

Section 5.15 Title: Preparing Acid and Base Baths
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Revision Date: 11/01/19
P.I.: Prof. John F. Berry

Prior Approval: This procedure is NOT considered hazardous enough that prior approval is needed from the Principal Investigator.

Involves Use of Particularly Hazardous Substance (PHS)? No
 Carcinogen Reproductive Toxin High Acute Toxicity
Does this procedure require medical surveillance? No
Does this require use of a fit-tested respirator? No

Brief Description of Procedure:

Preparing solutions of hydrochloric acid (HCl) and potassium hydroxide (KOH) for cleaning glassware.

Location: *List the locations (buildings/rooms) where this procedure may be performed. For use of a PHS indicate a more precise location within the room, if appropriate, as a designated area.*

Daniels Chemistry - All Berry group labs

Chemicals Involved:

| Chemical | Physical or Health Hazard (e.g. carcinogen, corrosive) |
|---------------------|--|
| Hydrochloric acid | Corrosive, inhalation hazard |
| Potassium hydroxide | Corrosive |
| Isopropanol | Flammable, irritant |

Other Hazards: *Include hazards, other than chemical, that may be present during operation of the procedure.*

Dissolution of HCl and KOH generates significant heat.

Exposure Controls: *(Check all that apply)*

PPE: Safety Glasses Face Shield Chemical Splash Goggles
 Chemical Apron Gloves (Nitrile) Lab Coat
 Respirator (type) Other:

(Chemical splash goggles are recommended instead of safety glasses, but not required.)

Engineering Controls:

Fume Hood Biosafety Cabinet Glove box
 Vented gas cabinet Other:

Administrative Controls: *List any specific work practices needed to perform this procedure (e.g., cannot be performed alone, must notify other staff members before beginning, etc.).*

Inform other lab members when an acid or base bath is being prepared. Aqueous base baths are preferred, and isopropanol baths require approval from the group CHO.

Task Hazard Control Table: *For procedures involving numerous steps, it may be convenient to indicate specific requirements for individual tasks in the table below:*

N/A

Waste Disposal: *Describe any chemical waste generated and the disposal method used.*

Aqueous baths should be neutralized to a pH between 5 and 9 and then flushed down the drain with a large volume of water. Alcoholic baths can be similarly disposed of or transferred to an 18 L drum and disposed of through EH&S.

Accidental Spills: *Describe the procedure for handling small chemical spills that may occur during this procedure. Note that for large spills it may be appropriate to call 911.*

Neutralize spilled acid with sodium bicarbonate and base with citric acid and mop to dryness.

Decontamination Procedures (required for PHS use): *Describe the procedure for decontamination of personnel and equipment.*

N/A

Training: *Describe any training needed prior to performing this procedure. Include training performed in-lab and any required demonstrations of competency.*

No formal training or documentation is required. This procedure should be demonstrated by experienced lab members. New members should talk through their procedures with experienced lab members.

Principle Investigator Approval: I have reviewed this procedure and approved it for use. Note: Modifications to the procedure may require update to this form.

Name: John F. Berry

Signature: _____

Date: _____

Preparing Acid and Base Baths

Generating a 1M acid bath

Before preparing an acid bath, consider the size of the container you are filling. Calculate the amount of HCl and DI water you will need to generate a 1 M solution. Keep in mind that you do not want the level of the acid to go above a gloved hand reaching to the bottom of the container. The 5-gallon buckets commonly used should at most hold 12.6 L, which would consist of 960 mL conc. HCl and 11.6 L of DI water.

1. In an appropriate container (Nalgene, plastic, etc.), add the calculated volume of DI water.
2. In a fume hood, slowly add the measured quantity of concentrated acid to the water. Add in portions and stir between to minimize local heating.
3. Attach an appropriate lid, label the container, and allow the solution to cool to ambient temperature in the fume hood before removing for storage and use.

Generating an aqueous base bath

1. Perform your calculations. Based on the desired amount, no more than 2/3 of your container, calculate the amount of KOH and DI water you will need to generate a solution of the desired concentration. Keep in mind that you do not want the level of the base to go above a gloved hand reaching to the bottom of the container. Standard aqueous base baths contain 1 kg KOH in 10 L water (1.8 M).
2. Prepare the bath: In an appropriate container (Nalgene, plastic, etc. - not glass), add the calculated volume of DI Water. In a fume hood, while wearing appropriate PPE, slowly add the KOH in batches to the water. Stir until each batch is dissolved. If preparing a more concentrated bath, you may wish to use an ice bath to cool the solution.
3. Secure the lid to the container and label it clearly. Allow the solution to cool to ambient temperature before removing it from the fume hood for use.

Generating an isopropanol base bath

When cleaning organic contamination from glassware, alcoholic base baths can be more effective. Due to the flammability of such solutions, however, aqueous base baths are preferred whenever possible. The same general considerations for aqueous baths apply for alcoholic baths. Alcoholic baths should be prepared entirely in a fume hood. A general procedure for preparing a 10L alcoholic baths is:

1. Add 8 L isopropanol to the base bath container.
2. In a second container, carefully dissolve 600 g KOH in 2 L water. It may be easier to do this in two 1 L batches.
3. When the aqueous KOH is at room temperature, slowly add it to the isopropanol. Stir to mix.
4. Secure the lid to the container and label it clearly. Allow the solution to cool to ambient temperature before removing it from the fume hood for use.