Sodium Hydroxide and Ethanol Bath

Standard Operating Procedure

Revision Date: 12/20/23

Laboratory Director (LD) Approval is Required Prior to Performing this Procedure

This standard operating procedure (SOP) outlines the handling and use of sodium hydroxide and ethanol solution. 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 this solution. 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]

A sodium hydroxide and ethanol bath is used for glass cleaning by immersing glassware in the solution to remove any prior chemicals used. The solution is extremely corrosive and causes caustic burns.

## Protocol

*Each lab will need to customize this section with their own protocol for making the solution and cleaning the glassware. Example: Slowly* Mix sodium hydroxide in a solution of 20% ethanol. The container will get quite warm. Using distilled deionized water in a squirt bottle, extensively rinse glassware and dry in the 60°C oven. Store in a polypropylene container with a lid.

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

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

* Sodium hydroxide combined with ethanol makes a highly concentrated alcoholic hydroxide solution that can be used to clean glassware after use. The solution is both flammable and corrosive.
* It may be harmful if inhaled, ingested, or absorbed through the skin.
* Inhalation may cause irritation to the respiratory tract with burning pain in the nose and throat, coughing, wheezing, shortness of breath and pulmonary edema. It is destructive to the tissue of the mucous membranes and upper respiratory tract. Inhalation of solvent vapors may cause chronic toxic effects in the liver or kidney.
* Contact with skin causes burns and irritation. Prolonged or repeated skin exposure may cause skin defatting or dermatitis.
* Eye contact causes burns, irritation, and may cause blindness.
* Ingestion may cause permanent damage to the digestive tract.
* Flash fires may occur in the presence of ignition sources.
* An explosion or sudden release of pressure can result from storing sodium hydroxide and ethanol in a closed container due to pressure buildup. Never store the solution in an airtight container until the solution has cooled and is ready to be to be collected as waste.
* Sodium hydroxide-saturated ethanol solution is extremely ***corrosive*** and causes caustic burns. Avoid contact with skin or clothes!
* Ethanol is a ***flammable liquid***. Do not dispose in sink.
* Inhalation of low levels of sodium hydroxide as dusts, mists or aerosols may cause irritation of the nose, throat, and respiratory airways. Inhalation of higher levels can produce swelling or spasms of the upper airway leading to obstruction and loss of measurable pulse; inflammation of the lungs and accumulation of fluid in the lungs may also occur.
* Exposure to sodium hydroxide and ethanol can cause severe burns in the eyes, skin, and gastrointestinal tract which may ultimately lead to death.
* Eye contact can result in corneal damage or blindness.
* Keep away from incompatibles such as oxidizing agents, reducing agents, metals, acids, alkalis, moisture.
* Do not store solution in a **polyethylene** container. Store solution in **polypropylene** container only. Recommend using a 2-gallon or 5-gallon rectangular polypropylene tank with lid from National Tank Outlet. Here is link to their website: https://www.ntotank.com/ (search for rectangular polypropylene tanks).
* Read Safety Data Sheets (SDSs) for more information on sodium hydroxide and ethanol.

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

* Use of sodium hydroxide and ethanol solution must be conducted in a properly functioning chemical fume hood. The chemical fume hood certified by Environment, Health & Safety (EHS).
* Cover the container with a loose fitting lid while glassware is in solution.
* An eyewash and safety shower must be available in the immediate work area for any work with corrosive materials. Verify their location and confirm that both are working properly.

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

* Do not make excessive amounts of solution; only make what can be safely stored in the laboratory.
* A current copy of the SDS for sodium hydroxide and ethanol solution being used must be made available to all personnel working in the laboratory at all times.
* Containers must be labeled appropriately. Label should indicate the name of the chemical(s) in the container. Avoid using chemical abbreviations (acceptable if a legend is present in the lab) and formulae. Example: *“Sodium Hydroxide and Ethanol Bath. Highly Corrosive and Flammable.”*
* Glassware with excessive grime should first be rinsed with an appropriate solvent (such as water and a little acetone). Collect the rinse solution in a separate container, label with all constituents, and submit to EHS - Hazardous Materials Management (HMM) as waste. Call: 763-4568.
* If the glassware is greased, excess grease should be removed with a paper towel.
* Check all glassware for cracks before placing in the bath.
* Do not leave glassware in the solution for more than one overnight period. Prolonged soaking in the bath will lead to degradation and consequent thinning of the glass.
* Take care not to cause the solution to overflow. Secondary container should capable of containing the full solution volume in the event that the bath container fails.
* Solution must be stored in appropriate containers such as polypropylene container. Do not store solutions in metal containers or polyethylene containers. Do not store solution in Rubbermaid or other types of plastic storage containers.
* Avoid contact with skin and eyes. Avoid inhalation of vapor or mist.
* Keep away from incompatible materials such as acids and oxidizing materials. Keep away from sources of ignition. Avoid heat and shock or friction when handling.
* Containers should remain closed when not in use with loose lid.
* Do not store it in the same secondary container as acids or oxidizers.
* Store waste in a heavy glass bottle with loose cap. Store container in a cool, dry area away from sources of ignition. Prior to collection by EHS-HMM, tighten cap.
* Hygiene Measures: Avoid contact with skin, eyes, and clothing. Wash hands before breaks and immediately after handling the product.

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

Hand Protection: Gloves must be worn. Wear butyl rubber gauntlet-style gloves and as added protection wear nitrile gloves underneath. If the solution gets inside the butyl rubber gloves, it will penetrate the nitrile gloves in 5 minutes or less. This will be enough time to remove the gloves and wash your hands with soap and water. Use proper glove removal technique to avoid any skin contact.

**NOTE**: Consult with your preferred glove manufacturer to ensure that the gloves you plan on using are compatible with the specific chemical being used.

Eye Protection: ANSI approved properly fitting chemical splash goggles and a face shield are required.

Skin and Body Protection: Flame resistant laboratory coats must be worn and be appropriately sized for the individual and buttoned to their full length. Additional protection such as a chemical-resistant apron is appropriate when handling of large volumes and when there is a potential for splash. The area of skin between the shoe and ankle must not be exposed.

* Wear closed-toe shoes (non-mesh upper), lab coat, splash goggles, chemical apron, and chemical-resistant gloves when working with this solution.
* Heavy rubber gloves are recommended when working with this solution.
* Exposed skin should be minimized.

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

Store waste in piranha waste bottles with piranha venting caps. Store container in a cool, dry area away from sources of ignition and strong oxidizers (like piranha!).

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

After use, allow solution to cool in a labeled container inside a fume hood. The container will need to have a piranha venting waste cap which allows the solution to vent and avoid bottle pressurization.

Waste solution must be cooled overnight or to room temperature prior to waste storage/disposal. You can cap the container only after the waste solution has cooled completely.

The waste solution etches, so it should only be kept in glass containers having a plastic safety containment coating on the exterior surface. These containers are designed to prevent material loss in the event of cracking or breaking. These containers and venting caps are available from EHS Hazardous Materials Management (HMM) at (734) 763-4568. When calling HMM you need to request the piranha waste bottles and piranha caps. While waiting for pickup, the waste must be stored in the described container.

Do not add any other materials to the waste solution.

Because most spent, unused, and expired chemicals/materials are considered hazardous wastes, they must be properly disposed of. **Do not dispose of chemical wastes by dumping them down a sink, flushing in a toilet or discarding in regular trash containers, unless authorized by EHS Hazardous Materials Management (HMM)**. Contact EHS-HMM at (734) 763-4568 for waste containers, labels, manifests, waste collection and for any questions regarding proper waste disposal. Also, refer to the EHS [Hazardous Waste](http://ehs.umich.edu/haz-waste/) Web page for more information.

# Training of Personnel

All personnel are required to complete the ***General Laboratory Safety Training*** session (**BLS025w** *or equivalent*) via the [EHS My LINC](https://ehs.umich.edu/safety-training/) Web page.

Furthermore, all personnel shall read and fully adhere to this SOP.

# Certification

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

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

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| Date | Revision |
| 03-23-18 | Put into EHS format, changed department name, and fixed links. Revised Spill Procedure section (AKJ). |
| 04-09-18 | Revised formatting (AKJ). |
| 04-23-18 | Changed injury type and action from paragraph to table format (AKJ) |
| 03-01-19 | Updated links, certification and format (DML). |
| 12-22-22 | Updated emergency info and links (BR) |
| 12-20-23 | Reviewed content and updated links. (BR) |