
The Waste-Paper

“A waste is a terrible thing to mind”

Volume 11 Issue 6

June 2008

Managing Chemicals with Limited Shelf-Life

Does your research involve solvents? Have you used acid chlorides or organic peroxides in the past? Extended storage of certain solvents, acid chlorides, organic peroxides, amines, and even acetic or nitric acid can result in container degradation, unintended chemical reactions and hazardous byproduct formation.

The following is a short list of chemical classes with associated hazards to keep an eye on:

- Oxygenated Solvents (ethyl ether, tetrahydrofuran, n-butanol) may form unstable (e.g., explosive) peroxides
- Organic Peroxides (dibenzoyl peroxide, butylperoxyacetate) may undergo energetic reactions when dehydrated or concentrated, such as through evaporation.
- Acid Chlorides (stearic chloride, titanium tetrachloride) may degrade the container and cause it to fail and may form crystals on and near the cap.
- Amines (triethylamine, butylamine) may form crystals on the cap, inside and outside the container. May also release strong odors.
- Strong Oxidizing Acids (>60% nitric acid) may degrade the cap, causing a spill or leak.



Hydrazine, red phosphorus and brominated compounds beyond their shelf-life

Factors that Accelerate Decomposition

The shelf-life of a chemical is not always indicated solely by its expiration date. Certain storage conditions can facilitate accelerated decomposition of reagents,

This Month's Waste Disposal Drop Off: Wednesday, June 25, 2008

Lewis Thomas loading dock

1:00 - 4:30 PM. Coordinators: [Michael Fredericks](#) (8-1351) or [Mary Zikos](#) (8-4095)

Jadwin Hall (Physics only)

E-mail selwood@princeton.edu with the chemicals, quantity, location, contact person.

E-Quad room 7 (E-Quad and Bowen)

2:00 - 3:00 PM Coordinators: [Joe Laskow](#) (8-4739) or [Joe Palmer](#)

Frick loading dock (Chemistry, Psychology, Vis Arts)

1:00 - 2:00 PM Coordinator: [Phil Fairall](#) (8-3913)

including:

- Direct or prolonged sunlight
- Excessive heat
- Nearby incompatible materials
- Loosely capped containers
- Contamination

Avoiding Chemical Overstock

There are many things you can do to minimize your chemical stock and to avoid creating the hazards associated with prolonged storage. Best management practices to maintain chemical supplies, minimize waste and keep a lab safer include:

- Verify stock prior to ordering new chemicals.
- Order only the amount you need (Just-in-time).
- For small quantities, check with other labs to possibly trade, borrow or purchase.
- Organize chemicals by hazard class, not alphabetically.
- Create and post a list of stock chemicals and their expiration dates.
- Dedicate a day every quarter to review stock and eliminate unneeded or expired chemicals.
- Once a chemical is destined for disposal, be sure to label immediately and dispose of it during the next scheduled waste pickup.

For more information, see the Laboratory Safety Manual on the [EHS website](#) or contact Jim Boehlert at 8-7882 or Boehlert@princeton.edu.

Chemical Stewardship IQ

So, you think you've thought of everything when it comes to safely storing the chemicals in your work area? Test your chemical stewardship IQ by considering the following important chemical storage issues:

Storage Areas

Space is at a premium on our campus.

- Are your chemicals stored on sturdy shelves appropriate to the weight?
- Are corrosives stored below eye level?
- Are temperature sensitive chemicals in refrigerators or freezers with *Chemical Storage Only* labels?
- Have you minimized storage of chemicals and other items inside the working area of your fume hoods?
- Do you have less than a combined total of 10 gallons of flammable liquids stored outside of flammable liquid storage cabinets?
- Do you routinely evaluate your chemical stock and take advantage of the monthly waste pickups?

One point for each checked box (6 points)

Chemical Segregation

Storing chemicals alphabetically, without regard to compatibility, can increase the risk of a hazardous reaction, especially in the event of container breakage.

- Are dry reagents stored separately from liquids?
- For dry reagents, are oxidizers, flammables and water-reactives stored separately?
- For liquids, are acids, bases, oxidizers, perchlorates and flammable liquids segregated from each other?
- Are mineral acids (hydrochloric, sulfuric) separated from organic acids (picric, acetic)?

One point for each checked box (4 points)

Chemical Shelf-life

- Have you identified chemicals with a limited shelf-life? (see related article in this edition)
- Have you labeled these chemicals with the date received and date opened?
- Do you order only the amount you need?
- Do you remove old/expired materials before getting new stock?
- Do you store these materials in a manner that avoids direct or prolonged exposure to sunlight (through a window) and excessive heat?
- Are the lids/caps secure?

One point for each checked box (6 points)

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Chemical Waste Management

- Have you identified which chemicals need to be disposed as hazardous waste?
- Do you avoid pouring hazardous wastes, including toluene and acetone in any amount, down the drain?
- Are all chemical wastes labeled with the words *Hazardous Waste*, preferably using the yellow waste labels?
- Are all chemical wastes labeled with the chemical contents using chemical names, not diagrams, abbreviations or trade names?
- Are all chemical waste containers sealed except when filling, with no funnels left in open containers?
- Are you using secondary containment for wastes stored near sinks or drains or on the floor?

One point for each checked box (6 points)

Your Score

Add up all points and compare:

22 points: You are at the top of the class. Interested in a job in EHS? Excellent chemical stewardship!

15-21 points: You paid attention in class. A little more attention to detail and you'll be on the dean's list in no time.

8-14 points: Academic probation may be in your future. Study the Chemical Storage and Waste sections of the Lab Safety Manual and re-test later.

0-7 points: An accident waiting to happen. Looks like you will need to repeat this class. Review the Lab Safety Manual and contact EHS if you would like some guidance.

Increase Your Chemical Storage IQ

Review the *Safe Work Practices* section of the Lab [Safety Manual](#) at and the [Chemical Waste Disposal](#) page at for guidance or contact EHS.

<i>EHS HAZARDOUS WASTE CONTACTS</i>	
Main Office	8-5294
Steve Elwood (Chemical & Radioactive Waste)	8-6271
Tonya Gruchacz (Waste-Paper)	8-6255
Don Robasser (Biohazardous Waste)	8-6256
EHS Web Page http://www.princeton.edu/ehs	