

Standard Operating Procedure (SOP) for (Sodium Hydroxide)

PI Name: Yat Li

Date: 10/12/2012

Name of Lab or Unit: PSB 198

Review any applicable manufacturer/vendor safety information before developing Standard Operating Procedure (SOP) and append UC Approved Chemical SOP, if available, or SDS and other Chemical reference materials if UC Chemical SOP is not available.

#1	<p><u>Scope of Work/Activity:</u> Describe the experiment purpose/scope.</p> <p>Sodium hydroxide is a kind of strong base, and used to make electrolyte.</p> <ol style="list-style-type: none"> 1. Before handling, correctly calculate the amount needed (~16 g). 2. Weigh the proper amount of sodium hydroxide solids via electronic balance. Do not spill solids on the balance. 3. Dissolve the solids into cold water (400 ml) in chemical fume hood. When dissolving solid, gradually pour solid into water, do not put water into solid to avoid splattering. NOTE: Sodium hydroxide when reacting with water is an exothermic reaction (generates heat). Moderate addition to control exotherm, may use an ice bath if needed for larger quantities. Allow solution to cool before transferring to reaction or reagent bottle. 4. Cool the solution naturally in hood. 5. Transfer this solution into one pint plastic bottle to restore. <p>Apparatus: electronic balance, chemical fume hood</p>
#2	<p><u>Specific Safety and Environmental Hazards:</u> State the specific hazard and consequences to person, environment, or property if procedure not followed.</p> <p>Extremely CORROSIVE (causes burns to any area of contact – skin, eyes, mucous membranes) Irritant (skin, eyes, and respiratory tract)</p> <p>Unlike acids, hydroxides do not coagulate protein which impedes penetration. Metal hydroxide may not be immediately painful during skin penetration, producing severe and slow-healing burns.</p>
#3	<p><u>Describe in detail how the hazards will be controlled.</u></p> <p>a. Identify the Engineering Controls (e.g., fume hood, interlocks, shielding), work Practices or Procedures, or Personal Protective Equipment (e.g., gloves, respirator) that will be employed to reduce hazards to acceptable levels.</p> <p>After weighing the solid material on the lab bench, all operations involving sodium hydroxide should be carried out in a chemical fume hood with the sash in the down position, between your chest and what you are handling in the hood.</p> <p>Wear lab coat, splash goggles, and disposable nitrile gloves.</p> <p>b. Address emergency shutdown procedures. Contain any open material on lab bench. Close fume hood.</p>
#4	<p><u>Designated Area:</u> Indicate the area designated for performing this process in the laboratory.</p> <p>Weigh on electronic balance on lab bench, then conduct work in chemical fume hood</p>
#5	<p><u>Personal Protective Equipment (PPE):</u> State the personal protective equipment selected and required. Examples: safety glasses, goggles or face shield; lab coat; specific gloves; chemical-proof apron; respiratory protection.</p> <ol style="list-style-type: none"> 1. Chemical splash goggles. Face shield, optional. 2. Double nitrile gloves <ul style="list-style-type: none"> • Immediately replace with new gloves when contamination occurs. 3. Lab coat that covers limbs 4. Closed-toed, impervious footwear

#6	<p>Important Steps to Follow: List the specific sequence of steps staff should follow to mitigate potentially hazardous conditions.</p> <ol style="list-style-type: none"> 1. After weighing, conduct work in chemical fume hood. 2. When dissolving solid, gradually pour solid into water, do not put water into solid to avoid splattering. <p>Consult PI and obtain approval if greater than 600g are needed.</p>
#7	<p>Emergency / First Aid Procedures:</p> <ol style="list-style-type: none"> a. Describe immediate First Aid or medical treatment required in case of personnel exposure. -Complete incident report form (contact EH&S) <p>Eye or Skin Contact: Check for and remove any contact lenses. In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes. Cold water may be used. Get medical attention immediately.</p> <p>Inhalation: If inhaled, remove to fresh air. Get medical attention immediately.</p> <p>Ingestion: Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Get medical attention immediately.</p>
#8	<p>Training & Competency Requirements: Describe necessary training and demonstration of competency for performing the hazardous operation.</p> <p>Prior to conducting any work with Sodium Hydroxide, 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.</p> <p>The Principal Investigator must provide his/her laboratory personnel with a copy of this SOP and a copy of the Sodium Hydroxide MSDS provided by the manufacturer. Read MSDS and SOP before use.</p> <p>The Principal Investigator must ensure that his/her laboratory personnel have attended the “Introduction to Laboratory Safety” class offered by EH&S within the last two years.</p> <p>The Principal Investigator must ensure that his/her laboratory personnel complete the Lab-Specific Training Checklist prior to working in the lab.</p>
#9	<p>Identify hazardous waste(s) generated: List expected concentrations and amounts of hazardous waste(s) generated during this process. Contact EH&S for specific guidance regarding hazardous waste handling and disposal.</p> <p>Place waste in labeled solid waste container with hazardous waste tag complete.</p> <p>Waste solution containing sodium hydroxide should be collected in liquid waste container with hazardous waste tag complete.</p>
#10	<p>Decontamination and spill clean-up procedures (reference embedded specific Chemical SOP as needed)</p> <p>Do not attempt to clean up any spill or release for which you are not fully trained and equipped. Contact 911 and ask for EH&S assistance for spill cleanup.”</p> <p>For small spills, use appropriate tools to put the spilled solid in a convenient waste disposal container. Do not get water inside container. Do not touch spilled material.</p>
#11	<p>Laboratory Emergency Response Equipment: All research personnel must know location of nearest fire alarm pull station and emergency shower/eyewash.</p> <ol style="list-style-type: none"> a. Note location and use of any emergency response equipment specific to process (e.g., Calgonate gel, Class D fire extinguisher)

As the Principal Investigator, it is your responsibility to ensure that all individuals conducting this protocol are taught the correct procedures for safe handling of the hazardous materials involved. It is also your responsibility to assure that your personnel complete Laboratory Safety Training and other applicable safety training courses.

I have reviewed and approve this Standard Operating Procedure.



1/9/2013

PI Signature:

DATE

Note that personnel associated with the protocol must sign the acknowledgement at the end of this document.

(Insert UC approved Chemical Specific SOPs/Lab Chemical Safety Summaries here)

Chemical Hazards and Controls

Sodium Hydroxide

This is a Chemical Hazard and Control template and is not complete until: 1) Chemical specific information is entered into the boxes below 2) It is appended to the protocol/procedural SOP and 3) Complete SOP 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 with the Procedural SOP. Refer to instructions for assistance.

Department:	Chemistry
Date SOP was written:	12/13/12
Date SOP was approved by PI/lab supervisor:	Click here to enter a date.
Principal Investigator:	Yat Li
Internal Lab Safety Coordinator/Lab Manager:	Tianyu Liu
Lab Phone:	Click here to enter text.
Office Phone:	831-459-1952
Emergency Contact:	Yat Li (Name and Phone Number)
Location(s) covered by this SOP:	PSB 198 (Building/Room Number)

Physical & Chemical Properties/Definition of Chemical Group

Purpose

Sodium hydroxide (also known as lye or caustic soda) is an extremely corrosive alkali. It readily absorbs moisture and carbon dioxide in air. It may be harmful if ingested, inhaled, or absorbed through the skin. Exposure can cause severe burns to the gastrointestinal tract, respiratory tract, skin, and eyes with permanent damage. Sodium hydroxide has a variety of industrial uses including the manufacture of paper, soap, detergents, and drain cleaners.

Physical & Chemical Properties/Definition of Chemical Group

CAS#: 1310-73-2

Class: **Corrosive**

Molecular Formula: NaOH

Structure:

Molecular Weight: 39.997 g/mol

Form (physical state): liquid (solution)

Density: 1.0-2.13g/cm³

Color: colorless

Solubility: soluble

Boiling point: 100 - 140 °C

Melting point: N/A

Toxicity LD₅₀: CEIL 2 mg/m³ USA. ACGIH Threshold Limit Values (TLV).

Potential Hazards/Toxicity

Can react with certain metals to release explosive hydrogen gas. Can react explosively with nitro and chloro organic compounds. Forms hazardous sodium oxides when exposed to fire. May be harmful if inhaled, ingested, or absorbed through the skin. Causes gastrointestinal burns with severe or permanent damage. May cause perforation of the digestive tract. It is destructive to the tissue of the mucous membranes and upper respiratory tract. Causes skin and eye burns with severe damage. May cause chemical conjunctivitis. May cause deep skin ulcers or skin rash. Symptoms of exposure include burning sensation, cough, wheezing, laryngitis, shortness of breath, spasm, inflammation and edema of the larynx or bronchi, pneumonitis, and pulmonary edema.

Inhalation

May be harmful if inhaled. Material is extremely destructive to the tissue of the mucous membranes and upper respiratory tract.

Eye Contact

Causes eye burns. Causes severe eye burns.

Skin Contact

May be harmful if absorbed through skin. Causes skin burns.

Ingestion

Toxic if swallowed.

Personal Protective Equipment (PPE)

Respiratory Protection

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 there is a possibility that a Cal/OSHA Permissible Exposure Limit (PEL) or Action Level (AL) 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 a PEL).
- As protective equipment during a chemical spill clean-up process (only when approved by EH&S).

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

<http://ehs.ucsc.edu/programs/safety-ih/respiratory-protection.html>

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 hydroxide solution.

Refer to glove selection charts 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

ANSI approved, tight-fitting safety glasses/goggles. Face shields are also recommended.

Skin and Body Protection

Flame resistant lab coat, 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

Chemical fume hood. Good ventilation.

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 30 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

Avoid inhalation and ingestion. Avoid contact with eyes, skin, and clothing. Provide adequate ventilation.

Conditions for safe storage: Keep container tightly closed in a dry and well-ventilated area. Opened containers must be carefully resealed and kept upright to prevent leakage. Store away from acids, metals, flammable liquids, nitrocompounds, and organic halogens. Store in corrosives area.

Incompatible with the Following Materials

Acids

Spill and Accident Procedure

Chemical Spill Dial 911

Spill – Dial **911** and ask for EH&S assistance or call EH&S directly x459-2553.

Chemical Spill on Body or Clothes – Remove clothing and rinse body thoroughly in emergency shower for at least 15 minutes. Seek medical attention if needed. *Notify supervisor and EH&S via 911 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 via 911 immediately.*

Mucous Membrane Exposure: Flush the affected area for 15 minutes using an eyewash station.

Needlestick/Puncture Injuries – Wash the affected area with soap and warm water for 15 minutes. For employees, follow the instructions at the Risk Services website: <http://risk.ucsc.edu/workerscomp/injuryreportinghowto.html>

Medical Emergency Dial 911

Life Threatening Emergency, After Hours, Weekends And Holidays – Dial **911**

Non-Life Threatening Emergency – For employees, follow the instructions at the Risk Services website: <http://risk.ucsc.edu/workerscomp/injuryreportinghowto.html>

Note: All serious injuries must be reported to EH&S as soon as possible.

Decontamination/Waste Disposal Procedure

Contaminated instruments and benches should be decontaminated with soap and water. All waste and contaminated disposables should be disposed of as hazardous waste according to the guidelines below.

Waste Procedures

General hazardous waste management guidelines: <http://ehs.ucsc.edu/programs/waste-management/index.html>

Waste Labeling

- Affix an on-line hazardous waste tag on all waste containers using the Online Tag Program (OTP) <http://otp.ucop.edu/> as soon as the first drop of waste is added to the container.

Waste Storage

- Store hazardous waste in closed containers, in clean secondary containment, segregated by hazard class, in a marked and designated waste accumulation area.
- Double-bag dry waste using transparent bags.
- Waste accumulation area must be under the control of the person generating the waste.

Waste Disposal

- Hazardous waste must be removed from the lab within 180 days.
- Containers must be clean, sealed, and safe to transport.
- Mark container as ready for pick up in OTP, move container to accumulation area.
- Contact EH&S at x9-3086 for questions

Safety Data Sheet (SDS) Location

Online SDSs can be accessed at: <http://www.ucmsds.com/?X> .

NOTE

Any deviation from this Procedural/Chemical Handling SOP requires approval from PI.

Documentation of Training (signature of all users is required)

- Prior to conducting any work with **sodium hydroxide, sodium hydroxide solution**, the PI or designee must provide training to his/her laboratory personnel regarding the specific 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 within the last year.

Revision History

Version	Date	Revision Author	Summary of Changes
1	12/13/2012	Tianyu Liu	Initial SOP author
2	12/17/12	Lisa Wisser	Update process and chem info
3	01/05/2013	Tina Ross	SOP Merge, Chem Review, edits