

# BenchSmart



A NEWSLETTER FOR THE UMDNJ LABORATORY COMMUNITY

## IN THE NEWS

# Death of UCLA Research Assistant from Burns Suffered in Laboratory Fire

In January 2009, a 23 year old UCLA Research Assistant (RA) died of injuries sustained in a laboratory fire involving t-butyllithium (t-BuLi) dissolved in pentane, a mixture which ignites spontaneously on contact with air or moisture. She was employed in the lab for approximately three (3) months.

## Summary of the Incident

The incident occurred on December 29, 2008, when the building was shut down except for critical research. There were no written Standard Operating Procedures (SOPs) listing required work practices, personal protective equipment, supervision requirements or other safety measures. There was no documentation of formal training.

The syringe plunger, which was being used to withdraw the reagent, came out of the barrel causing the mixture to leak out and ignite upon contact with air. The RA was not wearing a lab coat; the synthetic sweater she was wearing, and her nitrile gloves caught on fire. Although she was only six feet away from the safety shower, she did not use it. A post-doc smothered the flames with his lab-coat and another colleague threw water at her from a sink rather than getting her into the safety shower.

## Planning

Planning is essential when working with very dangerous substances. People who have discussed and rehearsed emergency procedures have a much better chance of not panicking in an emergency. A written SOP helps the Principal Investigator (PI) ensure that everybody knows which safety measures are required. EOHSS will develop an SOP for a specific chemical or piece of equipment

upon request. SOPs for some particularly hazardous materials are available on the EOHSS website by following the "Publications" link.

## Training

It is critical for the PI to ensure the appropriate training, supervision and oversight of personnel working with hazardous materials. EOHSS general laboratory safety training sessions do not cover specific laboratory procedures. This is the responsibility of the laboratory.

## Personal Protective Equipment

Use cotton, or better yet, a flame resistant lab coat. A polyester blend lab coat is not recommended when working with highly pyrophoric materials because it is too flammable. Besides from providing an extra layer of protection, a lab coat is easier to remove in an emergency than a sweater.

## Emergency Procedures

For clothing fires, use a safety shower if one is nearby. If a safety shower is not available, "Stop, Drop, and Roll" to help extinguish the fire and then immediately go to the safety shower.

Try to stay in the safety shower for as long as possible - up to 15 minutes and remove clothing. There have been many incidents where lab personnel have suffered burns that were made much worse because they were too shy to use the nearby safety shower or remove clothing.



*Above all, try to use a less hazardous chemical whenever possible.*

## Fire Extinguisher

When working with pyrophoric materials, an appropriate fire extinguisher must be available nearby. A poignant discussion of this incident on a Corante technology blog, "In the Pipeline," has posts from chemists who work with pyrophoric chemicals. One blogger described how he was trained to have a person with a fire extinguisher readily available when working with t-butyllithium.

## Work Practices

Working with the hood sash lowered could have helped in this situation and should be a habit for anyone working in a chemical hood. Also, a blast guard should have been used. *Above all, try to use a less hazardous chemical whenever possible.*

Additional information on safe use of Phrophoric Chemicals is available at: <http://www2.umdnj.edu/eohssweb/publications/external.htm#Pyrophoric>

## References:

Deadly UCLA Lab Fire Leaves Haunting Questions, Los Angeles Times, 1March 09, <http://www.latimes.com/news/local/la-me-uclaburn1-2009mar01.0.1233856.full.story>

Researcher Dies after Lab Fire, C&E News, 22 January 2009, <http://pubs.acs.org/cen/news/87/i04/8704news1.html>

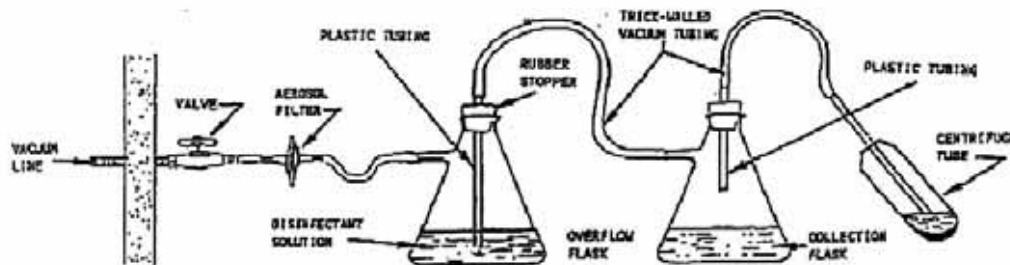
<http://www.chemistry-blog.com/2009/01/20/tert-butyllithium-claims-fellow-chemist-at-ucla/>

[http://pipeline.corante.com/archives/2009/01/23/the\\_real\\_hazards\\_of\\_the\\_lab.php](http://pipeline.corante.com/archives/2009/01/23/the_real_hazards_of_the_lab.php)

<http://www.rsc.org/chemistryworld/News/2009/January/23010903.asp>

## Vacuum System Protection

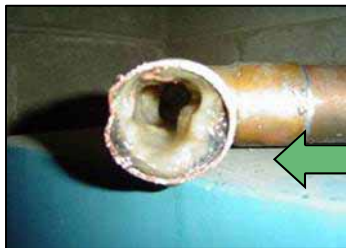
The 5th edition of the CDC-NIH publication, **Biosafety in Microbiological and Biomedical Laboratories**, recommends that BSL-2 and higher laboratories use both a series of traps and an in-line filter to provide protection to laboratory personnel, the central building vacuum system and to the personnel who service this equipment.



In the illustration above, the aerosol/fluid trap set-up consists of two vacuum flasks, preferably plastic, thick walled plastic tubing (to prevent tubing collapse), rubber stoppers and a filter (Whatman Vacu-Guard). The aspiration flask on the right contains decontamination solution and is used to collect and disinfect the contaminated fluids (tissue culture media, stains, fixative). The flask on the left serves as a fluid overflow collection vessel.

A Whatman Vacu-Guard filter, installed in-line, can isolate and confine infectious aerosols, prevent biological contamination of vacuum pumps or aspiration suction systems, and eliminate potentially hazardous exhaust. These filters should be replaced whenever there is evidence of filter blockage, failure, wetness, and on a routine basis, at least annually.

Dispose of used filters as regulated medical waste (if contaminated with a biological), hazardous chemical waste (if contaminated with a chemical) or as radiological waste (if contaminated with a radionuclide).



The inside of a vacuum line from a biological safety cabinet (BSC) that was not protected by a particulate filter.

## Vacuum Filters and Flasks



Whatman Vacu-Guard filters (#672-5000 or 672-5001), PTFE membrane retains 99.9% of air/gas particles 0.1  $\mu\text{m}$  and larger, are available at UMDNJ from General Stores.



Nalgene filtering flasks, polypropylene, DS4101-0500, are made to withstand full vacuum to 762mm Hg (30in. Hg) and are available in 500, 1000 and 2000 ml sizes.

On the EOHSS Website: <http://www2.umdnj.edu/eohssweb/>

There is now a new, convenient way to contact EOHSS, If you have a non-emergency safety concern or question you can use the new "EOHSShelp" button on the EOHSS website or send an email directly to [EOHSShelp@umdnj.edu](mailto:EOHSShelp@umdnj.edu). EOHSS will contact you with an answer by the next business day!

Computer Ergonomics Guide, self-assessment form, ergonomic questionnaire and listing of chairs and equipment: <http://www2.umdnj.edu/eohssweb/publications/index.htm#Ergonomics>

Updated procedures for high school students working in UMDNJ laboratories can be found by following the campus specific links to the "Forms" page: <http://www2.umdnj.edu/eohssweb/publications/highschool.htm>.

The online version of the new and expanded Emergency Response Guide flipcharts that were recently distributed is also available from the EOHSS home page at [http://www2.umdnj.edu/eohssweb/publications/emergency\\_response\\_guide.pdf](http://www2.umdnj.edu/eohssweb/publications/emergency_response_guide.pdf).

Do you know how to check for changes in the UMDNJ Laboratory Safety Plan? It's easy – follow the "Publications" links on the EOHSS website, click on "Laboratory Safety," and navigate to the Laboratory Safety Plan or you can go directly to <http://www2.umdnj.edu/eohssweb/publications/lsp.htm>.



# Reduce our Footprint... Reduce our Costs



## Doing Our Part: Reducing Mercury Waste at UMDNJ

The University is committed to leadership in protecting the environment and promoting sustainability. Reducing the amount of hazardous (chemical) waste that it generates is an important part of this mandate.

For this reason, a mercury restriction directive has been issued for all schools and units requiring the elimination of mercury use in research, clinical, and facility settings wherever possible, except when an exemption is approved by EOHSS, in consultation with designated UMDNJ officials.

## Background

Mercury spills from thermometers and other devices results in a significant amount of waste because the presence of even trace amounts of mercury requires the spill clean-up materials to be managed as hazardous waste. For this reason, EOHSS has worked with schools and units for years to replace mercury-containing devices.

The push to replace mercury in health care began in June 1998, when the Environmental Protection Agency and the American Hospital Association agreed to limit the amount of mercury waste from hospitals as much as possible by 2005. In 2004, UMDNJ signed a Consent Agreement/Final Order (CAFO) with the United States Environmental Protection Agency (USEPA) which included a Supplemental Environmental Project (SEP) that focused on Mercury Source Reduction. UMDNJ was successful in removing mercury sphygmomanometers, a frequent source of mercury spills, from all patient care areas.

However, even though the use of mercury thermometers has been discouraged in laboratories for years, mercury thermometers are still being used in water baths, ovens, incubators, and heat blocks and are the most common source of hazardous material incidents in our research laboratories.

Aside from being costly, these incidents have the capacity to be extremely hazardous since heating mercury causes the liquid to quickly evaporate into the air.

Earlier this year, Laboratory Safety Committees on the Newark, Piscataway/NB, Stratford and Camden campuses approved a change in the wording of the UMDNJ Laboratory Safety Plan which would prohibit mercury thermometers in UMDNJ laboratories.

Revised wording about mercury thermometers is reflected in each Laboratory Safety Plan, accessible from: <http://www2.umdnj.edu/eohssweb/publications/lsp.htm>.

Recently, a [University-wide directive](#) was issued mandating that UMDNJ schools/units eliminate mercury in all applications, including research, clinical, and facility settings.

Non-mercury thermometers are available from common laboratory equipment suppliers (e.g. VWR, Lab Safety Supply, Fisher Safety, etc.) and are relatively inexpensive, with prices starting from \$11.

For prices and more information on mercury-free thermometers please view the EOHSS Mercury-free Thermometer Fact Sheet located at <http://www2.umdnj.edu/eohssweb/publications/thermometer.pdf>.

## Chem-Mart

Save money, reduce your environmental footprint, and help your fellow researchers by participating in Chem-Mart. Chem-Mart is a new EOHSS service on the Piscataway and Newark Campuses where researchers can donate and obtain, for free, unopened, unexpired chemicals. Use the "Chem-Mart" button on the EOHSS website or go to [http://www2.umdnj.edu/eohssweb/publications/chem\\_mart.htm](http://www2.umdnj.edu/eohssweb/publications/chem_mart.htm) to see which chemicals are currently available. Write to [EOHSShelp@umdnj.edu](mailto:EOHSShelp@umdnj.edu) to notify EOHSS of chemicals for Chem-

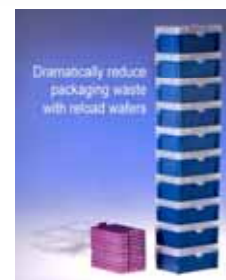
Mart that you would like to donate. EOHSS will pick them up. Before you buy, check to see if a chemical you need is available at your campus Chem-Mart.

## Pipette Tip Boxes: Don't Bury Us in Plastic



Many labs are throwing away plastic pipette boxes on a daily or weekly basis. Pipette tips in all varieties are now available in a cardboard box. Go to <http://www.bioexpress.com> and search for e-dek.

For tips that come in a plastic box, buy pipette-tip refills and reuse the tip boxes. USA Scientific and Rainin have recycling programs for their tips boxes.



## REGULATORY SPOTLIGHT

# What to Know when Ordering DNA or other Biological Agents

Last year, a UMDNJ graduate student contacted a researcher at another institution and requested to be sent the *Xylella fastidiosa* organism or its DNA. *Xylella fastidiosa* is a bacterium that causes a variety of plant diseases affecting grapes, citrus, almonds, peaches and coffee. The United States Department of Agriculture (USDA) regulates this plant pathogen as a "select biological agent" because it has the potential to pose a severe threat to plant health, plant products, and therefore, the economy. The regulations governing transport, possession and use of select biological agents are complex and not intuitive. The graduate student could have put UMDNJ in violation of USDA Select Agent regulations if the bacterium were received and used without the proper license

Prior to obtaining or conducting experiments with **any** new pathogenic microorganisms or their components (e.g., RNA, DNA, virulence factors), toxins, human

cells, or recombinant DNA, Principal Investigators must apply for approval from their campus Institutional Biosafety Committee (IBC). The UMDNJ Newark Campus uses a registration form for Research Involving Pathogenic Microorganisms, Human Cells, Select Agents, and Recombinant DNA. The other campuses have separate forms for Recombinant DNA, Pathogenic Microorganisms or Potentially Infectious Materials. All of the forms can be found by following campus specific links on the EOHS website at <http://www2.umdnj.edu/eohssweb/index.htm>.

The campus IBC will conduct a risk assessment to examine the hazardous characteristics of the agent, evaluate the laboratory procedures planned, and determine if there are appropriate facilities, equipment and personnel to safely handle the agent. The IBC can also assist with interpreting and complying with any applicable regulations, such as the select agent rules.

## Select Agents, Virulence Factors or Select Agent Toxins

There are a myriad of registration, approval and security requirements that must be in place before a select agent can be obtained, possessed or transferred from one institution to another or from one researcher to another. Any UMDNJ employee, staff member or student contemplating to obtain, use or transfer any select agent, including its DNA, must contact the campus Biosafety Officer to initiate a review of the necessary requirements. Only designated UMDNJ responsible officials have the authority to make contacts regarding Select Agents.

A complete listing of select biological agents and toxins, considered high risk to humans, animals, or plants can be found on the CDC website: <http://www.cdc.gov/od/sap/docs/salist.pdf>.

If you have a question about obtaining DNA from a select agent or high consequence pathogen, handling toxins, working with commercially available vectors, hazardous chemicals precautions or transporting biological substances, contact EOHS staff for assistance:

Piscataway, New Brunswick, Stratford, or Camden: Tom Boyle, 856-566-6189, [boyletp@umdnj.edu](mailto:boyletp@umdnj.edu)  
Newark or Scotch Plains: Amy Ryan, 973-972-8424, [ryanaq@umdnj.edu](mailto:ryanaq@umdnj.edu)



THE DEPARTMENT OF ENVIRONMENTAL AND OCCUPATIONAL HEALTH AND SAFETY SERVICES (EOHSS) provides support to the University community through the development and implementation of health and safety programs. Some of the key areas in which EOHSS provides assistance are: hazard evaluation and control; consultation and technical assistance; safety education and training; hospital safety; fire/life safety; emergency chemical spill response; chemical waste management; and laboratory safety.

## Contact EOHSS at:

### NEWARK

65 Bergen Street, Room 443  
Newark, NJ 07107  
973-972-4812 / Fax: 973-972-3694

### SCOTCH PLAINS

1776 Raritan Road, Room 323  
Scotch Plains, NJ 07076  
908-889-2486 / Fax: 908-889-2496

### PISCATAWAY/NEW BRUNSWICK

335 George Street, Suite 2250  
New Brunswick, NJ 08901  
732-235-4058 / Fax: 732-235-5270

### CAMDEN/STRATFORD

40 E. Laurel Road, Suite 1060  
Stratford, NJ 08084  
856-566-6189 / Fax: 856-566-6352

## Visit our website at:

<http://www2.umdnj.edu/eohssweb>

**Executive Editor:** Renee Lyons, MPH  
**Managing Editor:** Lindsey Kayman, SM, CIH  
**Design Coordinator:** Sharon Stern

*BenchSmart* is published periodically by the Department of EOHS for UMDNJ laboratory personnel. This newsletter will address current and relevant laboratory health and safety information for the research community

If you have any comments, would like to submit an article, or would like us to address a particular topic, please contact Lindsey Kayman at 732-235-4058 or at [kayman@umdnj.edu](mailto:kayman@umdnj.edu).



## Top Fire Code Violations in UMDNJ Labs



- ◆ Use of extension cords as a replacement for permanent wiring
- ◆ Storage and clutter in the hallways
- ◆ Storage less than 24 inches from the ceiling
- ◆ Poor housekeeping -large amount of paper
- ◆ Unsecured compressed gas cylinders
- ◆ Flammable liquids stored outside flammable liquid cabinet
- ◆ Storage of flammable liquids in standard refrigerators, freezers or cold rooms

