Standard Operating Procedure of Handling Bases

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Overview

Background: Common Words Used in MSDS Labels, Precautions

Before The Fact: Preventative Actions

After The Fact: Immediate Responses, Contacts
The *Poison* label represents materials that often cause irreversible toxic effects on the body and can be harmful by any means of contact or consumption with the human body. In sufficient quantities, these substances may lead to death.

The *Toxic* label is very similar to the poison label, but refers to more acute effects that may occur at lower concentrations during short or long periods of time.

- Typically, in place of the poison or toxic label, there will be a skull and crossbones depiction

*Lachrymators* are highly volatile and upon opening exposure to open air and cause tearing and/or eye irritation.

Precautionary Measures for Toxins and Irritants

As a precaution measure, Lachrymator, Poison, and Toxic-labeled compounds should be handled with the upmost care and should be avoided by all means of primary contact, which will include taste, touch, and inhalation. Additionally irritants such as Lachrymator-labeled compounds should only be used in a laboratory fume hood—and should never be heated.
Precautions

Typical bases found in most laboratories in the IPST will include alkali metal hydroxides and concentrated solutions of aqueous ammonia. Examples of some of the alkali metal hydroxides you’ll encounter are sodium and potassium hydroxide, both of which are strong bases that are highly corrosive and destructive to skin and eyes. Strong bases are often insidious, as in there will be no pain until the corrosive damage is quite severe. Ca(OH)₂ is a great example of a highly insidious and very toxic base you can easily find in the laboratory area.

Ammonia in solution is a weak base, but it’s vapors are toxic and can even by a lachrymatory agent. Handling of any of these materials in highly concentrated forms should be conducted within a fume hood.

Organic Bases are typically weak, but can be just as poisonous and toxic.
Precautions

**Common Bases:**
- **Alkali Metal Hydroxides**
  - NaOH *(CAS 95077-05-7)*
  - KOH *(CAS 71769-53-4)*
- **Solutions of Aqueous Ammonia**
  - NH₃(aq) *(CAS 8013-59-0)*
  - NH₃(g) *(CAS 17655-31-1)*
- **Organic Bases (weak)**
  - Histidine *(CAS 110-86-1)*
  - Pyridine *(CAS 110-86-1)*
Accidents always happen, but preventive actions can be exercised to reduce the frequency and degree of danger of chemical spills or any other hazardous situation involving hazardous bases. These actions include wearing and maintaining proper protection equipment, proper handling of bases, and proper storage of corrosive materials.

- **Standard Protection Equipment**
- **Proper Handling of Bases**
- **Proper Storage of Corrosive Materials**
A lab coat can only protect you to the degree than you properly wear it. So, when you wear you lab coat in the laboratory, it should be fully buttoned to cover your as much of you as possible. Gloves should be worn at all times when handling any corrosive base in the lab and should be immediately replaced when they become worn, discolored, or have puncture holes.

The rest of your clothing should properly reflect the utility needed to protect yourself. Opened-toed sandals, crocs or any shoe that does not completely cover your feet are forbidden in the lab workspace. Likewise, skirts and shorts are not allowed in the working areas as they expose your legs to corrosive bases.
Standard Protection Equipment

- Properly Use Your Safety Equipment
  - Buttoned Lab Coat
- Gloves (Nitrile)
  - Additional Protection Offered by Additional Clothing

Proper Protection Equipment (Notes)

- Safety goggles should always cover your eyes at all times when you are in work area—and they need to be cleaned on at least a daily basis. The only goggles allowed in the lab are those that comply with ANSI Z87 American National standard Practice for Occupational and Educational Eyewear and Face Protection. Certificated items will have a “Z87” or a “AOSZ87” label to show that they have been designed to properly protect against chemical splashes and are sufficiently impact resistant.

Proper Protection Equipment

- Properly Use Your Safety Equipment
  - Face and Eyes must be Protected at all Times
  - ANSI “Z87” or “AOSZ87” Certified Equipment

Proper Handling of Bases

Concentrated bases are some of the most corrosive and dangerous materials you’ll encounter in the laboratory. Bases such as NaOH are poisonous and fatal if swallowed, harmful if inhaled, and will cause burns to any area of contact. Concentrated bases react with water, acids, and wealth of other materials. Therefore, whenever you need to work with concentrated bases, it MUST be within the safety of a fume hood.

Proper fume hood use involves working with someone present so in the case of an emergency. The protective window must be drawn down as much as possible while allowing for work to be comfortable.

Additionally, make sure the that the working area within the fume hood is free of any reactive agents and that when you pour your compounds, the bottles are far enough inside the fume hood so that no fumes leave the chamber.

Proper Handling of Bases

- Fume Hood
- Awareness of Nearest Emergency Equipment
  - Eyewash
  - Safety Shower
  - Fire Extinguisher
- Familiarity of MSDS
- Waste

Proper Storage of Corrosive Materials

- Chemicals that may react with each other must be stored separately. Bases are broken down to several different categories of storage based on differing chemical properties. See NFPA (National Fire Protection Agency) ratings for the standards of storing of any specific base. Also, make sure to never store corrosive materials above eye level so that other researchers can safely read and remove compounds from shelves. Corrosive compounds should be stored away from areas in the lab prone to heat, fire, or water sources. Containers should be returned to the shelves in the same manner they were removed; before you close the storage container shelf, make sure the bottle is properly fastened and if it required sealing tape, reapply it. Also, all manufacturer's warning labels must remain intact.

- NFPA: [www.nfpa.org](http://www.nfpa.org)
- Never Store Corrosive Materials Above Eye Level
- Store Corrosives From Heat/Flames, Oxidizers, and Water Sources
- Store Concentrated Bases (in Fume Hood or Storage Closets) in Secondary Container Trays
- Confirm that Containers are Properly Fastened/Closed in the Storage Closets
- Manufacturer's Warning Labels Must Remain Intact

After The Fact

- During a chemical spill, the most important thing to do is remain calm. The greatest priority during a spill is the safety of you and your teammates. Remaining calm during a spill will assist you in determining the severity of any hazardous situation and minimize any dangers. If your skin has come in contact with a corrosive base, rinse the affected area with water for 15 minutes and then treat with any of the First Aid. Remove any contaminated clothing as well. Eye exposure with a corrosive base will cause immediate tissue damage. Typically, you’ll be in too much pain to utilize a eye wash on your own, which is why it is important to work with someone in the nearby vicinity who can guide you to an eye wash.

- Remain Calm.

- Assessing Spills/Accidents
  - Skin Exposure
  - Eye Exposure
After The Fact

Assessing Spills/Accidents

- Small Spills (~30 mL)
  - “5 x 7 in Paper Towel will absorb ~5 mL of water”
  - Use Spill Contamination Kit and Minimize Contact.
  - Pour absorbent around the perimeter of the spill and then directly on top in a pile
  - Contain Absorbent in a Waste Bottle and Store in Fume Hood
  - Report all spills that take longer than 30 minutes to clean up.
After The Fact

Spill Response Kits are available throughout the IPST laboratories for the treatment of small chemical spills. **Know of their locations beforehand.** Make sure to wear protective equipment even in this instance. If you are in any way unsure of your capabilities in this regard, alert the nearest person capable to assist you. The most important part is to work as a team to combat spills.
After The Fact

- **For Large Spills (Non-Hazardous)**
  - Use a Basic Spill Kit
  - Document Spill if Clean-Up Takes More than 15 Minutes

- **For Large Spills (Hazardous)**
  - Notify Others and Evacuate the Area/Building Immediately
  - Place Absorbent on Spill Source if Inside Fume Hood
  - Turn Off All Ignition Sources if Possible
  - If a Fire Starts, Activate the Fire Alarm and Evacuate
  - Remain Nearby to Provide Information to Responders

- **Contact:**
  - GTech Police: 894-2500
  - Dr. Art Ragauskas (Supervisor): 404-894-9701
  - Jerry Nunn (Building Operations Division): 404-894-5332
  - Deborah Wolfe-Lopez (GTech Chemical Safety Manager) 404-202-7454
After The Fact

For Large Spills (Hazardous) Cont’d

- When the police arrive, they will likely set up a perimeter around the IPST which will be held until the Fire Dept/Hazmat teams can arrive. If you believe you have been contaminated, alert police that you require immediate medical attention. Although it’s ultimately your preference, it is recommend that you request to the paramedics that you wish to go to *Grady Memorial Hospital* as they have the only Level I Trauma Center in the nearest 100 miles of the IPST.

- While your waiting for paramedics, you can verify MSDS information data at www.msds.com or by phone at 1-800-360-3220.
After The Fact

**Ingestion**

- Contact DPS and Request Medical Assistance
- Do NOT Induce Vomiting or the Drinking of any Beverage Unless Instructed by Qualified Medical Personnel
- If Possible, Determine What Material was Ingested by the Victim
- If Victim Begins to Vomit, Turn Head or Entire Body to One Side to Avoid Choking
Additional Notes

- **Be Smart!**
  - Dilute Strong Bases Slowly *INTO* Water

- **Be Safe!**
  - Address Safety Issues with Coworkers Immediately and Professionally
  - Wipe Down Immediate Work Areas After Use

- **Be Prepared!**
  - Know the Location of the Nearest Emergency Equipment at All Times
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