HARVARD
Campus Services
ENVIRONMENTAL HEALTH & SAFETY

LABORATORY SAFETY GUIDELINE

Base Bath – Hydroxide and Isopropanol

Base Baths are highly concentrated alcoholic hydroxide solutions used to clean glassware with organic contamination. The solutions consist of Ethanol or Isopropanol and Sodium or Potassium hydroxide. The glassware is cleaned by chemically dissolving contaminated surfaces. Base baths are flammable and corrosive.

HAZARDS

	Potassium hydroxide (CAS #: 130-58-3): Corrosive to skin; acute oral toxicity; serious eye damage.
	Isopropanol (CAS #: 67-63-0): Highly flammable; causes serious eye irritation; specific target organ toxicity; causes drowsiness or dizziness.

PRECAUTIONS

Before starting work:

- Review manufacturer's Safety Data Sheet and additional chemical information.
- Ensure that a written experimental protocol including safety information is available.
- Be familiar with general University emergency procedures in the EHS Lab Emergency Response Guide.
- Identify the location of the nearest eyewash and shower and verify that they are accessible.
- Locate and verify that appropriate Base Bath spill cleanup materials are available:
  - Alkaline neutralizer
  - Scraper
  - pH test strips
  - Disposable scoop pan
  - Polystyrene bag or mayo jar for waste collection
- Choose a container volume that is large enough to hold all the constituents of the base bath, the glassware, as well as enough extra space to prevent accidental overflow.
- The base bath should be placed in a secondary container constructed of material such as HDPE Nalgene and capable of containing the full bath volume in case the primary container fails. Do not store Base Bath solutions in metal containers.
  NOTE: Always separate glass joints before soaking - a base bath can chemically bond them together permanently.
- Identify where you will be storing your Base Bath. The best practice is to prepare and store the Base Bath in a fume hood. If there is not enough space to store the Base Bath in or near the fume hood permanently, a well-ventilated area, and out of the way of foot traffic (to avoid accidentally knocking or kicking it over) is recommended.
  NOTE: The Base Bath will be heavy after prepared. Its best to prepare and store the bath in one location.
- Glassware with metal residues should not be cleaned using the base bath. Consider using an Acid Bath for such purposes. Please contact EHS for assistance.
- Do not put the following items in a base bath:
  - Glassware that is not pre-washed
  - Glassware contaminated with metals or oxidizers
  - Volumetric glassware
  - Quartz glassware
  - Glass fritted funnels
  - IR/UV cells
  - Rubber/plastic items (such as o-rings, vacuum tubing, stir bars, or plastic-lined glass)
  - NMR tubes
  - Stopcock keys

During Work:

- AVOID CONTACT! Wear appropriate PPE including:
  - Lab coat, long pants, and closed toed shoes.

- Neoprene or Butyl rubber gloves with a secondary nitrile glove underneath
- Safety glasses, or preferably safety goggles, must be worn at all times when working with the base bath. It is recommended that a face shield be worn when splash potential exists.
- Wash your hands thoroughly each time gloves are removed.

- AVOID INHALATION! The preparation of the base bath can generate volatile organic vapors – as the reaction between the potassium hydroxide and isopropanol is exothermic.
- You will be handling large amounts of glassware that can be slippery due to the cleaning solutions – be extra careful to avoid breaking the glassware and cutting yourself.

Procedure:

A. Pre-washing the soiled glassware
   1. All soiled glassware should be prewashed with appropriate solvent to get the glassware as clean as possible. Collect the solvent used to wash the glassware in a container and manage it as hazardous waste.
   2. Wash the glassware with detergent and then rinse with distilled water.

B. Preparation of the base bath
   1. This process is ideally performed in the fume hood.
   2. While wearing your PPE – lab coat, safety glasses (face shield if working outside of a fume hood), and nitrile gloves - place the container you have chosen for your base bath inside of the secondary container. Your primary container should have a tight-fitting lid.
   3. Label the container with the date and "DANGER: BASE-BATH SOLUTION, HIGHLY CAUSTIC"
   4. Fill the container with approximately 2 liters of deionized/distilled water. The best practice is for the DI water to be chilled. This will reduce the exothermic reaction produced when dissolving Potassium Hydroxide in water.
   5. To the DI water, add 560g of Potassium Hydroxide pellets slowly. DO NOT add pellets all at once. Potassium Hydroxide dissolving in water is exothermic and could overheat the solution. Stir slowly until all Potassium Hydroxide is dissolved. You must wait until the potassium hydroxide is clear and it has returned to room temperature. If you add hot potassium hydroxide to isopropanol you can bring the isopropanol to boiling temperatures.
   6. Once the solution has cooled, add 8 liters of Isopropyl alcohol and stir.

C. Using the base bath
   1. Before working with the base bath, be sure that your gloves are in good condition. Replace them if you have any doubt as to their condition.
   2. While wearing safety goggles, a face shield, and neoprene gloves or butyl rubber gloves over nitrile gloves, glassware that has been pre-washed according to the above procedure is gently lowered into the base bath allowing the solution to completely fill the glassware. Be careful to avoid splashing base bath solution onto yourself as air is displaced from your glassware.
   3. Allow the glassware to remain in the solution several hours or overnight.
      i. Do not leave glassware in the base bath for more than one overnight period. Prolonged soaking in the bath will lead to degradation and consequent thinning of the glass.
   4. While wearing safety goggles, (a face shield if working outside a fume hood), and neoprene or butyl rubber gloves over nitrile gloves, remove glassware from the base bath **with tongs** allowing as much of the solution to drain as is possible. Do not leave the tongs in the base bath and rinse them once you have removed all your glassware.
   5. Transfer glassware to tray and rinse thoroughly with tap water into the sink.
   6. Rinse glassware once more with distilled water.
   7. Finally rinse glassware with acetone and place on the drying rack.
   8. After drying for 15 minutes, the glassware may be placed in a drying oven.
   9. When you are done with the base bath, close it with the container lid.

After completing the work:

- The base bath should be cleaned and refilled once every six months, when the liquid becomes opaque in color, or when you have noticed a decrease in the efficacy of the bath.
- Dispose of the Base Bath waste following Harvard University Hazardous Waste Procedures:
  - Transfer the dirty solution from the bath to empty 4L solvent containers using a beaker and a funnel. DO NOT POUR OUT DIRECTLY FROM THE BATH – that is an easy way to cause a large, uncontrolled spill.
  - Hazardous Waste Classification: Corrosive/Flammable
  - Wash hands before leaving lab.

EMERGENCY PROCEDURES

First Aid

SKIN CONTACT

- Flush skin with tepid water for 15 minutes using the closest available sink, portable drench hose or safety shower.
- Call 911 on a landline phone for medical assistance (or provide location if calling on a mobile phone).

EYE CONTACT

- Using eyewash, flush eyes while hold eyelid open and away from exposed eye for 15 minutes.
- Call 911 on land line phone for medical assistance (or provide location if calling on a mobile phone).
- Continue flushing with water until emergency medical personnel arrive.

INHALATION

- If mist or vapors are inhaled, immediately move to get fresh air.
- If respiratory irritation occurs call 911 on land line phone for medical assistance (or provide location if calling on a mobile phone).

INGESTION

- Do not induce vomiting.
- Call 911 on land line phone for medical assistance (or provide location if calling on a mobile phone).

Spill Response

NOTE: DO NOT use water, since the bath contains exothermic materials that could reach vigorously with water.

OUTSIDE FUME HOOD OR VENTILATED ENCLOSURE

- Alert others and evacuate to a safe distance and prevent entry.
- Contact the University Operations Center at (617) 49**5-5560** [HMS/HSDM (617) 43**2-1901**]
- Remain in a safe location until EH&S or other response personnel arrive.

INSIDE FUME HOOD OR VENTILATED ENCLOSURE (< 500 ml)

- If trained and confident, don the PPE described above and apply acid neutralizer.
- Otherwise close the fume hood - contact the University Operations Center at (617) 49**5-5560** [HMS/HSDM (617) 43**2-1901**] and await support.