

# Standard Operating Procedure

## Sodium

*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.

<b>Department:</b>	Chemistry & Biochemistry - Chemical Engineering
<b>Date SOP was written:</b>	December 14, 2012.
<b>Date SOP was approved by PI/lab supervisor:</b>	January 18, 2013
<b>Principal Investigator:</b>	Prof. Susannah Scott
<b>Internal Lab Safety Coordinator/Lab Manager:</b>	Stephanie Goubert-Renaudin
<b>Lab Phone:</b>	805-893-8941
<b>Office Phone:</b>	805-893-7403
<b>Emergency Contact:</b>	EH&S 24 hour line: 805-893-3194 <i>(Name and Phone Number)</i>
<b>Location(s) covered by this SOP:</b>	ESB 3324 and 3328. <i>(Building/Room Number)</i>

**Type of SOP:**     Process             Hazardous Chemical             Hazardous Class

### Purpose

Sodium is a soft, silver-grey alkali metal with atomic number 11. It is very reactive with water producing flammable hydrogen gas that can ignite spontaneously. It also produces caustic sodium hydroxide upon contact with water. The powdered form can burn in the presence of air or oxygen. It is harmful if inhaled, ingested. It is extremely destructive to the tissue of the mucous membranes and upper respiratory tract. It can cause burns to the skin and eyes with irreversibly damage. Due to sodium's reactivity, it is not found free in nature. It is the sixth most abundant element in the Earth's crust. It is a vital nutrient for humans regulating blood volume, blood pressure, osmotic equilibrium, and pH. Sodium is used as an alloying metal, as a reducing agent for metals, and as a desiccant. It is also used in optics.

### Physical & Chemical Properties/Definition of Chemical Group

CAS#: 7440-23-5

Class: Highly flammable, water reactive, corrosive, pyrophoric

Molecular Formula: Na

Form (physical state): Solid

Color: Grey

Boiling point: 883 °C

## Potential Hazards/Toxicity

Contact with water releases flammable gases which may ignite spontaneously. May burn in the presence of air. Handle under inert gas and protect from moisture. May be harmful if inhaled, ingested, or absorbed through the skin. It is extremely destructive to the tissue of the mucous membranes and upper respiratory tract. Causes skin and eye burns with severe or permanent damage. Symptoms of exposure may include burning sensation, coughing, wheezing, laryngitis, shortness of breath, inflammation and edema of the larynx, spasm, inflammation and edema of the bronchi, pneumonitis, and pulmonary edema.

## 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 sodium.

Refer to glove selection chart from the links below:

[http://www.ansellpro.com/download/Ansell\\_8thEditionChemicalResistanceGuide.pdf](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

ANSI approved, tight-fitting safety glasses/goggles.

### **Skin and Body Protection**

Flame resistant lab coat preferably made of antistatic material, long pants, and closed-toe shoes.

### **Hygiene Measures**

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

### **Engineering Controls**

Sodium should be used within a certified chemical fume hood or a glove box.

### **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**

Wash off with soap and plenty of water for at least 15 minutes while removing contaminated clothing. Consult a physician.

#### **In case of eye contact**

Rinse thoroughly with plenty of water for at least 15 minutes lifting upper and lower eyelids and removing contact lenses. Consult a physician. Continue rinsing eyes during transport to hospital.

#### **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 exhaust ventilation. Keep away from sources of ignition- No smoking.

**Conditions for safe storage:** Keep container tightly closed in a dry and well-ventilated area. Never allow contact with water. Air sensitive. Incompatible with oxidizing agents and acids. Store in flammables-area. Handle and store under inert gas.

### **Spill and Accident Procedure**

#### **Fire-fighting & Extinguishing media**

Acceptable fire extinguishing media include Metal X, soda ash (lime) or *dry* sand to respond to small fires, and an ABC extinguisher for large fires. **DO NOT use water.** A small beaker of Metal X/LithX, dry sand or soda ash (lime) in the work area is useful to extinguish any small fire that occurs at the syringe tip and to receive any last drops of reagent from the syringe. In general, an ABC dry powder extinguisher will put out the fire, but the pyrophoric reagent may reignite.

## 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 (805-893-3194) 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, sweep. **Do not flush with water.** Carefully proceed to quenching as described in the protocol/procedure below. Call EH&S for assistance if needed (805-893-3194). Collect and place in container for disposal following the guidelines below.

*General hazardous waste disposal guidelines:*

### Label Waste

- Affix an on-line hazardous waste tag on all waste containers 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
- Waste must be under the control of the person generating & disposing of it

#### 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 (irrespective of the container size)
  - Consult waste pick-up schedule
  - Prepare for transport to pick-up location
    - Check on-line waste tag
    - Write date of pick-up on the waste tag
    - Use secondary containment

#### Safety Data Sheet (SDS) Location

SDS can be found online: <http://ehs.ucsb.edu/units/labsfty/labrsc/chemistry/lchemmsdsacc.htm>

#### Protocol/Procedure

**Please see attached SOP “Procedures for Safe Use of Pyrophoric Solids” (online link: [http://web.chem.ucsb.edu/~moretto/SOP\\_Pyrophoric.pdf](http://web.chem.ucsb.edu/~moretto/SOP_Pyrophoric.pdf))**

Work with Sodium is not allowed when alone in the laboratory. Prior to starting reaction, locate the extinguisher, eyewash and safety shower.

In the Lab, sodium is mainly used as a desiccant for organic solvents (typically Toluene and THF).

Sodium is stored in the form of chunks kept in mineral oil in a sealed container in a ventilated cabinet, and as a dry metal in a sealed container in the glove box.

Due to its high water reactivity, sodium is always handled away from any source of water, on a fully dry, cleared and neat working surface. Sodium can be handled under inert atmosphere in the glove box, and if not, has to be used in an uncluttered ventilated fume hood.

Due to its high flammability, a flame-retardant lab coat has to be worn at all times in addition to nitrile gloves and safety goggles.

With a dry and clean knife/spatula or tweezers, a piece of sodium is cut/taken from the container. In order to wash off the mineral oil, sodium is put in a flask containing anhydrous hexanes. The flask is swirled to wash off the oil and the supernatant is carefully decanted into another flask. The procedure can be repeated one or two times more to obtain the sodium clean. Due to the prompt reactivity of sodium with the ambient moisture, the handling is made quickly to limit the duration of exposition of sodium metal to moisture. With the dry knife/spatula, the passivated tarnish surface of sodium can be cut and collected in a dry waste flask to be quenched soon. The clean chunks of sodium, free of oil, are then quickly added to the solvent to be dried.

**Quenching:** Residues of sodium have to be quenched as they are highly reactive. The quenching has to be done in a secured flask (clamped on a support) in the fume hood, by slowly adding isopropanol or butanol to the sodium residues. Due to the high exothermic nature of the reaction, the flask can be placed

in an ice bath to cool down. When sodium is almost fully dissolved and that gas evolution has diminished, the quenching can be pursued by adding slowly ethanol or methanol over time. When no sodium residues are observed and gas evolution has stopped, water can be added very carefully.

When the solution is not reactive, it is basic and can be disposed in the appropriate basic waste container.

**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 sodium, 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			



