

# Base Bath Handling and Safety

## (Standard Operating Procedure)

Before using the base bath, the Principal Investigator (PI) or lab manager must provide training to laboratory personnel specific to the hazards involved with safe use, work area decontamination, and emergency procedures.

### Section 1: Hazards

Laboratory glassware is valued for its strength, chemical resistance, and smooth, clean surface. Proper cleaning is essential because residues, especially solids and grease, can interfere with chemical reactions.

Base baths are concentrated alcoholic hydroxide solutions used to clean only glassware by chemically etching the outer silica layer to remove residual contaminants. These solutions usually contain sodium or potassium hydroxide dissolved in ethanol or isopropanol. Base baths are both highly corrosive and flammable.

Exposure can occur through inhalation, skin contact, eye contact, or ingestion. Breathing vapors or aerosols may irritate the respiratory tract and cause burning sensations in the nose and throat, coughing, wheezing, and shortness of breath. Severe exposure can lead to pulmonary edema. Long-term inhalation of solvent vapors may cause toxic effects in the liver and kidneys. Skin contact can cause irritation or chemical burns, and prolonged exposure may lead to dryness or dermatitis. Eye contact can result in severe irritation, burns, or permanent vision loss. Ingestion can cause serious and permanent damage to the mouth, throat, and digestive tract. Because ethanol and isopropanol are flammable, flash fires can occur if ignition sources are present.

Glassware is typically soaked in the base bath for several hours or overnight, then thoroughly rinsed and washed with detergent. Soaking should be long enough to remove contaminants but not so long that the glass is damaged. Do not use base baths on ground-glass joints, fritted glass, or volumetric instruments, as the alkali solution can alter their dimensions, enlarge pores, or change calibrated volumes.



**Table 1.** Base bath reagents and key hazards. Please consult a safety data sheet (SDS) to further identify the material hazards, proper handling, and storage procedures.

Compound Name	CAS No.	Key Hazards
Potassium hydroxide (KOH)	1310-58-3	Highly corrosive; causes severe burns; reacts with water; acute oral toxicity
Sodium hydroxide (NaOH)	1310-73-2	Highly corrosive; causes severe burns; reacts with water
Isopropanol (IPA)	67-63-0	Irritant; highly flammable liquid and vapor (flash point - 12 °C); causes dizziness

Ethanol (EtOH)	64-17-5	Irritant; highly flammable liquid and vapor (flash point – 13 °C)
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## Section 2: Hazard Controls and Personal Protective Equipment (PPE)

**Hazard Controls:** Base baths must always be prepared inside a properly functioning chemical fume hood that is approved and certified. Once prepared, the bath may be stored outside the hood in a well-ventilated area, ideally near a lab sink to minimize the transport of wet glassware. The storage location should be easily accessible, not block aisles, and avoid creating tripping hazards. The bath should be placed in a secondary container and covered with a lid when not in use.

**Hygiene Measures:** Avoid contact with skin, eyes, and clothing. Wash hands thoroughly after handling glassware or the base bath solution and before leaving the lab or when taking breaks.

**Hand Protection:** Gloves are required whenever handling the base bath. Use proper removal techniques to avoid skin contact. Nitrile gloves under long butyl or neoprene rubber gloves are recommended. Confirm glove compatibility with the chemicals being used.

**Eye Protection:** Approved chemical splash goggles are required. A face shield should be worn when pouring or transferring larger amounts to prevent splashes

**Skin and Body Protection:** Wear a flame-resistant lab coat that fits properly and stays buttoned. A chemical-resistant apron may be necessary when handling large volumes. Long pants and closed-toe shoes must always be worn, and no skin should be exposed between shoes and pant legs.



## Section 3 –Storage Requirements and Handling

- Prepare only the amount of base bath solution that can be safely stored in the laboratory. Avoid making excessive quantities (do not fill beyond 2/3 of the container capacity).
- Containers must be clearly labeled with the full chemical names. Avoid using abbreviations or chemical formulas unless a legend is posted in the lab.
- Glassware with heavy residues should be pre-rinsed using an appropriate solvent (e.g., water or water with a small amount of acetone). Collect the rinse waste in a separate, labeled container and submit a waste pick-up request.
- Remove excess grease from glassware with a paper towel before placing it in the base bath.
- Inspect all glassware for cracks or damage before use. Do not place broken or compromised glassware in the base bath, as it may shatter and produce shards.
- Do not leave glassware soaking in the base bath for more than one overnight period. Extended exposure can degrade and thin the glass.
- Keep base bath containers upright, covered with a lid, and stored in a dry, well-ventilated location.
- Use chemically compatible containers for storage, such as a heavy-duty HDPE Nalgene container. Do not use metal or non-chemical-approved containers.

- Avoid direct contact with skin or eyes and minimize inhalation of vapors or mist.
- Store away from incompatible materials, including acids and oxidizers, and keep away from heat, ignition sources, and situations that could cause friction or shock.
- Containers should **always** remain closed when not in use.
- The base bath should be stored in an area where it does not need to be moved for use, such as under the sink or in a designated, permanent area. If the base bath requires moving while full, at least two people should be involved for safe handling.

## Section 4 – Spill and Accident Procedures

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**Immediate Response:** In the event of a large spill, immediately evacuate the area and alert others nearby and Research Safety.

**Fire or Emergency Threat:** If there is an imminent risk of fire, activate the nearest fire alarm, evacuate the building, and call 911.

**Medical Emergencies:** If any personnel are exposed or injured and require medical attention, call 911 immediately.

**Minor Spills:** For minor spills, use appropriate PPE and apply a base spill neutralizer to safely neutralize the solution. Then, use a suitable absorbent material to contain and collect the spill. Once the liquid has been absorbed and neutralized, place the waste material in a sealed, chemically compatible bag or container and dispose of it according to the laboratory's chemical waste procedures.

## Section 5 – Waste Disposal

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Hazardous waste must be stored in closed, properly labeled containers in a designated waste storage area. When a base bath has lost its cleaning effectiveness, the solution should be transferred to a heavy-duty container, such as a Nalgene bottle or carboy. Base bath solutions must not be disposed of down the drain and should never be mixed with acidic waste streams. To arrange for proper disposal, complete a Chemical Waste Pickup Request Form and submit it to Lumen.

## Section 6 – Preparing a Base Bath

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Always wear full PPE (gloves, flame resistant lab coat, goggles) and work in a fume hood before beginning. To prepare a base bath, first dissolve 200–300 g of KOH pellets in 1 L of distilled water. This dissolution is highly exothermic, so add the base **slowly** while stirring and allow the solution to cool before proceeding.

Once fully dissolved and cooled, slowly add 4–8 L of IPA depending on the desired final concentration of the base bath (more IPA gives a lower molarity). These amounts are provided as a practical example; exact volumes can be adjusted depending on your specific concentration needs.

Stir thoroughly to ensure the solution is homogeneous. Always add the aqueous KOH solution to the alcohol, **never** add alcohol directly to solid KOH. Label the container with contents, approximate concentration, and date. Store in a tightly sealed, chemically resistant container away from acids, oxidizers, heat, and open flames. Replace the bath if it becomes cloudy and precipitates form.