

Base Bath SOP

What are base baths, and what are the hazards?

Base baths are used to clean glassware and typically consist of alcoholic solutions (ethanol or isopropanol) of sodium or potassium hydroxide. The base concentration and quantity of alcohol can vary substantially between particular recipes, but typically 200-500 g of base dissolved in 1 L of water is used per 2-3 gallons of alcohol or an alcohol/water mixture.

Base baths are highly corrosive and flammable. Care must be taken to prevent contact exposure and to mitigate any risk of fire.

Base Bath Preparation

- Wear appropriate eye protection (chemical splash goggles are recommended), exam grade nitrile gloves, and a lab coat.
- Always prepare the initial concentrated aqueous base solution in a chemical fume hood. Add the amount of solid hydroxide salt called for in the recipe to the water with stirring. The dissolution of the base in water will produce a significant amount of heat. Ensure that this solution is cooled in the hood before handling or mixing further.
- Base baths must be prepared and stored in thick plastic containers (such as Nalgene tubs with lids, shown at right) that are also in secondary containment (i.e., a plastic bin able to contain the entire contents of the bath should the container fail). Do not use containers made from any other materials, and ensure the plastic is compatible with the base bath. Good choices of plastic include those described as “heavy duty” LLDPE (linear low-density polyethylene), HDPE (high-density polyethylene), and PP (polypropylene). Choose containers that will be no more than half full once the bath solution is added. Once prepared, base baths must be covered unless items are actively being transferred to or from the bath.
- Ensure the bath container and secondary container are positioned in the final location prior to preparing the bath as it will be impossible to safely move the full bath. Baths should be located

Nalgene Container for Base Baths



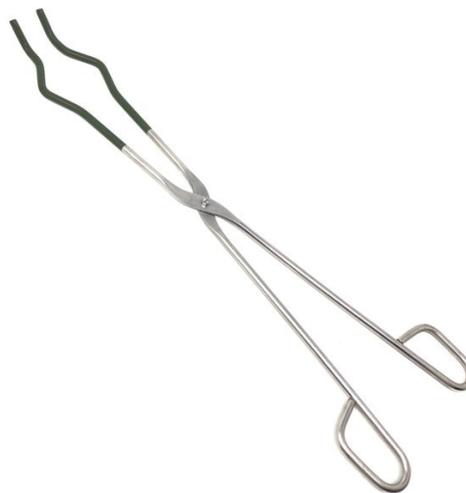
by sinks where glassware will be rinsed to minimize transport of wet items. Baths should be positioned at a height that enables comfortable access to the shortest user. Step-stools, or other devices, should not be used. Ensure baths do not block aisle ways or create tripping hazards. Ensure that an eye wash and drench shower are accessible within 50 ft. of the bath. Ensure there are no potential sources of ignition near the bath.

- To prepare the bath, wear appropriate eye protection (again, chemical splash goggles are recommended), a face shield, lab coat, exam grade nitrile gloves under thick butyl rubber elbow length gloves.
- Add at least half the amount of alcohol or alcohol/water mixture called for in the recipe that will be used to the bath container, and then add the concentrated aqueous base solution prepared previously. Ensure this is well mixed before adding the remaining alcohol or alcohol/water mixture.
- Ensure that the bath is prominently labeled with the contents and the hazards (i.e., corrosive and flammable). A label that may be used for this purpose is included at the end of this document. Consider laminating the label or using a sheet protector to keep the label in good condition. Replace labels that become illegible.

Base Bath Use

- Ensure glassware is precleaned using appropriate solvents or soap to remove gross contamination. Contaminated cleaning fluids should be handled as hazardous waste. Wipe off any stopcock grease from joints. Trace amounts of stopcock grease can be removed by scrubbing with hexanes and a brush. All solvents should be used in a chemical fume hood.
- Wear appropriate personal protective equipment, including eye protection (chemical splash goggles are recommended), a face shield, lab coat, and exam grade nitrile gloves under thick butyl rubber elbow length gloves.
- Use tongs, or other handling device, to place items into or remove from the bath. Take care to not generate splashes. Ensure glassware that is connected by ground glass joints is disconnected prior to placement in the bath and disassemble stopcocks.
- The following items are not appropriate for cleaning in a base bath:
 - Items containing glass frits-the glass creating the small pores is capable of fusing in the bath thus rendering the frits unusable
 - Items containing volumetric markings, including volumetric flasks and pipettes, graduate cylinders, burets, etc.: base baths clean glassware by etching a small portion of the surface of the glass which can also remove volumetric markings
 - Items used for spectroscopy or optics, including cuvettes and NMR tubes: these items can be etched in the bath and ruined.

Tongs For Handling Glassware



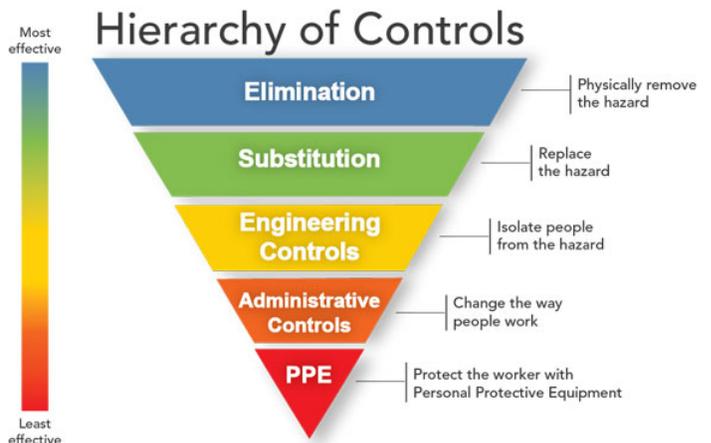
- Some plastic and rubber items, including o-rings and glass with plastic coatings: these items can degrade in the base bath. Teflon (PTFE) items are acceptable.
- Metal items, such as spatulas and tongs-metals can dissolve over time in the bath leading to contamination and potentially dangerous reactions. Use of metal tongs to add and remove items from the bath is acceptable, however, do not leave the tongs in the bath.
- When removing items, empty liquid from submerged materials back into the bath. Use the lid of the bath, or other type of tray with sides, to hold the wet items and prevent spills from dripping when moving items to the sink.
- Rinse all items thoroughly, including the lid or tray used to hold the items and the tongs.
- Wipe down the work area, clean up any spills, and ensure the sink is completely rinsed when finished. Replace the lid on the bath. Do not store the tongs in the bath.

Base Bath Disposal

- Change baths when they lose cleaning ability. Empty baths that are no longer needed.
- Wear appropriate personal protective equipment, including eye protection (chemical splash goggles are recommended), a face shield, lab coat, and exam grade nitrile gloves under thick butyl rubber elbow length gloves.
- Position an adequately sized plastic waste container in secondary containment next to the base bath.
- Carefully use a beaker, or other appropriate container, to transfer the bath to the waste container in small aliquots. Never attempt to pour a full base bath. Other methods of emptying the bath should only be approved after an appropriate risk assessment. Please contact EH&S should you have any questions.
- Once the volume of bath remaining in the tub is a few hundred milliliters or less, the remaining solution can be poured into the waste container by using a large funnel.
- Wipe up any spills and cap the waste container.
- Add a completed hazardous waste label to the waste container and place it in the satellite accumulation area. Pick-up can be requested through CEMS.

How Can Exposures and Physical Hazards Be Minimized?

When working with any hazardous material or process, always conduct a thorough risk assessment and employ the hierarchy of controls to minimize risk. Some specific applications of the hierarchy of controls to the unique hazards of base baths are listed below. Always apply the controls in the order of most effective to least effective (see graphic), and apply as many controls as possible to reduce the risk to the lowest achievable level.



Elimination/Substitution

- Choose less hazardous methods for cleaning glassware when possible.
- Always pre-clean glassware before placing in a base bath to ensure glassware is appropriately cleaned by the bath and problematic reactions do not occur in the bath. Scrub glassware with a soap and brush or solvent as appropriate to remove the majority of contaminants.

Engineering Controls

- When preparing a base bath for use, always prepare the aqueous base solution in a chemical fume hood. These solutions should be allowed to cool before further mixing to prevent exothermic processes and splattering.

Administrative Controls

- Ensure all individuals who need to use the bath are trained on hazards, use, and emergency procedures. SDSs for the base and alcohol solvent should be reviewed along with this SOP.
- Implement a bath use schedule if it is to be shared among multiple users. Moving items around in the bath to find other items can create a splash potential. All of the glassware should be removed from the bath when glassware is washed to prevent this issue. Glassware should not be left in the bath for more than 48 hours to prevent damage to the glassware.
- All base baths must be stored covered and in secondary containment.
- Position baths so that the shortest user can comfortably use the bath without the need for a step stool or similar device.
- Always use tongs or other device to manipulate items. Never submerge gloved hands in the bath.
- Never transport wet items from the bath to the sink without containment. Use the bath lid, or other tray with sides, to move emptied glassware. Base baths should be located immediately adjacent to sinks where glassware will be washed.
- Clean up all spills and drips when finished.

Personal Protective Equipment

- Always wear appropriate eye protection. Chemical splash goggles and safety glasses rated for impact (ANSI Z87+) should be worn under a face shield.
- A lab coat must be worn for all work with base baths.
- Wear appropriate gloves. Thick butyl rubber elbow-length gloves with exam grade nitrile gloves underneath are appropriate. Rinse butyl rubber gloves after use and inspect for holes before use if these are reused.

Waste Handling

Bath baths should be handled as hazardous waste when discarded. To have the waste picked up by EH&S staff, complete a Hazardous Materials Pickup Request Form in CEMS.

Exposure and Spill Procedure

In the event of a spill involving a base bath that does not involve the contamination of a person, the material may be cleaned up if it is safe to do so following the general procedure for small spills detailed in the University's Chemical Hygiene Plan.

- Ensure that it is safe to clean up the spill.
 - Spills of more than 1 L should be immediately referred to EH&S (413-545-2682) and the area should be evacuated. Do not permit entry to the area until EH&S arrives.
- Use absorbent material to contain and remove the liquid. After the liquid is removed rinse the area with water and contain and remove with absorbent material.
- Place all items used for cleanup in a labeled hazardous waste container and request a pickup through CEMS.
- If at any point you are uncomfortable cleaning up the spill or require assistance, stop and call EH&S (413-545-2682).

Exposures to hazardous materials should follow the general procedures for exposures outlined in the University's Chemical Hygiene Plan.

For a major exposure or fire requiring the use of a drench shower or eyewash:

- Have someone call 911 (report the building name, room number, and street address) or 413-545-3111 (or simply 5-3111 from a campus line) to report the incident and request medical help. If possible, communicate to the first responders that there was an exposure to base bath, which is highly corrosive.
- Help the affected individual to position their head over the eyewash and activate it, or position them under the drench shower and activate it as appropriate.
 - Always ensure your own safety before helping others. Only help if it is safe for you to do so.
 - Wear gloves, safety glasses, and a lab coat.
- If using an eyewash: Instruct the affected individual to open their eyes and roll them around while the water is flowing. Help them to hold their eyes open if necessary and safe to do so.
- If using a drench shower: Remove all clothing from the affected area while under the shower.
- Flush the affected area for 15 minutes with water.
- If a base bath ignites, smother the fire with the lid to the bath or use a fire blanket. Do not use a fire extinguisher.

For minor exposures such as a spill to readily accessible extremities (e.g., hand):

- Flush the affected area in a sink equipped with potable water for at least 15 minutes.
- Go to University Health Services (UHS) for medical evaluation, and tell them you have had a lab exposure to base bath, which is highly corrosive.
- Notify EH&S (413-545-2682) as soon as possible and complete the lab incident form (<https://ehs.umass.edu/lab-incidents-and-lab-incident-report-form>).

Base Bath

Contains: Sodium/Potassium Hydroxide, Water, Ethanol/Isopropanol

Highly Corrosive
and



Flammable!

