

Hoo's going to help me? START to help you keep the evidence

Physics Colloquium
September 19, 2014

Environmental Health and Safety
Ralph Allen, Director of EHS
Clarissa Lynch, Chemical Safety Officer
434-982-4911



Our founder knew....

-our state legislatures, the members of which do not generally possess information enough to percieve the important truths, that knolege is power, that knolege is safety, and that knolege is happiness." - Thomas Jefferson to George Ticknor, 25 November 1817 on the establishment of what became the University of Virginia

Dec. 29, 2008

- Research assistant "Sheri" Sangji was transferring a t-butyl lithium when it spilled, igniting on contact with the air. Sangji, 23, wasn't wearing a protective coat, and her sweater melted into her skin. She died 18 days later.
- Harran (Sangji's direct supervisor) and UCLA contended that her death was a tragic accident, not a crime.

UCLA chemistry professor avoids prison time in fatal lab fire case

- Patrick Harran, charged with four felony counts of willfully violating state occupational health and safety standards, had faced up to 4-1/2 years in prison if convicted. Instead, under a deferred prosecution agreement he was ordered to pay \$10,000 to the Grossman Burn Center, spend five years teaching high school summer classes and perform 800 hours of community service.

UCLA

- The UC Board of Regents also faced three charges of violating safety standards causing death. Charges were dropped in July 2012 as part of a court-approved agreement in which the university vowed to institute corrective safety measures and fund a \$500,000 scholarship in Sangji's name at UC Berkeley.

National Academies of Science:

Strong, Positive Safety Culture in
Chemical Labs Requires Support
From All Levels Within Research
Institutions



National Research Council

- -- Everyone involved in the academic research enterprise has an important role to play in establishing and promoting a strong, positive safety culture.
- This requires a constant commitment to safety organization-wide and emphasis on identifying and solving problems, rather than merely adhering to a set of rules and assigning blame when those rules are not followed.

NRC Report

- • Principal investigators and department chairs are responsible for establishing a strong, positive safety culture in the laboratories they oversee, by demonstrating safe practices and wearing personal protective equipment, ensuring researchers are properly trained in safety before they begin any work....



New! Safety Training and Record Keeping

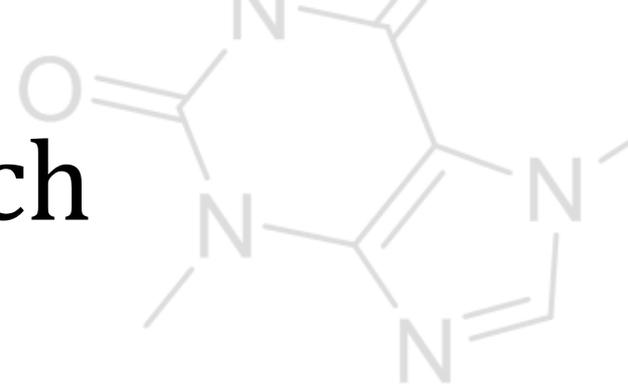
EHS is part of the VPR Office as they are here to help you as a real service.

Database system developed by EHS just to protect **you**

- It is easy to keep track of mandatory training
- Document “local” training
- Assign additional EHS training



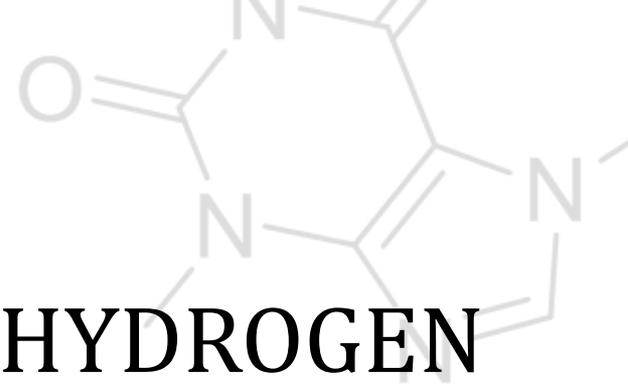
Physics Research



- You are a real problem...
- You are doing things that are new...
- And at the same time you are doing things in the way that you have been doing them successfully for a long time...

Physicists know something about chemicals



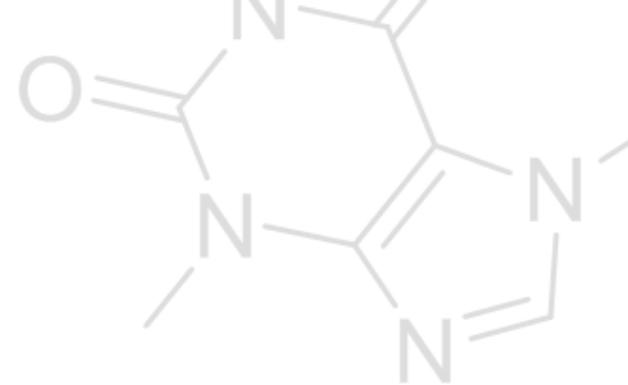


PHYSICISTS REALIZE THAT HYDROGEN AND OXYGEN ARE DANGEROUS RIGHT?!

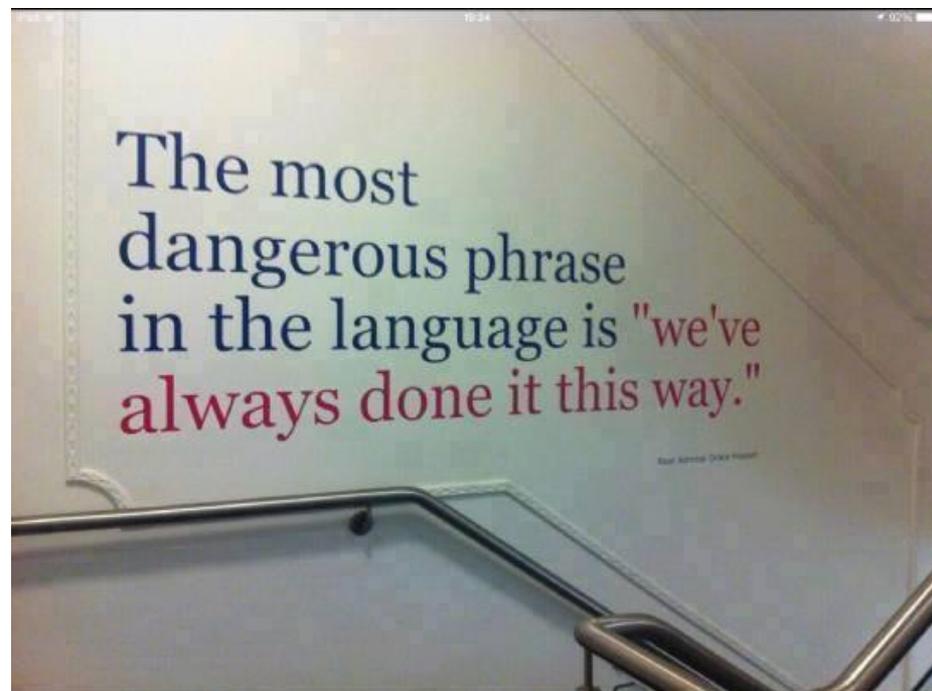




WADITY



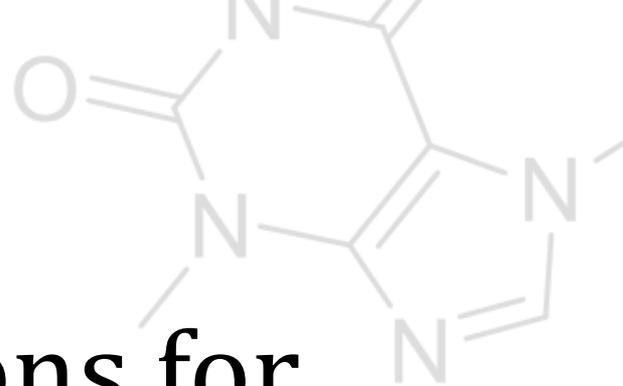
- Done it a million times
 - Doesn't mean it's the safe or 'right' way, or can't go wrong
- Doing something for the first time





University of Iowa – August 10, 2010

- University owned Ford Explorer in parking lot
 - Coordinator of outreach program with Physics and Astronomy
- Hydrogen and hydrogen/oxygen explosion
 - 8 Balloons filled and ready to go
 - Opened a side door
 - 1st and 2nd degree burns
 - Shattered windshield
- Hundreds of times without incident
- Reviewing procedures for transporting hazardous materials



There are regulations for
transporting materials

You could get in a lot of trouble
and fined \$\$\$\$\$



Domestic Shipping of Hazardous Materials

- Any hazardous chemical – Training is Required, shipped by EHS ONLY
- **Dry Ice** with non-regulated material – Training is Required, shipped by EHS upon request.
- Need training or help with shipping a regulated material?
Contact EHS for more information at 982-4911





International Shipments and Exports

- Do you need to ship a chemical or research sample internationally?
 - It *may* be export controlled
- Contact EHS for all chemical shipments
 - No threshold limits
- Also taking computer out of country??
- Contact the Office of Export Controls in Sponsored Programs for additional questions



Your chemicals are not hazardous



- You would be surprised what OSHA considers hazardous
- Do you know what OSHA is?
- Intentional violation (no evidence of training) is \$27,500 per person



Would
Physics staff
know about
compressed
gases and
regulators?

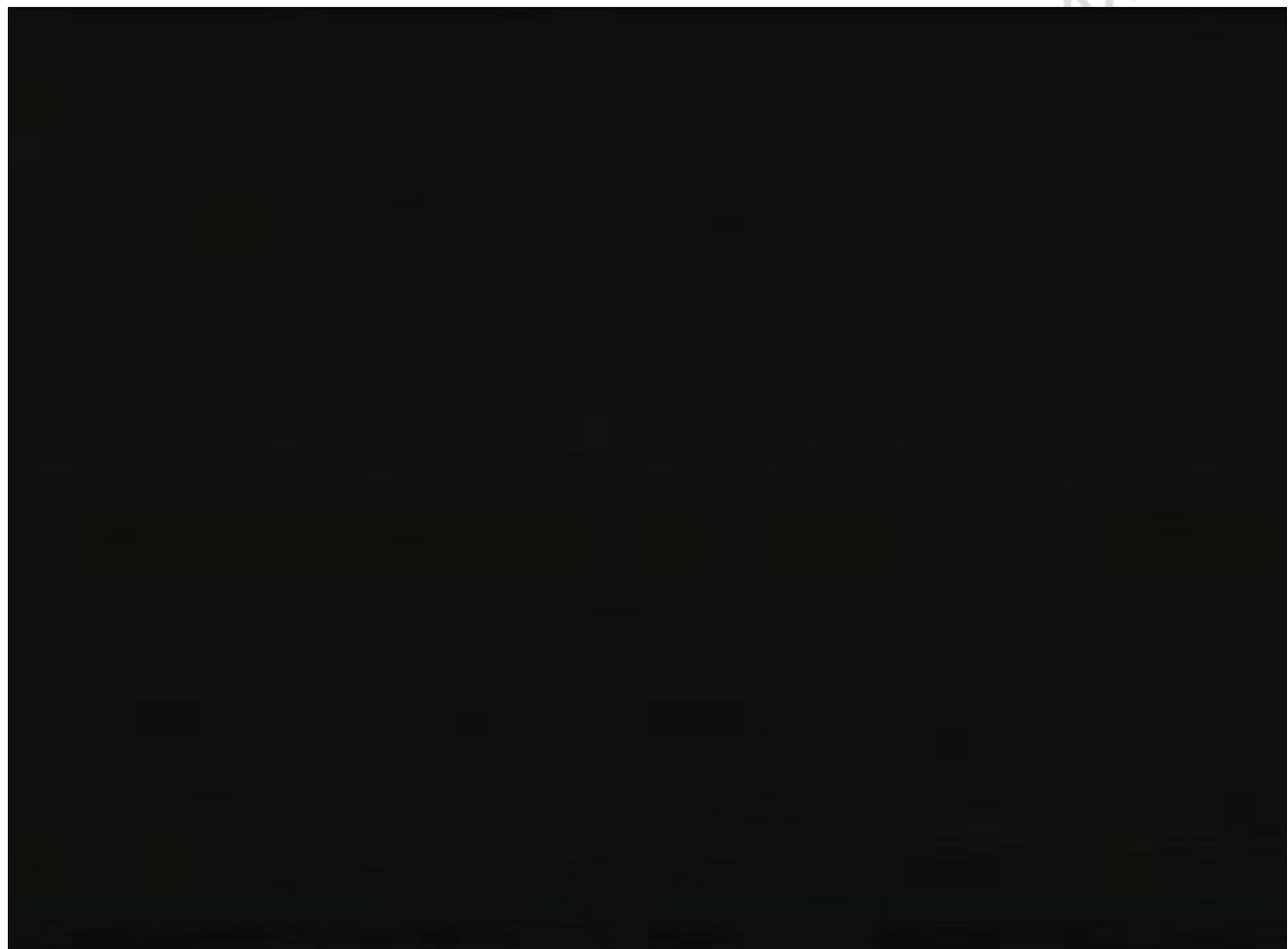




Compressed gas

Ralph's favorite clip

- Chain cylinders
- Check regulators
- Cap when not in use





Additional Training

- Ex. Gas cylinder



ENVIRONMENTAL HEALTH & SAFETY
UNIVERSITY of VIRGINIA

ABOUT

STAFF

TRAINING

DOOR SIGNS (aka HAZARD)

Chemical & Laboratory Safety

Training

Recommended Training

After completing your required [UVA/EHS Chemical Safety Training](#), you may find that you want more information regarding Laboratory & Chemical Safety. Below you will find links to additional UVA and Non-UVA sources of these types of materials.

Other UVA Recommended Training

- [Chemical Safety - Chemical Storage: A General Guideline](#)
 - Recommended training for persons who work with chemicals and/or manage the storage of chemicals. Training includes guidance on how to properly segregate incompatible chemicals and locations for proper storage.
- [Chemical Safety - Compressed Gas Cylinder and Regulator Safety](#)
 - Recommended training for persons who work with compressed gas cylinders. Training includes guidance on: how to store, move and secure cylinders properly, choosing and attaching the appropriate regulators for the gas type, and checking for gas leaks after regulator attachment.
- [Chemical Safety - Eye Protection for Research Personnel](#)
 - Recommended training for persons who utilize areas where there is the potential for exposure or injury due to chemical or physical hazards. Training includes guidance on how to choose the appropriate eye protection for your application.
- [Chemical Safety - Housekeeping Practice in Research Labs](#)
 - Recommended training for persons using laboratory space. Training emphasizes the importance of good housekeeping practice and the implications for overall safety when an area is poorly maintained. Advice is given on how to properly maintain laboratory space.



Our most serious problem

- Virginia Statewide Building Code
- International Fire Code
- State Fire Marshal
- UVA Inspection Program





SFMO inspection of Jordan found: Real quantity violations that can not be cured easily

1. Quantities of hazardous materials (including flammable liquids) appear to exceed the maximum allowable quantities of flammable liquids per control area.
3. Hazardous materials storage cabinets (including flammable cabinets) do not comply with construction provisions.



These were the kind of problems that really made them unhappy and they were occupant created

5. Incompatible materials were not separated.
6. Compressed gas container, cylinders and tanks not secured to prevent falling.
7. Empty containers without covers or plugs.
8. Safety Data Sheets (SDS) were not available (according to occupants). They are on-line.
9. They were alarmed about lack of security with fire doors left open in unoccupied spaces and emergency equipment and exits blocked

Examples of what they found:



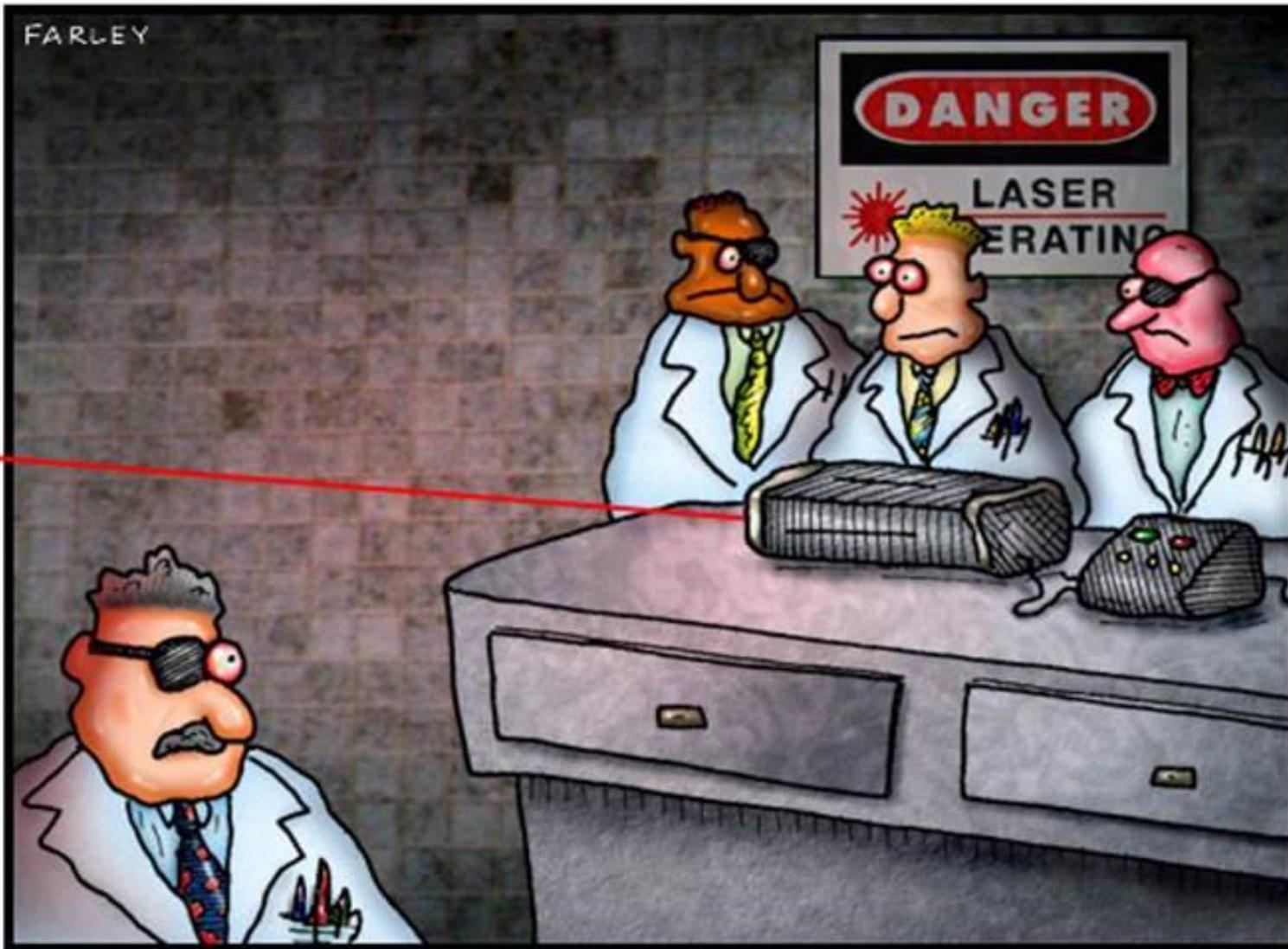






Laser Safety Training on STAR





Copyright © 1997 David Farley, d-farley@tezcat.com

Peer pressure in the laser lab

Laser Safety Hazard Analysis & eyewear OD calculation



DANGER



UVA Laser Safety Program 2-4911

Class 4 Laser Controlled Area

Avoid Eye and Skin exposure to direct or scattered radiation

Laser eye protection required

Principal Investigator: Prof. Jesse Beam 4-4141

Type	Wavelength	Power	Minimum OD

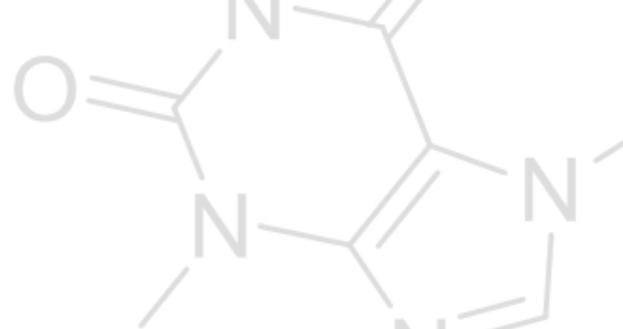


What about new things you are doing

- I can at least tell you about my colleagues in chemistry...

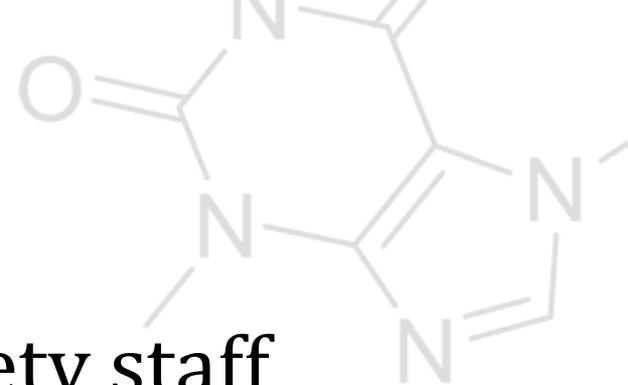


Pentaborane





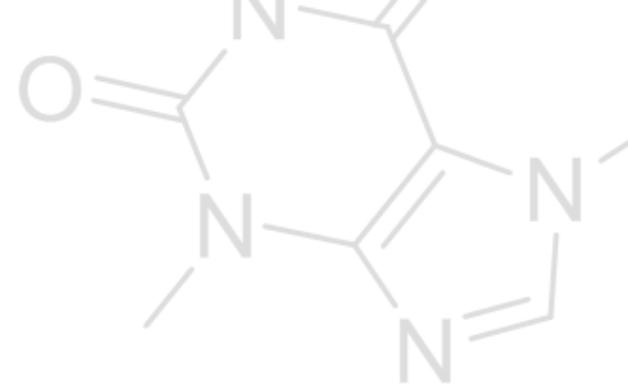
Role of EHS



- Environmental health and safety staff partner with faculty, and researchers to go beyond compliance and support research so together we establish a strong, positive safety culture.
- EHS is part of the VPR Office and we are here to help you.



UVA Expectations



EHS provides:

- Chemical Hygiene Plan
- Written Hazard Communication Program
- Provides Support for University Policies
 - No food or drink in the lab
 - Health and safety
 - **Personal Protective Equipment**
 - Chemical safety and waste training
 - Hazardous (chemical) waste collection and disposal
 - Disposal of regulated (hazardous) materials



Let's work together!

Our goal is to keep you

- ✓ Working **safely**
- ✓ Research going

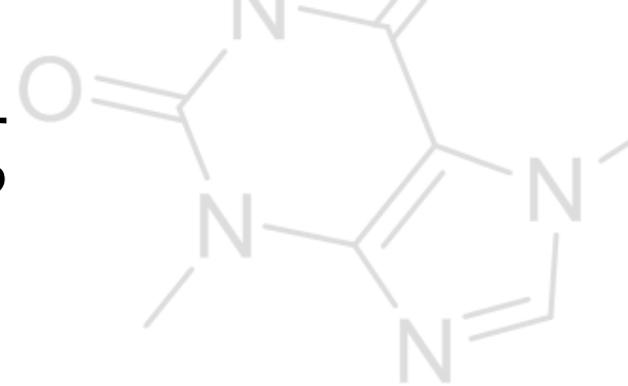
We Provide:

Training, Resources, Annual Inspections

Your Safety is in **your** hands...be Proactive, not reactive
How can **YOU** help us achieve this goal?



New! Safety Training and Record Keeping



Training record system developed by EHS to
protect you

- Database to keep track of training
- Assign and Document “local” training
- Assign additional EHS training



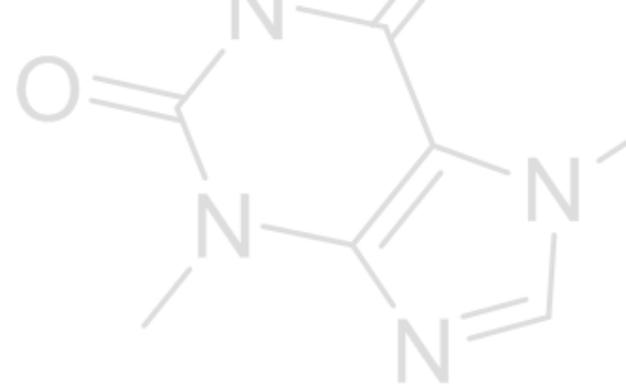
Who can use STAR

- Anyone at the university with a computing ID
 - Faculty/Staff/Administrators/TAs/Students
- Manage data as a “STAR Associate”



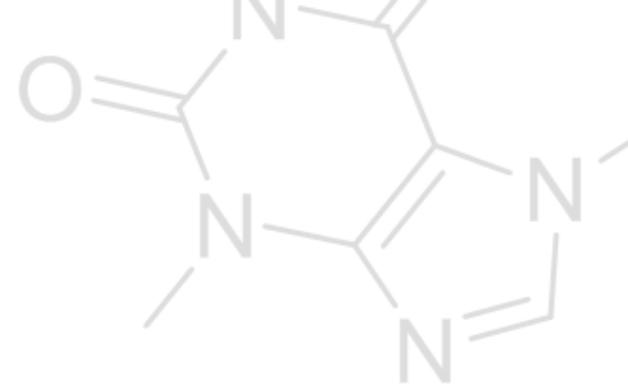
Key Features

- Group membership
 - Research vs. Teaching Lab
- Assign training to Group or Individual
- View completed training by
 - Group
 - Individual
 - Training Title





Features

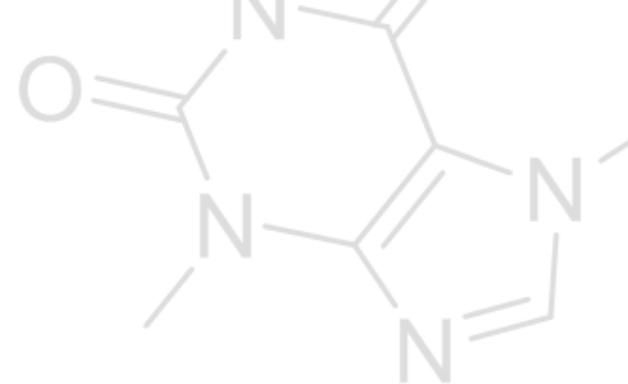


- STAR associate
- Group Membership to separate:
 - Research (graduate/undergraduate/staff)
 - Teaching labs
 - Specific instrument/equipment
- Members can be added/removed from groups – but training record will remain



Assign, View and Manage Training

- Assign easily by email
- View training by Title, Group or Individual Personnel
- Training records stay with an individual
 - Not the PI or group
- Contact Clarissa if you need help getting started! **982-4311**





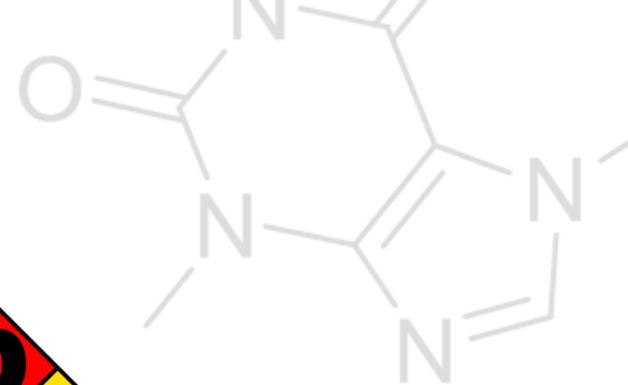
Chemical and Lab Safety Group

What do **we** do?

- Create training and documentation tools
 - STAR website
 - Short safety modules
- Annual lab visits
- Guidance and technical assistance
- Lab moves and decommissioning/commissioning



Hazard Communication Door Sign



LYNCH,
CLARISSA

Room(s): 234



CAUTION!

ADMISSION TO AUTHORIZED
PERSONNEL ONLY!

When lab personnel are present, enter **ONLY** as instructed.
No Eating or Drinking except where posted by EHS.



Caution



Radioactive
Materials

FIRE



HEALTH

SPECIAL

NFPA

REACTIVITY

BIOHAZARD



BSL-2

Additional Room Information & Special Entry Requirements

- Typical quantity of flammable liquid stored in this room: **2 gallons**

EMERGENCY CONTACTS

1. 222-222-2222 (M-F) 8AM - 5PM (LYNCH, CLARISSA)
2. 222-222-2222 (After Hours) (LYNCH, CLARISSA)
3. Environmental Health & Safety: 434-982-4911
4. Emergency Operator: 434-924-2012



A, B, C or D

A= Higher Density, Higher Hazard
D= Lower Density, Lower Hazard

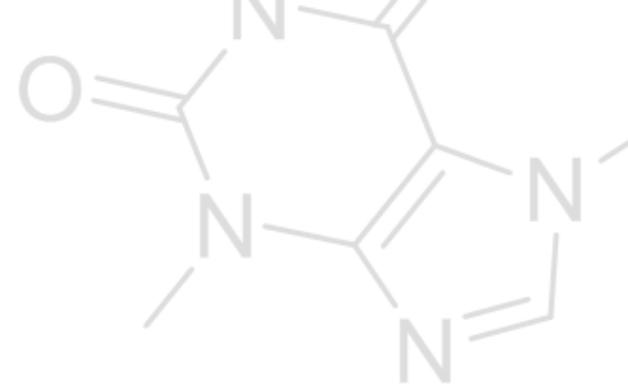


Read signs and follow instructions





(Material) Safety Data Sheet



❖ EHS Website or Online

2. HAZARDS IDENTIFICATION

Emergency Overview

OSHA Hazards

Highly toxic by inhalation, Harmful by ingestion., Mutagen

GHS Classification

Acute toxicity, Oral (Category 4)

Acute toxicity, Inhalation (Category 2)

Germ cell mutagenicity (Category 2)

GHS Label elements, including precautionary statements

Pictogram



Signal word

Danger

Hazard statement(s)

H302

Harmful if swallowed.

H330

Fatal if inhaled.

H341

Suspected of causing genetic defects.

Precautionary statement(s)

P260

Do not breathe dust/ fume/ gas

P281

Use personal protective equip

P284

Wear respiratory protection.

P310

Immediately call a POISON C

7. HANDLING AND STORAGE

Precautions for safe handling

Avoid contact with skin and eyes. Avoid formation of dust and aerosols.

Provide appropriate exhaust ventilation at places where dust is formed.

Conditions for safe storage

Keep container tightly closed in a dry and well-ventilated place.

Keep in a dry place.

4. FIRST AID MEASURES

General advice

Consult a physician. Show this safety data sheet to the doctor in attendance. Move out of dangerous area.

If inhaled

If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact

Wash off with soap and plenty of water. Take victim immediately to hospital. Consult a physician.

In case of eye contact

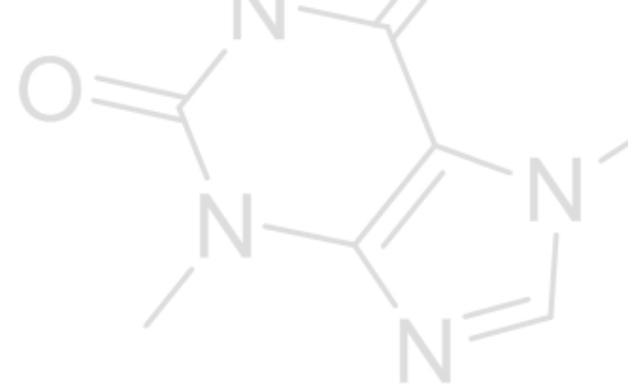
Flush eyes with water as a precaution.

If swallowed

Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician



Avoiding Exposure



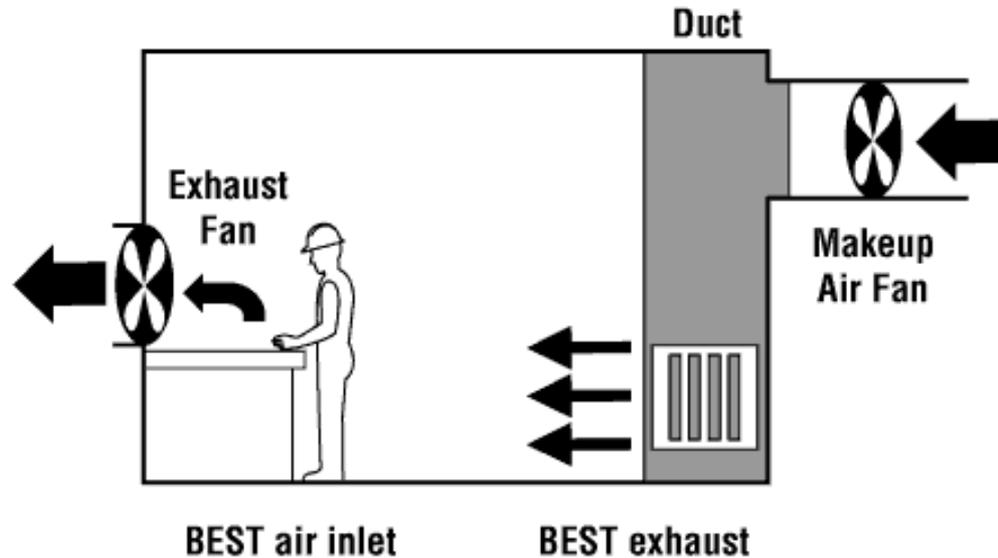
Consult the SDS

- Inhalation – **Fume hoods**
 - **Toxic, carcinogenic, volatile**
- Absorption – Lab attire and gloves
- Ingestion – No food or drink





EHS can help you with better local exhaust design!



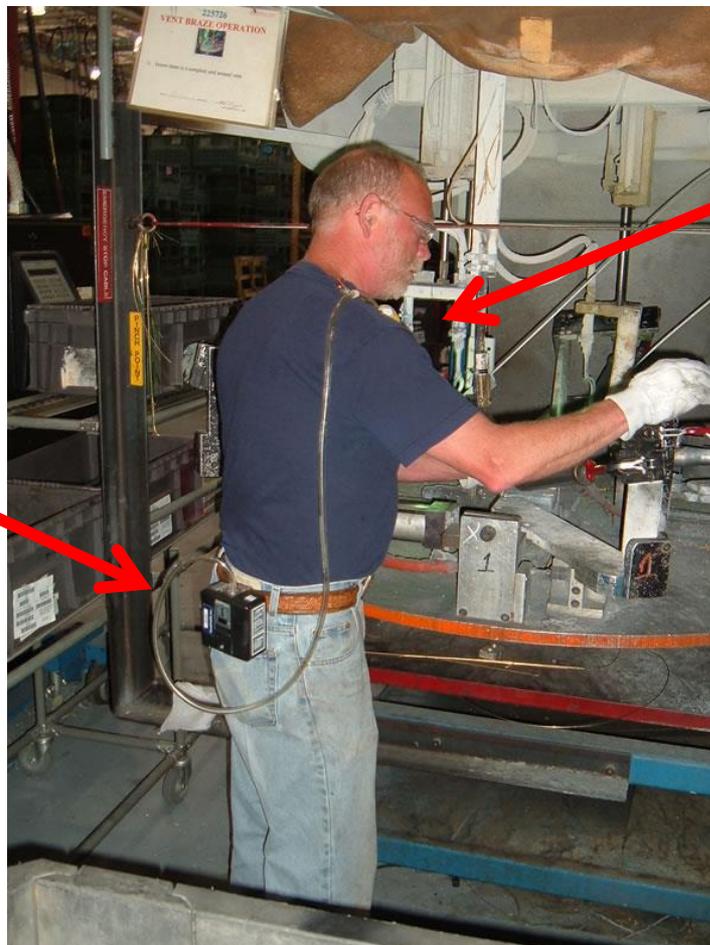
Contact Kristy Davis - IH



Exposure monitoring



Calibrated pump
for air sample



Sample media at
breathing zone



NOISE LEVELS

Dangerous Decibels

Noise Induced Hearing Loss (NIHL)



Average and impact noise
Take care not to exceed
85 dB(A) average per day
140 dB(C) single impact



Eye Safety

Not just for liquids!

Safety glasses

– Lower hazard

- Impact-Flying particles
- Dusts
- Powders

Laser goggles

Comparison of Eye Protection Options



Safety Glasses With Vented Side Shields (Impact Only)



Safety Glasses With Nonvented Side Shields (Impact Only)



Visorgogs® (Impact Only)



Impact Safety Goggles (Impact Only)



Chemical Splash Safety Goggles (Impact and Splash Protection)



© Copyright Science & Safety Consulting Services, Inc. 2008. All rights reserved.

Linda M. Stroud, Ph.D. 919-881-0282 ph
919-799-4177 fax
LMS710AUG@scsafetyconsulting.com
www.scisafetyconsulting.com

AirClean Systems
www.aircleansystems.com

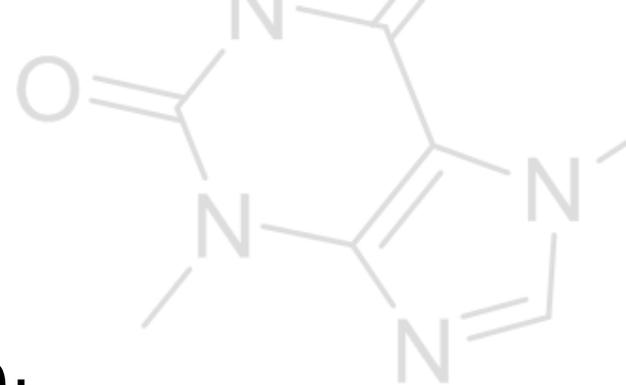


Material Spill

- Hazardous chemical spill (>1000 mL):
 - Contain the spill, if possible
 - Warn others/Restrict access
 - Evacuate the area
 - Call EHS at **2-4911** (434-982-4911) and notify supervisor

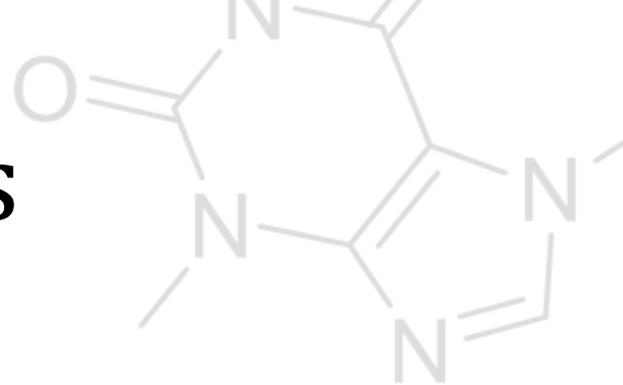
After Hours??

Danger to life or if hurt, call 911





Mercury Spills



- Call EHS right away
- Never attempt to use broom/vacuum, etc. to clean
- Watch for contamination (Flashlight method)
- Report if entered drain (sink or floor)
- Minimize Hg amounts





Fire Emergency and Alarms

Plan of action, *before* it happens

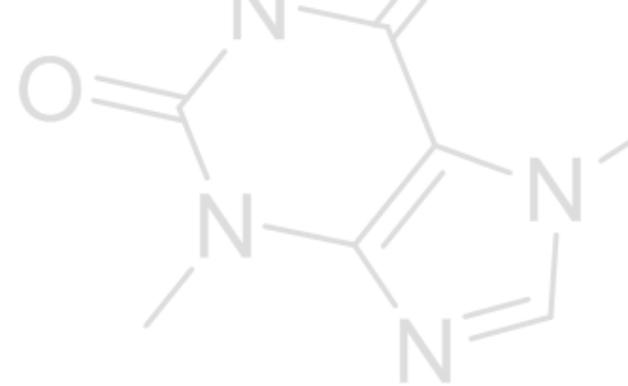
Fire: Notice smoke or flames?

- Fire extinguisher if trained and small fire
- **Call 911**
- Alert others
- Close doors
- Evacuate building right away (use stairs)
- **Pull fire alarm as you exit** →
- Gather in your lab's meeting area





Medical Attention



Illness or Injury

-Be transparent, your safety and health is important to us! -report to supervisor immediately and follow up with EHS

-Paid faculty, graduate student/post doc:

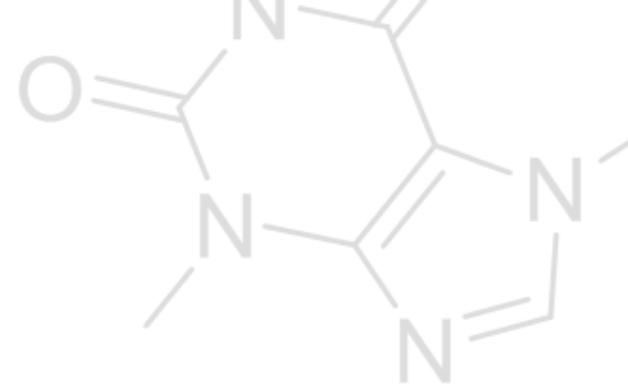
Work Med @ Arlington Blvd

-Unpaid students: Student Health @ 400 Brandon Ave

OR Emergency Room if life-threatening or after hours!



Chemical Storage



Do

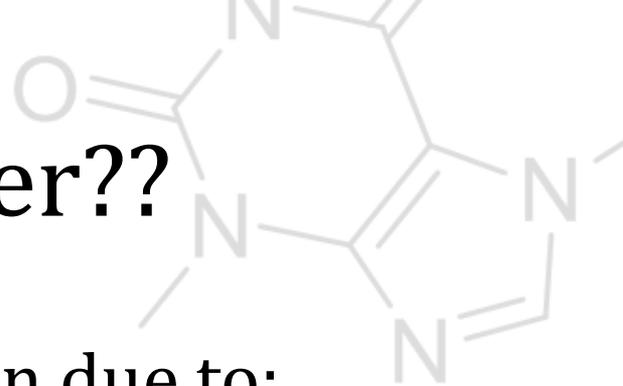
- Use flammable cabinets
- Secondary containers within cabinets/shelves

Don't keep different hazards together

- Separate
 - Flammable, oxidizer, corrosive, pyrophoric



Why Does Storage Matter??



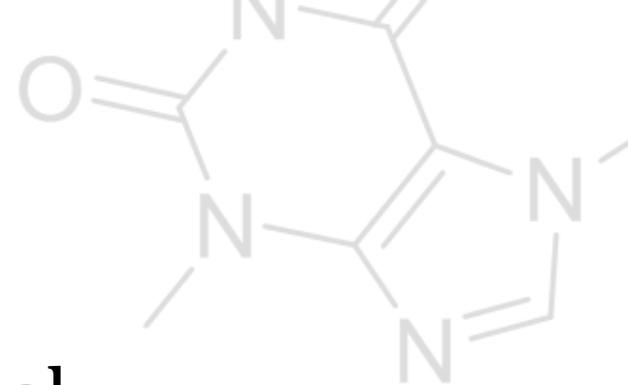
Segregation prevents hazardous reaction due to:
bottle break or crack, leaks, shelf falling

Examples:

- Acetone + Nitric Acid = Fire
- Acids + Bases = Heat generation
- Hydrogen peroxide + alcohols = Fire



Flammables



Commitment to State Fire Marshal

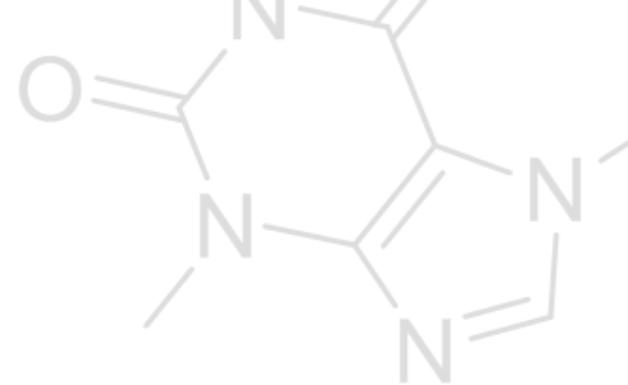
Keep volumes **low**

No 5 gallon containers





Gas Cylinders



UNSAFE



SAFE

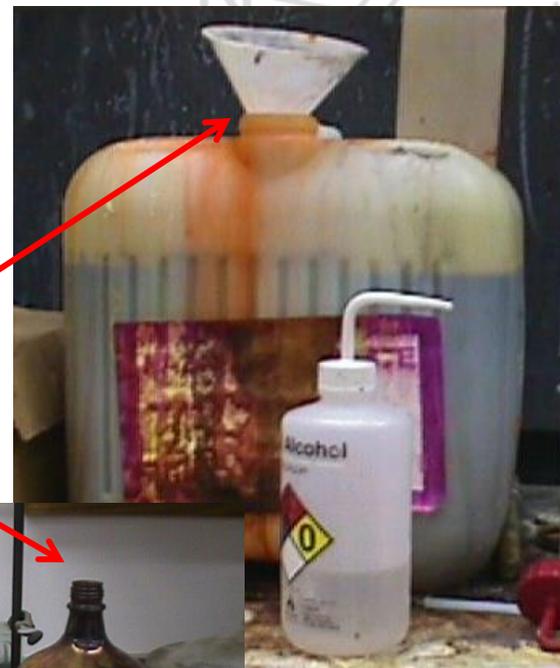


Proper Transportation
Technique



Hazardous Waste

- EHS provides containers
- Capped at all times
 - EPA law!
 - \$37,000 per violation, per day
- Fill-line
- Waste tickets





Empty Bottles

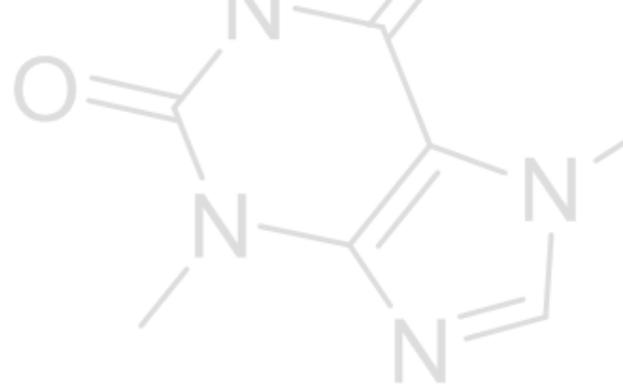
- Triple rinse
- Deface label
- Reuse and re-label

Disposal

- Trash (in lab or bring to dumpster)

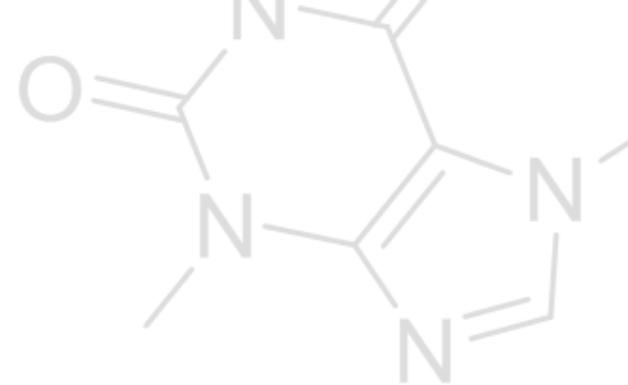
Or

- Reuse for waste





Broken Glassware & Waste Lab Glassware

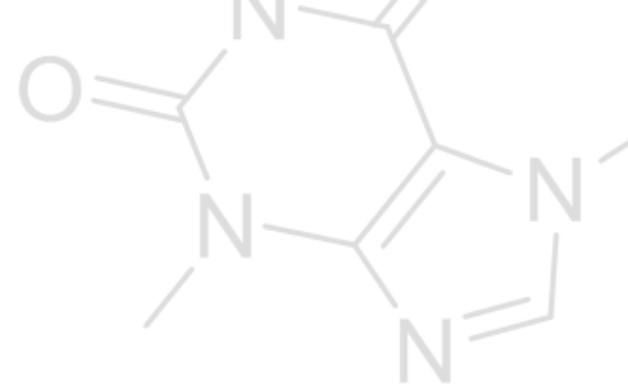


- As long as it isn't contaminated...
 - Cardboard box lined with bag
 - Close and tape up
 - Apply sticker 



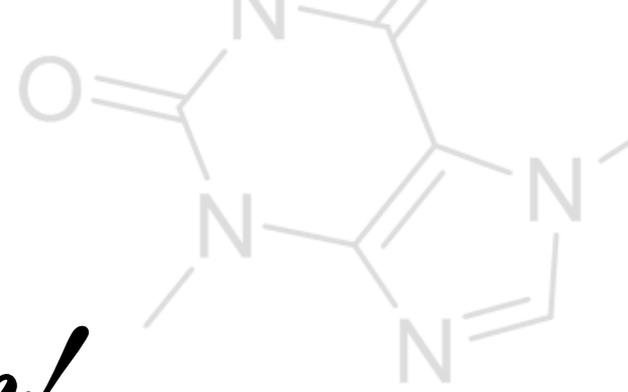


Sharps



- **NEVER** in glass waste boxes
- Dispose of in red sharps container
 - Provided FREE!





Thank you for your attention!

- Need additional training?
 - Online content available on our website
<http://ehs.virginia.edu/ehs/>
- Call us! 434-982-4911



PSA