

Standard Operating Procedure

Potassium hydroxide

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:	January 18, 2013
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

KOH is highly basic, forming strongly alkaline solutions in water and other polar solvents. These solutions are capable of deprotonating many acids, even weak ones. Potassium hydroxide is used in neutralization reactions to yield potassium salts. KOH works well in the manufacture of biodiesel by catalyzing transesterification of the triglycerides in vegetable oil. Aqueous potassium hydroxide is employed as the electrolyte in alkaline batteries based on nickel-cadmium and manganese dioxide-zinc. Alcoholic KOH solutions are also used as an effective method for cleaning glassware.

Physical & Chemical Properties/Definition of Chemical Group

CAS#	1310-58-3
Class:	<u>Strong Corrosive</u>
Molecular Formula:	KOH
Form (Physical State):	White solid
Boiling Point:	1320°C

Melting point: 361°C

Potential Hazards/Toxicity

Harmful through inhalation or skin absorption. Destructive to tissue or mucous membranes and upper respiratory tract. Causes burns to the skin and eyes. Toxic through ingestion: causes severe digestive tract burns with abdominal pain, vomiting, and possible death

Acute toxicity: Oral LD₅₀ [rat] 273 mg/kg

CalOSHA Permissible Exposure Limit (PEL): 2 mg/m³ (Ceiling)

pH: 13.0 – 14

Synonym: Caustic soda

Potential Hazards/Toxicity

OSHA Hazards - Corrosive

Pictogram



Signal word: **Danger!**

Personal Protective Equipment (PPE)

Respiratory protection

Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type AXBEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU). Refer to 8 CCR 5144 for selection of respirators. A respiratory protection program that meets 8 CCR 5144 must be followed whenever workplace conditions warrant use of a respirator.

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

NOTE: 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, neoprene and rubber](#) gloves are recommended. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. If disposable gloves are contaminated, discard them. If reusable gloves are contaminated, thoroughly rinse them with water.

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 glasses with side shields or tightly fitting safety goggles.

Skin and Body Protection

A lab coat must be worn.

Hygiene Measures

Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

Engineering Controls

KOH pellets should be handled and ground in the hood to prevent unwanted exposure.

First Aid Procedures

Notify supervisor and EH&S immediately.

If inhaled

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

In case of skin contact

Take off contaminated clothing immediately. Wash off with soap and plenty of water for 15 minutes. Take victim immediately to hospital. Consult a physician.

In case of eye contact

Rinse thoroughly with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical aid immediately. Continue to wash eyes during transport to the 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

NOTE: Specific information on handling and storage is to be added to the Protocol/Procedure section.

Precautions for safe handling

Do not allow water to get into the container because of violent exothermic reaction. Do not get in eyes, on skin, or on clothing. Do not ingest or inhale. Avoid formation of dust and aerosols. Provide appropriate exhaust ventilation at places where dust is formed.

Conditions for safe storage

Store in a tightly closed container. Store in a cool, dry, well-ventilated area away from incompatible substances. Keep away from strong acids. Keep away from water. Keep away from

metals. Keep away from flammable liquids. Keep away from organic halogens. Absorbs CO₂ from the air.

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, please decontaminate equipment and bench tops. Call EH&S if assistance is needed. Please dispose of the used potassium hydroxide and disposables contaminated with it as hazardous waste in the appropriate waste container.

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

In the laboratory, potassium hydroxide is a commonly used base.

It is often used as a 1-5 M aqueous solution. The solid pellets should be handled carefully to avoid exposure to skin as they are corrosive.

While preparing solutions of potassium hydroxide from potassium hydroxide pellets, the following personal protective equipment must be worn: eye goggles with side-shields, lab coat, and either rubber, nitrile or neoprene gloves.

The solutions have to be prepared in a ventilated fume hood, away from incompatible materials such as strong acids and metals. Because dissolution of KOH pellets in water is exothermic, solutions of potassium hydroxide should be prepared by slowly adding the potassium hydroxide pellets to water.

Diluted solutions of potassium hydroxide can be handled out of the fume hood.

When potassium hydroxide solution is used for liquid-liquid extractions in a separatory funnel, caution must be exercised such that pressure build-up in the funnel is safely vented.

For the purpose of cleaning glassware, KOH pellets can be dissolved in isopropanol to obtain a "base bath". In this case, the volume of solution must be monitored to prevent potential spillage or contamination of surrounding areas.

Potassium hydroxide solutions used have to be disposed as hazardous waste, 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 potassium hydroxide, 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 E&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			
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Jason Fendi			

