The Need for Academic Institutional Laboratory Safety

Safety Training Program Workshop hosted by the IUPAC Committee on Chemistry & Industry
Sao Paulo, Brazil
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Lab Safety - still a university lab issue

“Death in the Lab”    Discover Magazine, June 2015

FROM THE JUNE 2015 ISSUE

Death in the Lab
A UCLA laboratory fire took Sheri Sangji’s life. Her boss and the university closed ranks. Will her family’s crusade for justice make researchers any safer?
By David Jaffe Bender  | Thursday, April 30, 2015

With the campus nearly deserted for winter break, this Monday in late 2008 should have been a quiet one at the University of California, Los Angeles. Around 1 p.m., Dec. 20, Sherborne "Sheri" Sangji began an experiment in the fourth-floor chemistry lab where the 25-year-old worked as a research assistant to chemistry professor Patrick Harran.

Alone at the bench, wearing a synthetic-fiber sweatshirt, she put on goggles and gloves and began the procedure Harran had outlined to her that morning as part of work to develop a drug to treat obesity. It included transferring a liquid called tert-butyllithium from the bottle it came in to another bottle.

Tert-butyllithium is pyrophoric — it ignites on contact with air — so its manufacturer, Sigma-Aldrich, sent detailed instructions for safe handling with each bottle. Only “fully qualified and experienced laboratory workers” should work with it, the instructions say, according to an investigative report. They should receive training on the specific procedures needed to stay safe; goggles and gloves, but also a fire-resistant lab coat, coverall fire-resistant clothing down to the underwear, and possibly a full-face respirator mask. If a syringe is used, it should be glass, at least twice as large as the quantity to be transferred and fitted with a needle a foot or two long. Sangji had learned to make a transfer from one of Harran’s postdoctoral researchers, who would

• UCLA laboratory safety standards on trial

• “family pushed for accountability from researcher in charge & for better safety standards in academic labs”

• “UCLA spent $4.5M on professor’s defence”

• http://discovermagazine.com/2015/june/20-death-in-the-lab
Academic Institutional Safety Training
Brief Overview of a Canadian University perspective

York University Institutional safety training

- Undergraduate & graduate students
- Faculty
York University Human Resources
Health, Safety & Employee Well-Being - Health & Safety Training

Undergraduates & Graduate Students

- Once every 3 years (3 hours per course) for any laboratory work:
  - Minimum WHIMS II
  - Biosafety - to work in lab with biologicals
  - Compressed Gas Cylinder Safety - if appropriate
  - Laboratory specific training (on-going)

- Specialty training:
  - Radiation Safety if working with isotopes
  - X-Ray Safety if working in X-Ray diffraction - just access to area

http://hr.info.yorku.ca/health-safety-training/

Faculty Safety Officer

- “Solvents” training (chemical handling & volatile rooms):
  - To access the solvent storage (blowout) room
  - Located in common Science Stores area
Faculty (Principle Investigators)

- Same as students plus overview of:
  - Occupational Health & Safety Act
  - Biosafety: Full Training
  - Accident Investigation (online)
  - Reporting accidents
  - Workplace Violence
  - Harassment

- Typically by web-seminars

- This occurs by law every 3 years
Principle Investigators safety training within their laboratories

- Varies by Principle Investigator
- It is laboratory specific
- Some PI’s have guideline documents, some don’t
- PI and senior lab designate do the training & monitoring as necessary

- OHS does a safety audit of all PI laboratories once a year

- Specialty training:
  - Usually instrument specific
  - X-Ray Safety training working in X-Ray crystallography
    - specific to instrument, need radiation badges
Laboratory Safety is an ongoing challenge - the difficulty is buy-in

**In General -**
- Everyone is fine at beginning
- Can become rather lax quickly thereafter
- Laboratory safety comes with experience in lab
- Students will take short cuts - leads to problems
- On-going safety needs to be trained & kept foremost in mind
- The “spirit” of the rules in addition to the letter of the law
- On-going - in order to work safely & prevent injury/infection - & BAD data

**Industry**
- Why this matters - need it when they go to industry lab
- Not up to their safety standards
Audette Laboratory equipment - other student’s using it

Sonicator with lid open

- Student leaving soundproof enclosure open so they can hold samples being sonicated
- Students complaining about their hearing & concerns about infection/contamination
- Typically “non compliant” students go to other PI labs to use their sonicators
Classic example of undergraduate student being lax with lab safety
Container didn’t have lids on properly - biological spill
Undergraduate student did not clean up after the spill
Caused a lot extra work to clean up the centrifuge due to biological contamination
Thankfully only clean up and not damage to the instrument
Requires ongoing vigilance & continuous training - undergraduate student turn over

Audette Laboratory equipment - other student’s using it
Floor centrifuge
PhD student notices in Dec 2016 “a lot of white powder” in corridors of UofT laboratory building

Faculty & students working in area not informed of asbestos dust until at least 1 month later

Major lack of communications & safety training by DOHS on asbestos exposure

Health implications of known carcinogen

Ontario Ministry of Labor ongoing investigation

Results in major UofT DOHS protocols being changed
# Audette Laboratory
## ISO/IEC 17025 Quality Management System
### Laboratory Safety Manual TOC

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Document Control No.: AL-QMS-L-001-DOC

Computer File Name: LSM-01_Table of Contents 3.0.docx

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Signoff on reading Laboratory Safety Manual

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I have read, understood and agree to abide by all above QMS documents. I acknowledge this by filling in my York ID# in the space below and filling in the Date Completed.

York ID#: 2122xxxxxx

Date Completed: Sept. 21, 2016

Once completed rename the file (File > Save as) by completing the current year/month/day.

XX = your initials

XX_Acknowledgement Reading Lab Safety Manual 2016.qm.doc.docx

Email this completed acknowledgement form to Dr. G. Audette for his records.
### Chemical Hygiene Manual - QMS

**Section:** QMS  
**SOP ID:** QM-LSM04-CH

#### Process

<table>
<thead>
<tr>
<th>Process</th>
<th>Chemical Type</th>
<th>Instructions</th>
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</thead>
<tbody>
<tr>
<td>Storage</td>
<td>General</td>
<td>All chemicals should be stored in their original container with the manufacturer’s label intact. All chemicals shall be labelled using WHMIS guidelines. If the manufacturer’s label is missing or the chemical has been transferred to another container, a WHMIS Workplace label shall be applied to the container that identifies the chemical and its main chemical constituents. All chemicals shall be stored in a container that is inert to the contents and sealed so that it shall not spill during transport or handling. When in doubt as to how a chemical should be stored, refer to the MSDS sheet for the product.</td>
</tr>
<tr>
<td></td>
<td>Flammable &amp; Combustible</td>
<td>Store in proper flammable storage cabinets, which are labeled appropriately. The total quantity of flammable or combustible liquids stored in an approved cabinet shall not exceed 500L. Maintain as small a supply as needed for the efficient, uninterrupted operation of your laboratory. Not more than 50L of flammable liquids and not more than 300L of flammable &amp; combustible liquids shall be permitted in any open working laboratory area. This includes open shelves, benches and fume hoods. Containers used for the storage of flammable or combustible liquids shall not exceed 5L in capacity except if they are approved safety storage cans up to 25L capacity. If flammable or combustible liquids shall be refrigerated, store them only in explosion-proof refrigerators.</td>
</tr>
<tr>
<td></td>
<td>Corrosive Material</td>
<td>Containers of acids and highly caustic material shall be stored in the proper storage cabinets, near the floor, to minimize the danger of bottles falling from shelves. Rubber or plastic safety containers shall be used to transport bottles over 500mL in size. Use only the smallest size containers compatible with the current need.</td>
</tr>
</tbody>
</table>

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### Chemical Spill Process - QMS

**Section:** QMS  
**SOP ID:** QM-LSM05-CSP

#### Scope

This section of the Laboratory Safety Manual outlines the process for handling a chemical spill in the laboratory.

#### Process

1. **Emergency Spill and Odour Procedure**
   - **SPILL?** Is the spillmanageable? ODOUR? Noticeable?
   - **LEAVE AREA** (Shut Down Activities) Take Essential Belongings.

2. **High Risk?**
   - **Immediate health hazard to yourself or others?**
   - **Choking or first aid required?**

3. **SOUND FIRE ALARM** Via Pull Station

4. **CALL 911** From campus phone, campus pay phone or mobile phone.
   - From campus phone or campus pay phone OR CALL 410-776-3333 from campus pay or mobile phone.

5. **WAIT FOR INFORMATION FROM AUTHORITIES** (Dept. of Div., Health and Safety) AND OR OBTAIN SPILLS KIT TO CLEAN UP SPILL (Take precautions as needed).

6. **LEAVE THE BUILDING**

7. **REPORT ALL INCIDENTS TO AREA SUPERVISOR**

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**Document Control:** AL-LSM-5-004.DOC  
**SOP Revision No.:** 3.1

**Document Control:** AL-LSM-5-005.DOC  
**SOP Rev. No.:** 2.1

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**York University**

Laboratory Safety Manual Examples
# Laboratory Safety Manual Examples

## 10 WASTE DISPOSAL

### SECTION: QMS

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<th>Waste Classification</th>
<th>Contains</th>
<th>Type of Container</th>
<th>Notes</th>
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</thead>
<tbody>
<tr>
<td>General Waste</td>
<td>Office waste. Items contaminated with non-hazardous biomedical waste.</td>
<td>Black waste bag in a solid container. Items contaminated but not dripping with fluids should be put in the general waste.</td>
<td></td>
</tr>
<tr>
<td>Biomedical Waste</td>
<td>Refer to the Faculty of Science (FSc) and DOHIS current “Biohazardous Waste Disposal Protocol” document for specific details.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Note:</td>
<td>The Audette Laboratory waste is not biomedical. This section is for educational purposes only.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Biomedical specimen  waste</td>
<td>Yellow biohazard pail with tightly fitting lid. Any sharps contaminated with biomedical/biological waste shall be placed into a YELLOW sharps container labelled with a biohazard symbol.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Biomedical sharps</td>
<td>Double barrier containment system consisting of a yellow plastic liner in a cardboard box (for non glass containers).</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sharps</td>
<td>An approved clinical sharps container.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Note:</td>
<td>Most of the Audette Laboratory waste is microbiological (treatable at YorkU) with the exceptions of sharps.</td>
<td></td>
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</tr>
</tbody>
</table>

### Hazardous Waste

Refer to the Faculty of Science (FSc) and DOHIS current “Hazardous Waste Disposal Protocol” document for specific details.

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## 14 HAZARD ASSESSMENT & CONTROL

### SECTION: QMS

- “Laboratory Maintenance & Waste Disposal” document (AL-QMS-A-007.DOC)
- “Safety” document (AL-QMS-A-001.DOC)

### PROCESS

**Step** | **Detail** | **Information**
--- | --- | ---
1. Hazard Recognition | 1. Ask the question: Does this condition or circumstance create the possibility of potential harm to the worker? | Energy hazards can be electrical, chemical, mechanical, gravitational, biological or kinetic. Ergonomic hazards can be the worker, the task, the tool, the environment or the organization (shift conditions, work loads). |
2. Hazard Assessment | Hazards are assessed by three components: severity, probability and worker exposure. To evaluate the risk posed by a hazard, values are assigned to the three components. The values are added together to indicate the hazard risk. This enables the hazards to be prioritized in order of the risk to the worker. In the formal hazard assessment the person doing the evaluation shall rate the hazards and prioritize them in the order they should be looked at for control or elimination. | Component | Definition | Value |
| | Includes human fluid or blood products, items saturated or dripping with blood, needles, laboratory glass that is broken or can easily be broken, biological or discarded materials known to be contaminated with highly communicable infectious diseases. | Severity | No loss or damage | 1 |
| | | | First Aid | 2 |
| | | | Lost time injury | 3 |
| | | | Fatal | 4 |
| | | Probability | Practically impossible | 1 |
| | | | Possible (has happened) | 2 |
| | | | Likely to happen | 3 |
| | | | Likely to happen | 3 |
| | | Worker Exposure | Rarely (<1/month) | 1 |
| | | | Occasionally (<1/month) | 2 |
| | | | Frequently (<1/week) | 3 |
| | | | Frequently (>1/day) | 4 |

3. Hazard Control

3.1 Engineering controls:
   - Installation or modification of equipment.
   - Administrative controls:
     - Training of workers in safe work practices.
     - Task scheduling or rotation to reduce exposure to hazard.
     - Substituting a hazardous product with one that is less hazardous.
   3.3 Personal Protective Equipment: (As outlined in routine safety practices).
     - The use of correct protective gloves when handling body fluids or chemicals.
     - The use of protective eyewear when there is danger of splashes and the wearing of protective footwear that covers the whole foot.
     - The use of protective clothing such as gowns or lab coats when working in laboratory areas.
     - The use of protective masks and respirators when handling chemicals.

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Academic Institutional Safety Training

In summary

- **General Discussion** -
  - All YorkU students get training and everyone is fine at beginning
  - The challenge is laziness (buy-in) and people becoming rather lax there after
  - Laboratory safety comes with experience in lab - it’s a mind set!
  - People will take short cuts - which can lead to problems

  - With our ISO/IEC 17025 QMS Laboratory Safety Manual approach, on-going safety is trained & kept foremost in mind
  - The “spirit” of the rules in addition to the letter of the law
  - Mistakes can happen, but occur less often
  - On-going - in order to work safely & prevent injury/infection - & prevent BAD data

- **Industry**
  - Why this matters – students need it when they go to an industry lab
  - Our students have a better understanding and training in laboratory safety so they can more easily become up to speed to the specific industries safety standards
The Need for Academic Institutional Laboratory Safety

Questions? Discussion

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