**BASES (Alkalies)**

**STANDARD OPERATING PROCEDURE TEMPLATE**

**Type of SOP:**  ProcessHazardous Chemical Hazard Class

To customize this SOP, add lab-specific information to the sections below marked in RED, as applicable. Completion of the last section (“Lab-Specific Information”) is required. Also, any of the content below may be amended with lab-specific information to enhance worker safety as desired.

# HAZARD OVERVIEW

Bases are generally chemicals containing the hydroxide (OH-) anion, or materials that form hydroxide when added to water, e.g., carbonates. Bases are “corrosives” (like acids) and will destroy body tissue. The extent of injury depends on factors such as the type and concentration of the chemical, the route of exposure, the type of tissue contacted, and the speed used in applying emergency measures.  Skin contact with strong bases usually goes unnoticed, since pain does not occur immediately.

The eyes are especially susceptible to bases and must be immediately flushed with water for at least 15 minutes if exposure occurs.  Inhaling airborne dust and mist from bases irritate the nose, throat, and lungs.  Pulmonary edema, a severe irritation of the lungs resulting in fluid production that prevents the transfer of oxygen to the bloodstream, can also occur from extreme airborne exposures.  Secondary toxic effects may occur if the material is absorbed from the lungs into the bloodstream. The extent of these effects depends on the concentration in air and the duration of exposure.

Dilution of bases is exothermic and can result in the surface boiling and spattering. Therefore, always add the base to the water, thereby having a more dilute solution surface heating.  This is particularly true for potassium hydroxide. Concentrated solutions of inorganic bases are not in themselves flammable.

**HAZARDOUS BASES**

All base solutions are considered hazardous. The following is a list of common bases:

*Ammonium hydroxide; Barium hydroxide; Calcium hydroxide; Potassium hydroxide; Sodium hydroxide; Lithium hydroxide; Bicarbonate salts Carbonate salt*

# PERSONAL PROTECTIVE EQUIPMENT (PPE)

Given their tissue-damaging characteristics, it is crucial that appropriate PPE be used while handling bases. See the PPE information under Sec. II of the *UCSB Chemical Hygiene Plan* regarding:

* the UC PPE Policy and policy summary (what PPE is needed and when/where to use)
* obtaining your PPE via use of the *Laboratory Hazard Assessment Tool*
* glove selection criteria
* respirator use, etc.

# ENGINEERING/VENTILATION CONTROLS

All concentrated bases should be transferred and dispensed in an annually certified laboratory chemical fume hood with the sash at the certified position or lower.

# SPECIAL HANDLING PROCEDURES AND STORAGE REQUIREMENTS

* Bases can be only used in areas properly equipped with a certified **eye wash/safety shower** that can be reached within ten seconds.
* A relatively cool, dry environment free from extremes of temperature--humidity should be maintained. Some UCSB labs have ventilated “corrosive” cabinets built-in beneath the fume hood.
* Follow any substance-specific storage guidance provided in Safety Data Sheet documentation.
* Bases should be stored in a manner that separates them from incompatible materials. Each base should be stored in a manner consistent with its properties.
* Stored in material that is base-resistant; this facilitates flushing and other cleanup procedures in the event of leaks or spills.
* Store on low shelves or in base storage cabinets.
* Use bottle carriers for transporting materials when possible.
* Store solutions of inorganic hydroxides in polyethylene containers.
* Use small quantities whenever possible. Monitor your inventory closely to assure that you have tight control over your material.

# SPILL AND INCIDENT PROCEDURES

See directions under the “*Chemical Incident*” and “*Medical Emergency*” tabs of the *UCSB Emergency Information Flipchart* – should already be posted in all labs. A safety shower/eyewash should be immediately used in case of exposure.



# DECONTAMINATION

Wear proper PPE. Collect any crystals with brush – avoid creating dust. Decontaminate equipment and bench tops. Dispose of all used contaminated disposables as hazardous waste following the Waste Disposal Section.

# WASTE DISPOSAL

See “Chemical Waste Disposal” in Sec. II of the *UCSB Chemical Hygiene Plan*.

# PRIOR APPROVAL/REVIEW REQUIRED

As they deem necessary, the PI/supervisor should insert here any prior approval or review needed before an individual can do the operation.

# DESIGNATED AREA

As they deem necessary, the PI/supervisor should insert here any information about whether a special use-area is designated for this material/process.

# SAFETY DATA SHEETS

Online SDS can be found at: <http://ehs.ucsb.edu/labsafety/msds>

1. **LAB-SPECIFIC INFORMATION (required) *(***[*Examples*](http://www.ehs.ucsb.edu/labsafety-chp/sec1/three-examples-language-used-customize-standard-operating-procedure)***of appropriate content)***

Add appropriate lab-specific information here describing how this material(s) is generally used. E.g., name of protocol, typical frequency done, quantities used, temperature and any additional safety measures, etc.