initials*

Principal /Responsible Investigator (Print): \_\_\_\_\_

Principal /Responsible Investigator (Signature): \_\_\_\_\_

Date: \_\_\_\_\_

**7. IF ADDITIONAL ASSISTANCE IS REQUIRED**

7.1. The current version of this form and additional information will be posted at: <http://www2.umdnj.edu/eohssweb/forms.htm>

7.2. EOHSS Campus Contact Information:

**Newark**

65 Bergen Street  
Bergen Building Room 443  
Newark, NJ 07107  
(973) 972-4812  
Fax (973) 972-3694

**Piscataway**

675 Hoes Lane - Trailer #1  
Piscataway, NJ 08854  
(732) 235-4058

Fax (732) 235-5270

**New Brunswick**

Liberty Plaza Building Suite 2119  
335 George Street  
New Brunswick, NJ 08903  
(732) 235-8376  
Fax (732) 235-8370

**Camden/Stratford**

University Educational Center  
40 E. Laurel Road Suite 1031  
Stratford, NJ 08084  
(856) 566-6189  
Fax (856) 566-6352

**8. REFERENCES**

- 8.1. Fisher Scientific International. MSDS for L-Strychnine, 98%, <https://fscimage.fishersci.com/msds/86171.htm>, accessed July 7, 2006.
- 8.2. New Jersey Department of Health and Senior Services (NJDHSS) Hazardous Substance Fact Sheet, HSFS #1747, Strychnine, April 2000. <http://www.state.nj.us/health/eoh/rtkweb/1747.pdf>