UC | Center for Laboratory Safety

Standard Operating Procedure

Hydrogen peroxide

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:	EHS 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

Hydrogen peroxide is a clear liquid and strong oxidizer. It is a corrosive chemical that is toxic by ingestion. It may be harmful if inhaled or absorbed through the skin. It can cause severe burns to the digestive tract, respiratory tract, skin, and eyes with irreversible damage. Due to its strong oxidizing properties, hydrogen peroxide has several applications. It is often used as a bleach, cleaning agent, and disinfectant. It is an effective cleaning agent of wastewater. It can also be used as a rocket propellant.

Physical & Chemical Properties/Definition of Chemical Group

CAS#: 7722-84-1

Class: **Oxidizer, corrosive, toxic**

Molecular Formula: H_2O_2

Form (physical state): Liquid

Color: Colorless

Boiling point: 108 °C

Potential Hazards/Toxicity

Hydrogen peroxide is a strong oxidizer that has a potential to cause a fire or explosion in contact with incompatible materials. It is corrosive. It is toxic if swallowed. It may be harmful if inhaled or absorbed through the skin. May cause burns to digestive and respiratory tract. May cause nausea, vomiting, diarrhea, damage to the red blood cells, stomach distension, bleeding of the stomach, cerebral swelling, and ulcer formation. May cause ulceration of nasal tissue, insomnia, nervous tremors, chemical pneumonia, unconsciousness, and death. It may be destructive to the tissue of the mucous membranes and upper respiratory tract. Cause skin and eye burns. May cause permanent eye damage. May cause central nervous system effects. Prolonged exposure may cause dermatitis.

Hydrogen peroxide has a permissible exposure limit of 1 ppm or 1.4 mg/m3.

Specific Hazard(s): H_2O_2 is a strong oxidizer. It is NOT flammable itself BUT it can cause spontaneous combustion of flammable materials such as most cellulose (wood, cotton) materials. **If mixed or made in contact with magnesium (Mg), ignition will immediately occur.**

Personal Protective Equipment (PPE)

Respirator Protection
Use a full-face respirator with multi-purpose combination (US) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air 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

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 hydrogen peroxide.

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
Tight-fitting safety glasses/goggles.

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. If victim is conscious and alert, give 2-4 cupfuls of milk or water. 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. Ensure adequate ventilation. Keep away from sources of ignition- No smoking.

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. Recommended storage temperature is 2-8 °C. Store protected from light. Store away from combustible materials. Avoid metals, oxidizable material, alcohols, permanganates, zinc, powdered metals, iron, copper, nickel, brass, iron and iron salts.

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 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, decontaminate equipment and bench tops with water. Rinse used containers thoroughly with water before disposal.

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/lschemmsdsacc.htm

Protocol/Procedure

Hydrogen peroxide (30% wt in water) is used in the laboratory as an oxidant in diluted solutions, and is stored in a refrigerator.

Hydrogen peroxide (30% wt in water) has to be handled with the appropriate PPE, including nitrile gloves, safety goggles and a labcoat and has to be handled within the fume hood.

Due to its strong oxidation ability, care has to be taken not to put it in contact with incompatible materials, including oxidizable solvents, and reducing agents, that may cause spontaneous combustion. Hydrogen peroxide is catalytically decomposed by many common materials including various metals, resulting in the evolution of heat and oxygen, which can support the burning of combustible materials and can cause explosion. Therefore, avoid the use of metal spatulas and syringe needles when using concentrated solutions of hydrogen peroxide.

However, when highly diluted, hydrogen peroxide solutions can be used with oxidizable materials and handled out of the fume hood.

Hydrogen peroxide waste is disposed in the appropriate 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 hydrogen peroxide, 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			