Bleach

Standard Operating Procedure

Revision Date: 12/19/23

This standard operating procedure (SOP) outlines the handling and use of bleach. Review this document and supply the information required in order to make it specific to your laboratory. In accordance with this document, laboratories should use appropriate controls, personal protective equipment, and disposal techniques when handling bleach. *All laboratory workers must read and understand the*[*Laboratory Emergencies SOP*](https://ehs.umich.edu/wp-content/uploads/2022/05/LaboratoryEmergencyProceduresSOP.docx)*prior to commencing any work in a laboratory.*

# Description [Provide additional information as it pertains to your research protocol]

Bleach is a general term that typically refers to an aqueous mixture that has a primary active ingredient of either **Sodium Hypochlorite** or **Calcium Hypochlorite** and usually atconcentrations of **3 - 10%.** Bleach is used primarily as an oxidizing, cleaning, or a bleaching agent, as a disinfectant or within drinking water and waste water purification systems.

Synonyms of bleach include sodium hypochlorite, Clorox, liquid bleach, antiformin, chlorox, Carrel-dakin solution, Chloros, Dakin’s solution, hychlorite, Javelle water.

## Process [Write the steps for using the chemical in your research protocol]

# Potential Hazards [Provide additional information as it pertains to your research protocol]

* Corrosive. May cause severe irritation or damage to eyes or skin. Vapor may irritate eyes and respiratory tract.
* Incompatible with many chemicals/agents. Hazardous gases (including chlorine and chloramines) may be released if bleach is mixed with an incompatible material.
* Exposure to these gases can cause coughing, shortness of breath, irritation to, or burning of the eyes, nose, and throat, chest pain, wheezing, fluid in the lungs, and nausea. Chlorine can also be absorbed through the skin and cause pain, inflammation, swelling, and blistering.
* Strong oxidizer. May initiate or promote combustion in other materials. May intensify fire.

## Occupational Exposure Limits (OELs)

* MIOSHA: **0.5 ppm Chlorine** (*from sodium hypochlorite*), **8-hour** PEL
* MIOSHA: **1 ppm Chlorine** (*from sodium hypochlorite*), **15-minute** STEL
* AIHA (WEEL): **2 mg/m3 Sodium Hypochlorite, 15-minute** STEL

Contact EHS for assistance in performing an exposure assessment.

# Engineering Controls [Provide additional information as it pertains to your research protocol]

* An eyewash/drench hose combination unit must be available in the immediate work area for any work with corrosive materials, including bleach.
* If large quantities will be used, a safety shower will also be necessary. *Contact Environment, Health & Safety (EHS) at (734) 647-1143 for a determination of the need for a safety shower if there is not one available.*
* A system of local and/or general exhaust is recommended to keep employee exposures below MIOSHA Permissible Exposure Limits (PEL). Local exhaust ventilation (LEV) is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. *Contact EHS at (734) 647-1143 for a determination of the need for an LEV system, if there is not one available.*

# Work Practice Controls [Provide additional information as it pertains to your research protocol]

* **ALWAYS** review the SDS of both bleach and any chemicals/agents before mixing them with bleach to ensure compatibility. A general list of incompatible materials can be found [here](https://www.forceflowscales.com/downloads/chemical-safety/hypochlorite/SodiumHypoIncompatibilityChart.pdf).
* **NEVER** mix bleach with an unknown liquid or unknown residue.
* Do not mix bleach with any compound that is incompatible with oxidizers.
* Purchase bleach in the smallest containers that are practical for lab use.
* Work with the smallest practicable amount and lowest practicable concentration.

# Personal Protective Equipment [Provide additional information as it pertains to your research protocol]

* Wear a fully buttoned lab coat, safety glasses with side shields (that meet the requirements of ANSI/ISEA Z87.1) or goggles if splashing may occur, and gloves for any work with bleach. Depending on the quantities and concentrations used, a face shield, impenetrable chemical apron and sleeves (or coverall), and neoprene elbow length gloves may be recommended.
* If adequate dilution ventilation or LEV are present, respiratory protection should not be necessary. However, in the absence of these and when MIOSHA PEL, or other published occupational exposures limits (OEL) are anticipated to be exceeded, respiratory protection may be necessary. *Contact EHS at (734) 647-1143 for a determination of the need for a respirator.*

# Transportation and Storage [Provide additional information as it pertains to your research protocol]

* Transport concentrated bleach solutions in secondary containment, preferably a polyethylene or other non-reactive bottle carrier.
* Store in well-ventilated areas with secondary containment, such as a non-reactive plastic bin.
* Store below eye level.
* Store away from metal (unless the metal has a corrosion-proof coating).
* Store away from incompatibles and flammable materials. Always review the SDS of other chemicals in the storage area for compatibility with bleach.
* Avoid storing on the floor. If storing on the floor is necessary, use secondary containment.

# Waste Disposal [Provide additional information as it pertains to your research protocol]

If the bleach solution is at a household concentration or less, i.e., a maximum 10% concentration of sodium hypochlorite, **and** was used for disinfecting, limit discharges down a laboratory sink to less than 1-gallon (approx. 3.8 L). If the concentration was >10% **and** was used for disinfecting, limit the sink disposal to less than 2-cups (approx. 500 mL) of bleach solution.  Also flush the drain with adequate volumes of water.

This does **not** apply to “waste” bleach, e.g., ***unused*** or ***expired*** bleach. Any **leftover**, **unused product** or **expired bleach** not used as intended by the manufacturer, or used as a disinfectant, needs be collected by EHS Hazardous Materials Management (EHS-HMM) for proper disposal. Contact EHS-HMM at (734) 763-4568 for waste containers, labels, manifests, and waste collection. Also, refer to the EHS [Hazardous Waste](http://ehs.umich.edu/haz-waste/) Web page for more information.

# Training of Personnel

All personnel shall read and fully adhere to this SOP when handling bleach.

# Certification

I have read and understand the above SOP. I agree to contact my Lab Director if I plan to modify this procedure.

|  |  |  |  |
| --- | --- | --- | --- |
| Name | Signature | UMID # | Date |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |

|  |  |
| --- | --- |
| Laboratory Director | Revision Date |

### Major Revisions (Tracking purposes only -- Do not print as part of SOP)

|  |  |
| --- | --- |
| Date | Revision |
| 09-13-18 | EHS name and logo were added, updated the formatting, and revised the content under Exposure/Unintended Content (AKJ). |
| 03-04-19 | Reviewed and updated. |
| 04-14-22 | Updated safety shower and eyewash placement requirements consistent with current MIOSHA Agency Instruction. Reviewed and updated links. (LGS) |
| 05-11-22 | Removed emergency response procedures section (LGS) |
| 12-19-23 | Reviewed and updated links. (SMW) |

**References**

Agency for Toxic Substances and Disease Registry

*Calcium hypochlorite and Sodium hypochlorite fact sheet*: [www.atsdr.cdc.gov/toxfaqs/tfacts184.pdf](http://www.atsdr.cdc.gov/toxfaqs/tfacts184.pdf)

*Calcium hypochlorite and Sodium hypochlorite toxicological profile*: <http://www.atsdr.cdc.gov/Mhmi/mmg184.pdf>

The Chlorine Institute

*Sodium Hypochlorite Incompatibility Chart*:

<https://www.forceflowscales.com/downloads/chemical-safety/hypochlorite/SodiumHypoIncompatibilityChart.pdf>