

Chemical Inventory

The proper segregation and storage of chemical reagents



JENNIFER LONG
SAFETY AND HEALTH
JUNE 8, 2017



United Federation
of Teachers

Agenda



- Chemical Storage Standards (OSHA and FDNY)
- Chemical Storage Guidelines/Best Practices
- Chemical Container Labeling
- Chemical Inventory

Chemical Storage Standards (OSHA and FDNY)



OSHA/NYS PESH Requirements on Chemical Storage in Labs



- Federal and State health and safety standards that apply to school laboratories include:
  - The Hazard Communication standard (29 CFR 1910.1200) & New York State Right To Know Law 12 NYCRR Part 820
  - OSHA's Occupational Exposure to Hazardous Chemicals in Laboratories Standard (29 CFR 1910.1450)
- Both law tie together to provide employees the “right to know” the hazard of workplace chemicals they work with and are protected from chemical exposure. Some of the provisions of the laws include...
  - ✦ Hazard identification –
    - There must be an inventory list of hazardous chemicals and the Safety Data Sheets (SDS)
    - Chemical container labeling
  - ✦ Chemical hygiene plan –
    - CHP is a written plan that documents guidelines on practices and procedures for the use of chemicals in the laboratory (i.e. procedures, equipment, PPE and work practices capable of protecting workers from the health hazards presented by chemicals used in the laboratory.)
    - DOE'S template: <http://schools.nyc.gov/NR/rdonlyres/8F93A719-2021-43D0-B829-859EEBD32967/13923/NYCDOECHEMICALHYGIENEPLAN20062009.pdf>
  - ✦ Training
    - Annual training is provided on the identity, properties and safe use of toxic substances that the employees might encounter in their work, specific location of Safety Data Sheets, Chemical Hygiene plan
  - ✦ Exposure monitoring
  - ✦ Medical consultation
  - ✦ Recordkeeping



- ### Fire Department Permit Sample:

[illegible]

D-14 Certification



- FDNY Certificate of Fitness make sure that there are individual (certificate holders) on-site who can ensure that the handling and use of hazardous materials in the school are conducted safely and in accordance with the Fire Code and the Fire Rules
- At least one certificate of fitness holder shall be present on each floor of the laboratory unit room in which laboratory operations are being conducted while the laboratory is in operation.
- More information and application found:
<https://www1.nyc.gov/nycbusiness/description/cof-d14>

FDNY's Maximum Limitation in School Labs



- Per FDNY storage standards
  - Pre-existing labs. Labs that were approved by the FDNY before July 1, 2008. The majority of the science laboratories in NYC public schools are classified as Type II or Type IV laboratories unless the areas have a fire-resistance rating of at least 2 hours.

Table. Quantity Limitation for Pre-existing Laboratory

Lab Type	Fire Rating (hr)	Fire Protection	Flammable and Combustible liquids
I	2	Sprinklered	30 Gallons
II	1	Sprinklered	25 Gallons
III	2	Nonsprinklered	20 Gallons
IV	1	Nonsprinklered	15 Gallons



FDNY's Maximum Limitation in Newer School Labs



- Per FDNY storage standards
  - New labs: All educational and instructional non-production laboratories established on or after July 1, 2008 are required to be in compliance with the 2008/2014 Fire Code and shall comply with the Class “D” laboratory requirements.

Table. Quantity Limitation Flammable and Combustible Liquids

Laboratory unit hazard classification	Excluding Quantities in Storage Cabinets or Safety Cans		Including Quantities in Storage Cabinets or Safety Cans	
	Maximum Quantity Class I Liquids Alone per Lab Unit (gal)	Maximum Quantity Class I, II, IIIA Liquids per Lab Unit (gal)	Maximum Quantity Class I Liquids Alone per Lab Unit (gal)	Maximum Quantity Class I, II, IIIA Liquids per Lab Unit (gal)
Class D	0.5 gals/100 ft ² 37.5 (max)	0.5 gals/100 ft ² 37.5 (max)	1 gals/100 ft ² 75 (max)	1 gals/100 ft ² 75 (max)

FDNY Limitations on “Other Hazardous Material Quantity”



Table. Laboratory Hazardous Material Quantity Limitations

	Maximum quantity in 1-hr fire rated lab	Maximum quantity in 2-hr fire rated lab
Water-Reactive Material	2.5 Lbs.	5 Lbs.
Pyrophoric Material	0.5 Lbs.	1 Lbs.
Highly Toxic Material	5 Lbs.	5 Lbs.
Toxic Material	250 Lbs.	250 Lbs.
Corrosive Material	250 Gallons	250 Gallons
Flammable Solids	10 Lbs.	15 Lbs.
Oxidizers/Org Peroxides	40 Lbs. ^a	50 Lbs. ^a
Unstable reactive material	6 Lbs. ^b	12 Lbs. ^b

a. maximum 2 lbs of Class 3 oxidizers & 1 lb of Class I organic peroxides

b. maximum 1 lb of Class 3 unstable reactive material





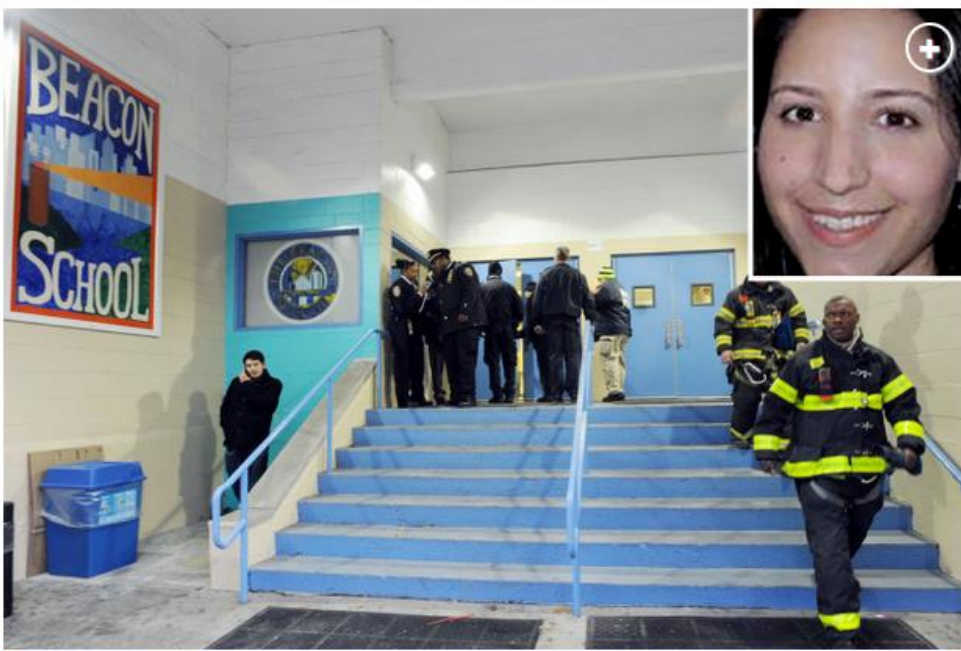


METRO

Safety lapses eyed in Beacon School chemistry fire

By Larry Celona and Laura Itallano

January 3, 2014 | 7:19pm



An accident during an experiment at the Beacon School conducted by teacher Anna Pool (inset) injured two students.

Photo: Kristy Leibowitz

MORE ON: BEACON SCHOOL

Teen with fear of large crowds asking for school reassignment

A Beacon School chemistry teacher accidentally poured highly explosive methyl alcohol directly into a still-flaming crucible, and her students had no safety gear or barrier to protect them from the resulting fireball, sources said Friday.

COLUMNISTS

Fredric U. Dicker



Legendary NY Republican rips party for not backing Trump

Steve Cuozzo



How Donald Trump helped save New York City

Kyle Smith



Lazy de Blasio is completely tone-deaf to the city's needs

SEE ALL COLUMNISTS ▶

TRENDING NOW IN METRO



Beacon High School Fire - Aftermath



- Effects on storage limitations
  - The rainbow experiment is suspended indefinitely—staff should not use the experiment in schools;
  - All schools cannot store bulk quantities (**two liters or more**) of methanol or other similar flammables;
  - All schools must use metal cabinets that are appropriate for storing flammable materials

Chemical Storage Guidelines/Best Practices



General Guidelines



- No eating in the lab
- Foods are not stored in chemical use areas
- Avoid storing liquid chemicals above eye level.
- Avoid storing chemicals in aisle ways.
- Avoid storing heavy containers above shoulder level.
- Avoid storing chemicals near sources of heat or in direct sunshine.



Chemical Storage Alphabetically



- What you may be doing now...
  - Storing Chemicals Alphabetically – Could result in incompatible chemicals stored next to each other
- A safer alternative...
  - Storing by Chemical Group – All nitrates together, sulfates together (can be alphabetical within their groups)



Chemical Storage – Hazard Class



- At a minimum, chemicals should be segregated as:



Corrosives



Oxidizers



Flammable Liquids

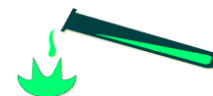


Poisons or Toxic Chemicals



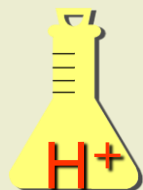
Reactive (water or time sensitive)

Chemical Storage – Corrosives



18

- Store concentrated acids and bases separately.



- Use secondary catch basins for concentrated acids and bases.



Acids



- Keep separate from all other class of hazards
- Store inorganic acids (i.e. HCl) away from organic acids (i.e. acetic acid)
- Store nitric acid away from all other acids. It is a strong oxidizer.
- Do not store on metal shelves



Bases



- Bases in a separate area of the store room
- Bases away from acids, flammables, organic halogens and metals
- Storage of bases on soap stone shelves OK

Chemical Storage – Flammable



- As a general rule of thumb, no more than 10 gallons of flammable liquids should be stored outside of an approved flammable storage cabinet. Storage of 1 gallon and more of flammable liquids will require FDNY permitting.



Chemical Storage - Flammable



22

- When refrigerating flammables, only use refrigerators specifically designed for flammable materials.
- Do not store food in chemical storage refrigerators.
- Label chemical storage refrigerators with the following:
  - No Food – Chemical Storage Only



Chemical Storage – Oxidizers



- Oxidizers react with a reducing agent. They are not necessarily combustible, but they can intensify combustion and increase the flammable range for chemicals so they ignite more readily.
- Store oxidizers away from flammable and combustible materials.
- Store oxidizers away from reducing agents.
- Maintain the minimum quantity needed and dispose of unneeded material immediately.

Chemical Storage – Toxic Chemicals



- Maintain the minimum quantity needed and dispose of unneeded material immediately.
- DOE Science Manual has a list of banned chemicals in school. List include many carcinogenic and toxic chemicals such as mercury, benzene, toluene, etc



Chemical Storage – Reactive



- Examples of reactive chemicals would include, but not be limited to:

Water reactive chemicals.

Examples: lithium, sodium, potassium

Pyrophoric, which react with air.

Examples: iron sulfide, phosphorus

Peroxide forming chemicals, which form shock sensitive explosives.

Examples: diethyl ether, picric acid



Water reactive metals



- Stored under kerosene/Na Mineral oil/lithium
- Stored in fire resistant room in air tight metal rust free container, in secure cabinet on a shelf off the floor, not in basement
- Stored away from and plumbing pipes
- Class D fire extinguisher



Storage Scheme for School Labs

ACIDS ON SHELVES AT TWO OR THREE FEET: NITRIC IN SEPARATE POLY TRAY; HCL, SULFURIC IN SEPARATE TRAY ACETIC IN SEPARATE TRAY

SEPARATE CABINET FOR NA, LI

OXIDIZERS:
H₂O₂
PERMANGANATE
S
CHLORATES
CHLORITES
INCLUDING BLEACH

NITRATES ON A SEPARATE SHELF

SPILL MATERIALS
CAUSTIC;;ACID
AND SOLVENT KITS

DRY CHEMICAL
FIRE
EXTINGUISHER

USE TOP SHELVES FOR NON-HAZARDOUS CHEMICALS AND OTHER MATERIALS

METAL SALTS THAT ARE NOT OXIDIZERS, NITRITES

BASES
AMMONIUM
SODIUM
POTASSIUM
HYDROXIDE
S
STORE AT TWO OR THREE FEET

fammable
storage cabinet
solvents, oils,
combustible liquids

Door should open outward AND BE SELF CLOSING

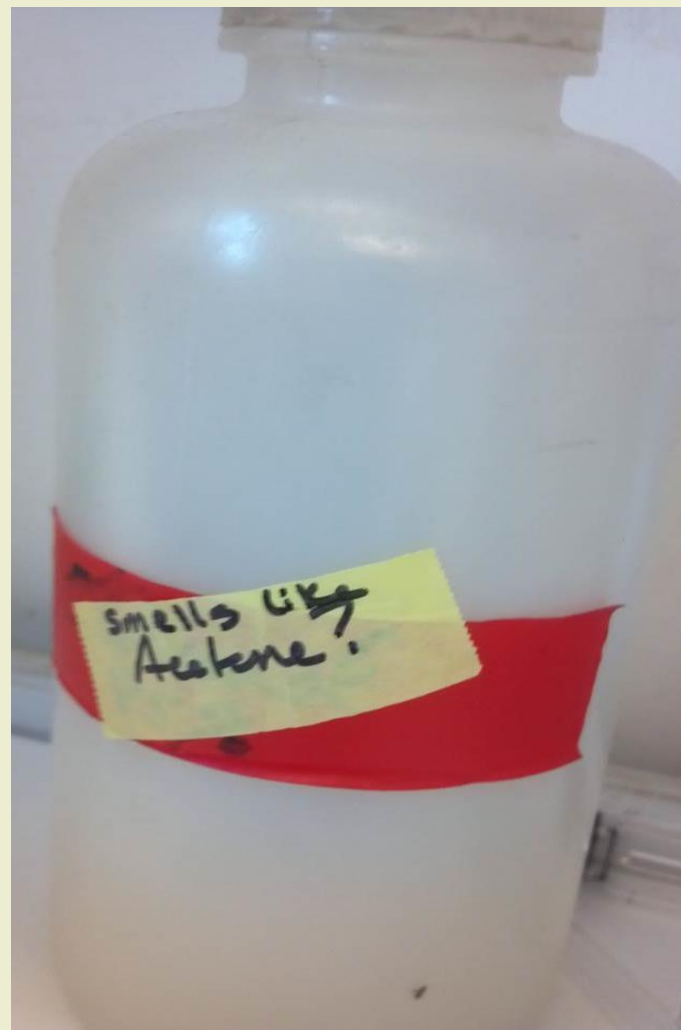
ROOM SHOULD HAVE AN EYE WASH AND SAFETY SHOWER OUTSIDE DOOR

PHONE OUTSIDE ROOM WITH EMERGENCY NUMBERS POSTED

Chemical Container Labeling



Labeling





Chemical Labeling



- All containers must be labeled
  - Includes wash bottles, reagent bottles, and other chemical containers
- Labels must identify contents
- Should date containers when received and opened
  - Dispose of expired and old chemicals

OSHA Requirements on labelling

470300-064 1 L

Acetone
Acétone
Lab Grade
 CH_3COCH_3 F.W. 58.08
CAS # 67-64-1 UN1090

ward's science+

399 Vansickle Road
St Catharines, ON, Canada
TEL: (800) 387-9393

5100 West Henrietta Rd.
PO Box 92912
Rochester, NY 14692-9012
TEL: (800) 962-2660




DANGER Highly flammable liquid and vapour. Causes serious eye irritation. May cause drowsiness or dizziness. Repeated exposure may cause skin dryness or cracking. Keep away from heat/sparks/open flames/hot surfaces. Avoid breathing mist/vapours/spray. Wash hands thoroughly after handling. Wear protective gloves/protective clothing/eye protection/face protection. IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists: Get medical attention. IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower. IF INHALED: Remove person to fresh air and keep comfortable for breathing. Call a POISON CENTER or doctor if you feel unwell. In case of fire: Use dry chemical, alcohol foam, carbon dioxide or water spray to extinguish. Store in a well-ventilated place. Keep container tightly closed. Store locked up. Keep cool. Dispose of contents/container to a licensed chemical disposal agency in accordance with local/regional/national regulations.

DANGER Liquide et vapeurs très inflammables. Provoque une sévère irritation des yeux. Peut provoquer somnolence ou des vertiges. L'exposition répétée peut provoquer dessèchement ou gerçures de la peau. Tenir à l'écart la chaleur/des étincelles/des flammes nues/des surfaces chaudes. Éviter de respirer les brouillards/vapeurs/aérosols. Se laver les mains soigneusement après manipulation. Porter des gants de protection/des vêtements de protection/un équipement de protection des yeux/du visage. EN CAS DE CONTACT AVEC LES YEUX: Rincer avec précaution à l'eau pendant plusieurs minutes. Enlever les lentilles de contact si la victime en porte et si elles peuvent être facilement enlevées. Continuer à rincer. Si l'irritation oculaire persiste: Obtenir des soins médicaux. EN CAS DE CONTACT AVEC LA PEAU (ou les cheveux): Enlever immédiatement tout vêtement souillé ou éclaboussé. Rincer la peau à l'eau/se doucher. EN CAS D'INHALATION: Transporter la personne à l'extérieur et la maintenir dans une position où elle peut confortablement respirer. Appeler un CENTRE ANTIPOISON ou un médecin en cas de malaise. En cas d'incendie: Utiliser un produit chimique sec, mousse anti-alcool, dioxyde de carbone ou eau pulvérisée pour l'extinction. Stocker dans un endroit bien ventilé. Maintenir le récipient fermé de manière étanche. Garder sous clef. Tenir au frais. Éliminer le contenu/récipient dans une agence agréée d'élimination chimique conformément à la réglementation locale/régionale/nationale.

For laboratory use only. Consult Safety Data Sheet (SDS) for full safety information.
Packaged in USA. Pour usage de laboratoire seulement. Consultez la fiche de données de sécurité (FDS) pour toute information concernant la manipulation de ce produit. Emballé dans USA.

LOT AD-15200

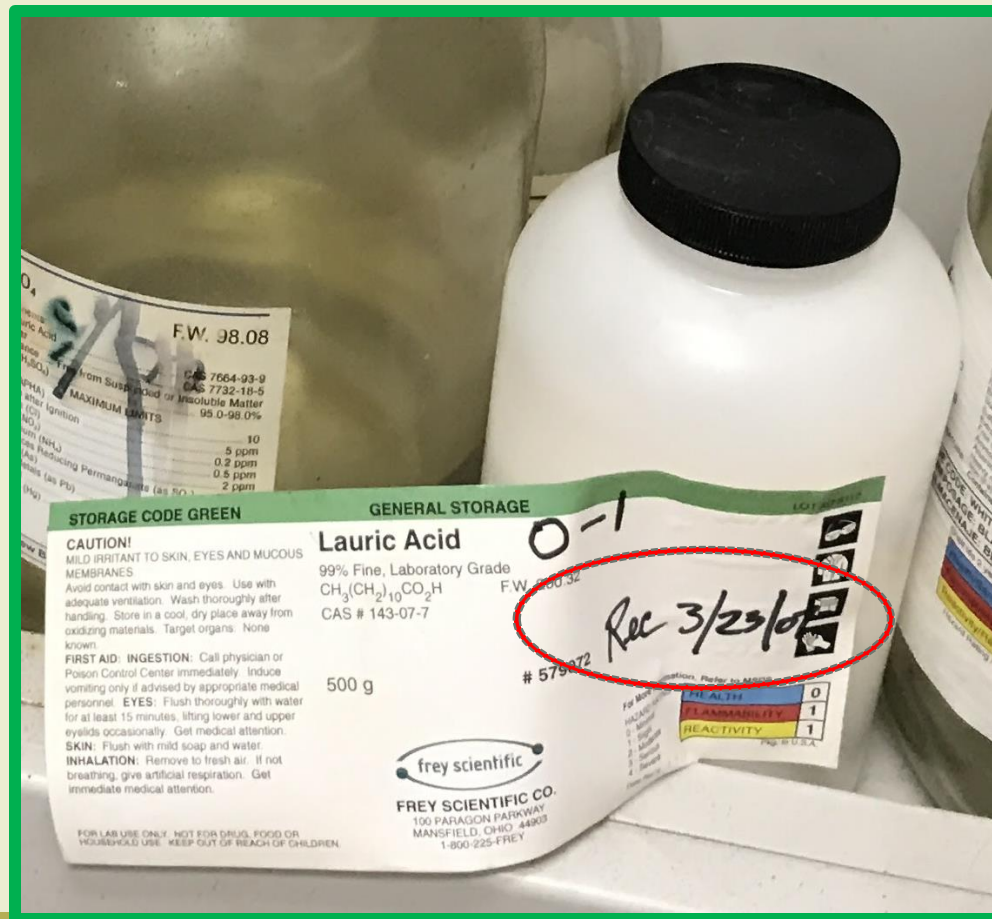
Pictograms:
Conveys specific information about the hazard(s) of a chemical

Signal Word:
Level of severity of hazard.

Hazard Statements:
Describe the nature of hazard(s) associated with a chemical.

Precautionary Statements:
Recommended measures to take to prevent adverse effects

OSHA Requirements on labelling



Color Coding



RED - Flammable and combustible. Store separate from other chemicals.

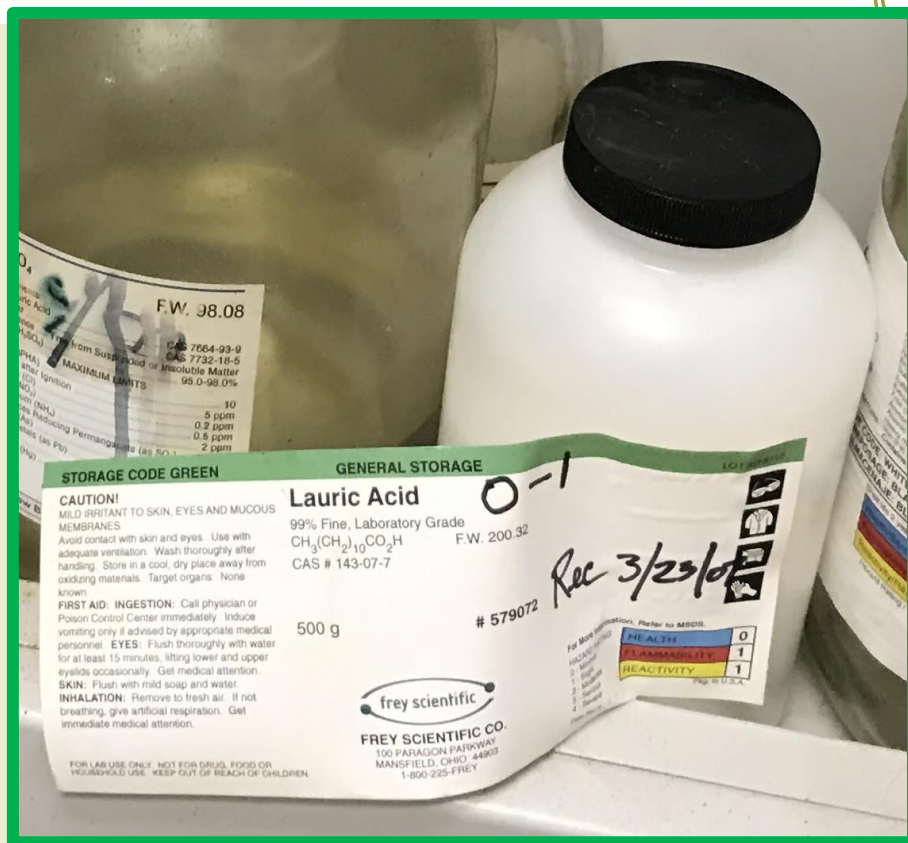


YELLOW - Oxidizer. Store away from flammables.

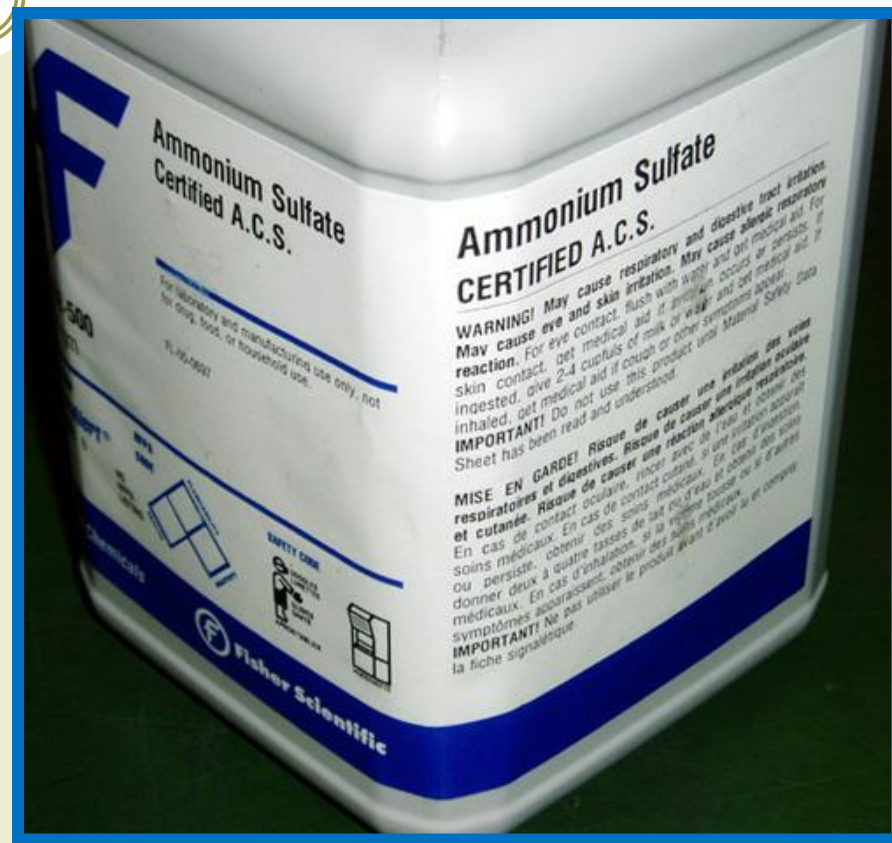


White - Corrosives - Store separate from other chemical and keep in mind to separate bases and acids

Color Coding



GREEN - Low Hazard – Suitable for general storage areas

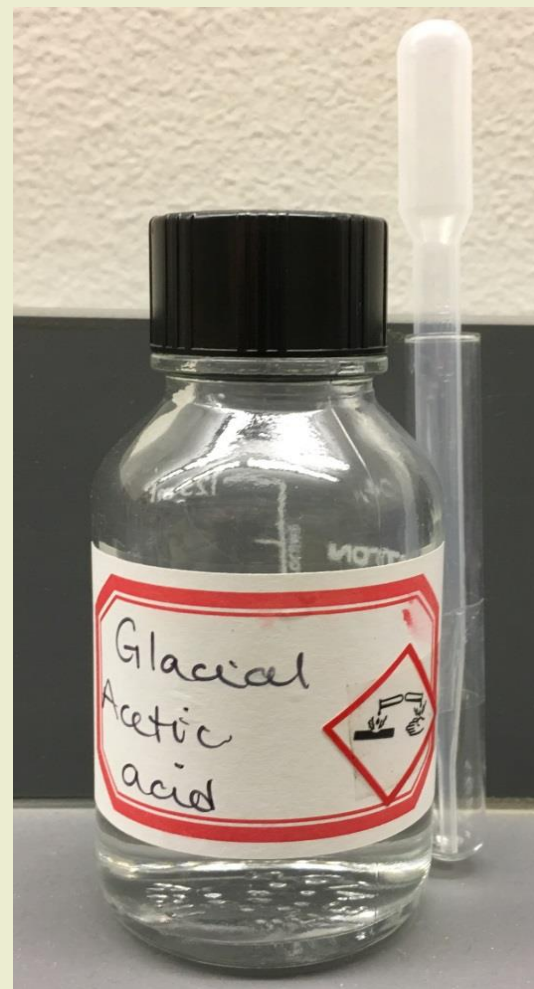


BLUE - Health Hazard - Toxic. Store in secure area.

Secondary Container Labels



- If you are transferring chemicals from the original labeled container into a secondary container (i.e. bottle, flask, beaker) AND the material in the secondary container is used longer for one shift, you **MUST** label the secondary container. The secondary container's label must include:
  - the identity of the hazardous chemical(s) in the container (e.g., chemical name) and,
  - words or pictures that show the **KEY HAZARDS** (e.g., flammable, corrosive, etc)



Chemical Inventory



Chemical Inventory



- Having a good inventory system helps to properly manage/maintain a safer lab.
  - By knowing what you have, you can use it more efficiently
  - Helps your colleagues track what they use each year versus what can be disposed of
  - Helps your colleagues organize chemicals by their properties (flammability, reactivity, acids)



Safety Data Sheets (SDS) (formerly known as MSDS)

- Recommend a binder
- A hardcopy in the lab
- Digital collection is okay along as there are back-ups systems in the case of power and/or internet outage and a hard copy



Unlocked Storage



Housekeeping



- Gives a general impression of the overall condition of your lab
- Includes benches, hoods, cabinets, sinks, refrigerators and freezers
- Clear aisle
- No eating in any science space
- No old, damage, corroded chemical bottles

92
20

noise

GREAT WHITE COPY
99.99% JAM-FREE
99.99% SANS BLOCAGE
99.99% LIBRE DE ATASCOS

husky copy

UCS

LIVING ENV.
LMS 6B
11/5 →

SCI. 109

Business 4200
Commercial 4200
XEROX

SCIENCE 109

INNERMILL







Thank you

Contact UFT Safety and Health **212-598-9287**
or contact your DR

Resources 1



- **Flinn Scientific**
<https://www.flinnsci.com/teacher-resources/safety/>
- **OSHA Lab Standard**
<https://www.osha.gov/Publications/laboratory/OSHA3404laboratory-safety-guidance.pdf>
- **CDC's School Chemistry Laboratory Safety Guide**
<https://www.cdc.gov/niosh/docs/2007-107/pdfs/2007-107.pdf>
- **DOE's template Chemical Hygiene Plan**
<http://schools.nyc.gov/NR/rdonlyres/8F93A719-2021-43Do-B829-859EEBD32967/13923/NYCDOECHEMICALHYGIENEPLAN20062009.pdf>

Resources 2



- EPA's Healthy School Web Portal
www.epa.gov/schools
- OSHA HAZCOM Pictogram
- <https://www.osha.gov/Publications/OSHA3636.pdf>
- DOE OOSH website
- <http://schools.nyc.gov/Offices/DHR/EmployeeSafety/Occupational+Safety+and+Health.htm>
- UFT Lab Specialist Chapter website
- <http://www.uft.org/chapters/lab-specialists>