1. Purpose

The following guidance document assists researchers to develop lab specific standard operating procedures for quenching (otherwise known as neutralizing), and properly disposing of pyrophoric wastes. This is important as pyrophoric chemicals are liquids and solids that ignite spontaneously in contact with normal atmosphere. They are extremely reactive toward oxygen and in most cases, water, and if exposed ignition could cause serious burns or other injuries to the person handling the reagent or others in the immediate area. Often small amounts of unused pyrophoric chemicals are left over from research experiments or as residue in the original container, creating a hazard potential for both the user and the waste technician handling the material.

2. Responsibilities

The Principal Investigator (PI) is responsible for ensuring all users in labs under their supervision are made aware of hazards in their lab(s), such as pyrophoric materials, received the appropriate training, adhere to lab specific standard operating procedures, and are provided with the appropriate personal protective equipment (PPE). In the case of work with pyrophoric chemicals, lab users should wear flame resistant lab coats, gloves, and safety glasses (or safety googles and face shield), in addition to other PPE as determined by their PIs.

Lab users who plan to work with pyrophoric chemicals are strongly encouraged to take the “Working Safely with Pyrophoric Chemicals” training class provided by the Department of Environmental Health and Safety (EH&S), in addition to any lab specific training provided by their PI.

Lab users working with pyrophoric materials are strongly encouraged to use a “buddy system”, as described in the Cornell University Laboratory Safety Manual, whenever handling pyrophoric materials or other highly hazardous substances or performing other highly hazardous operations.

3 Procedure Instruction

Quenching is the process of readying pyrophoric waste chemicals for disposal by neutralizing/deactivating the materials using unreactive solvents. Please note, the PI may have a preferred method for quenching pyrophoric waste other than as described here.

Users of pyrophoric materials should always consult with their PI and lab specific standard operating procedures before carrying out any procedures with pyrophoric materials.

3.1 Pyrophoric Waste Quenching

- Transfer the materials to an appropriate reaction flask for hydrolysis and/or neutralization.
- Dilute significantly with an unreactive solvent such as heptane or toluene and place
the flask in an ice water cooling bath.

- Slowly add isopropanol to quench pyrophoric materials.
- Upon completion, add methanol as a more reactive quenching agent to ensure completion.
- Add water drop-wise to verify there are no pockets of reactive materials in the container. Dispose of as hazardous waste.
- Alternatively, reactive substances can be quenched by slowly adding the dilute solution to dry ice, then adding a mildly reactive quenching agent such as methanol.
- AVOID low boiling diluents such as ether and pentane that tend to condense water upon evaporation.
- DO NOT reuse original manufacturer container after the liquid has been quenched as residue may still remain and present an ignition hazard.
- DO NOT leave containers with residues of pyrophoric materials open to the atmosphere due to uncontrolled ignition.

### 3.2 Pyrophoric Waste Disposal

- To request a chemical waste pickup, please visit [http://tiny.cc/wastepickupform](http://tiny.cc/wastepickupform) and submit the form online.
- Before the waste can be picked up it must be labeled with the following information on each Hazardous Waste Disposal Label:
  - **Building & Room**: Indicates the area where the hazardous waste is generated and stored.
  - **Name and Telephone Number**: Identifies the individual faculty, staff, or student generating the hazardous waste and assuming responsibility for its description. This information is important if subsequent questions arise related to the waste.
  - **Date**: At Satellite Accumulation Areas in the lab or work area when the container is ready for removal to a 90-Day Accumulation Area, the date should be added to the label and an online Waste Pickup Request Form submitted. The top copy of the label should be placed in the UN box with the waste. For 90 Day Accumulation Areas, the date the hazardous waste is first placed in the container must be written in this section.
  - **Type**: Identifies the general characteristics of the hazardous waste chemicals and indicates which classes of waste should not be mixed or packaged together to facilitate disposal procedures. A checkmark must be placed in each applicable box of this section.
  - **Chemical Name**: Precisely identify the exact composition of the hazardous waste in each container. You must use words describing the waste e.g., “methanol” or “acetic acid”, etc. New York State Department of Environmental
Conservation regulations do not allow the use of codes, chemical abbreviations, chemical formulas and symbols to describe the waste. Hazardous waste consisting of multiple elements or compounds requires the identification of each constituent, and the approximate percentage by weight or volume it occupies in the container, if known.

- **Tear-off Strip:** the two-part stick-on label has a tear-off strip along the bottom edge of the self-adhesive portion (second page) of the label. This tear-off strip is designed to facilitate the management of waste containers by making it easier to enter information on the waste label. The small tear-off strip can be removed from the main label and placed on the waste bottle. The label itself can then be placed on a clipboard near the waste bottle, which is filled out with initial information (name, address, etc.). As the waste container is filled, specific waste chemical information is added (names, amounts, etc.).

- Contact EH&S at [AskEHS@Cornell.edu](mailto:AskEHS@Cornell.edu) to request Hazardous Waste disposal labels.
- EH&S has scheduled waste pickups on Wednesdays and Fridays. Other pickups can be arranged for special situations.
- **Note:** Store pyrophoric chemical waste under an inert atmosphere or under kerosene. Storage area should be free of heat/flames, oxidizers, and water sources, as these wastes may pose a flammability risk and should not remain in the laboratory for any extended time. All pyrophoric containers should be quenched before disposal.

4 **References**

- [Sigma-Aldrich Technical Bulletin AL-134](https://www.sigmaaldrich.com/) – Handling Air-Sensitive Reagents
- [Sigma-Aldrich Technical Bulletin AL-164](https://www.sigmaaldrich.com/) – Handling Pyrophoric Reagents
- University of Minnesota, Environmental Health and Safety – “Pyrophoric Chemicals Guide”
- Tufts University, Environmental Health and Safety – “SOP for Pyrophoric Chemicals”
- UC Irvine, Environmental Health and Safety – “Pyrophorics Safety”
- UCLA, Environmental Health and Safety – “Pyrophoric Liquid Safety Video”