Wild, Wild West to GHS: Reflections on my first year as a general chemistry laboratory coordinator

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It's a Cultural Thing

- Covering up accidents is the right thing to do! Right?
- Baking soda fixes everything! Doesn't it?
- When we design experiments we should choose the most hazardous chemicals available! Shouldn't we?
- When I was a student, I practically bathed in hexanes and I'm just fine. Lab coats and gloves are overkill! Aren't they?

TA Training

- Our TAs are undergraduates who have taken the course—generally not chemistry majors
- No lab safety course is required, many skipped TA training
- We now have a thorough online training and an in-person “On-the-job checklist” for training at our first meeting
- Procedures in place for emergencies and special situations

Hazard and Risk Evaluation

- Team composed of laboratory coordinator, stockroom manager, TA, freshman student, and risk management representative
- Used ACS publication as a guide

Table F-2: Laboratory Hazard Risk Assessment Matrix

Laboratory Information
Laboratory Director / Principal Investigator: **Location:**

Hazard and Exposure Category	How could you be exposed to this hazard?	Given the exposure, what is negative outcome?	Severity of Consequences		Probability of Occurrence		Risk Rating (CV*OV)
			What is the expected harm?	(CV) Value (1,5,10,20)	Existing Control Measure In Place	(OV) Value (0,1,2,3,4)	
Training and Documentation							
Personnel are appropriately trained (hazard communication, waste handling, process and chemical specific hazards and risks and mitigation, emergency procedures)				No=1 Minor=5 Mod=10 High=20		N/A=0 Rare=1 Poss=2 Likely=3 Certain=4	0
Personnel are aware of all activities in the lab and associated hazards and risks				No=1 Minor=5 Mod=10 High=20		N/A=0 Rare=1 Poss=2 Likely=3 Certain=4	0
Average experience of lab personnel				No=1 Minor=5 Mod=10 High=20		N/A=0 Rare=1 Poss=2 Likely=3 Certain=4	0
SDSs and other hazard documentation are available as appropriate				No=1 Minor=5 Mod=10 High=20		N/A=0 Rare=1 Poss=2 Likely=3 Certain=4	0
Hazard communication program is in place				No=1 Minor=5 Mod=10 High=20		N/A=0 Rare=1 Poss=2 Likely=3 Certain=4	0

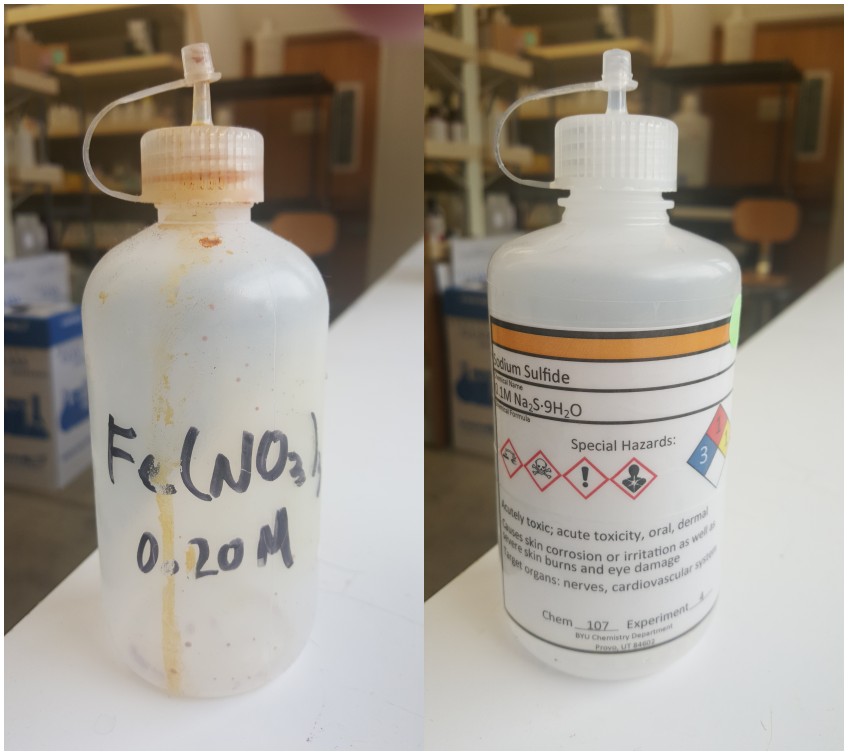
Table F-3: Laboratory Process Risk Assessment Matrix

Laboratory Process and Procedure Overview
Laboratory Director / Principal Investigator:
Location:
Process Title:
Description:

Hazard and Exposure Category	How could you be exposed to this hazard?	Given the exposure, what is negative outcome?	Severity of Consequences		Probability of Occurrence		Risk Rating (CV*OV)
			What is the expected harm?	(CV) Value (1,3,7,10)	Existing Control Measure In Place	(OV) Value (0,1,2,3,4)	
Training and Documentation							
Specialized training requirements for material hazards				No=1 Minor=5 Mod=10 High=20		N/A=0 Rare=1 Poss=2 Likely=3 Certain=4	0
Specialized training requirements for equipment / process hazards				No=1 Minor=5 Mod=10 High=20		N/A=0 Rare=1 Poss=2 Likely=3 Certain=4	0
Spill and Emergency Planning							
Means of Egress (Emergency)				No=1 Minor=5 Mod=10 High=20		N/A=0 Rare=1 Poss=2 Likely=3 Certain=4	0
Unattended Operations				No=1 Minor=5 Mod=10 High=20		N/A=0 Rare=1 Poss=2 Likely=3 Certain=4	0

Stockroom Procedures

- Trained and informed employees on emergency response
- Inspect emergency equipment
- Spill kits in each lab room
- SDS Database
- GHS compliant labeling
- Opening and closing procedures



Student Training

- Added Lab Safety Information as a chapter to the lab manual
- Lab Safety Tour on Day 1
- Require a 90% or higher on a safety quiz prior to participation in the first experiment
  - General lab conduct
  - GHS pictograms with explanations and precautions
  - How to read an SDS
  - HAZCOM program link
  - How to protect yourself—engineering controls and PPE
  - How to respond to accidents

Student Ongoing Education

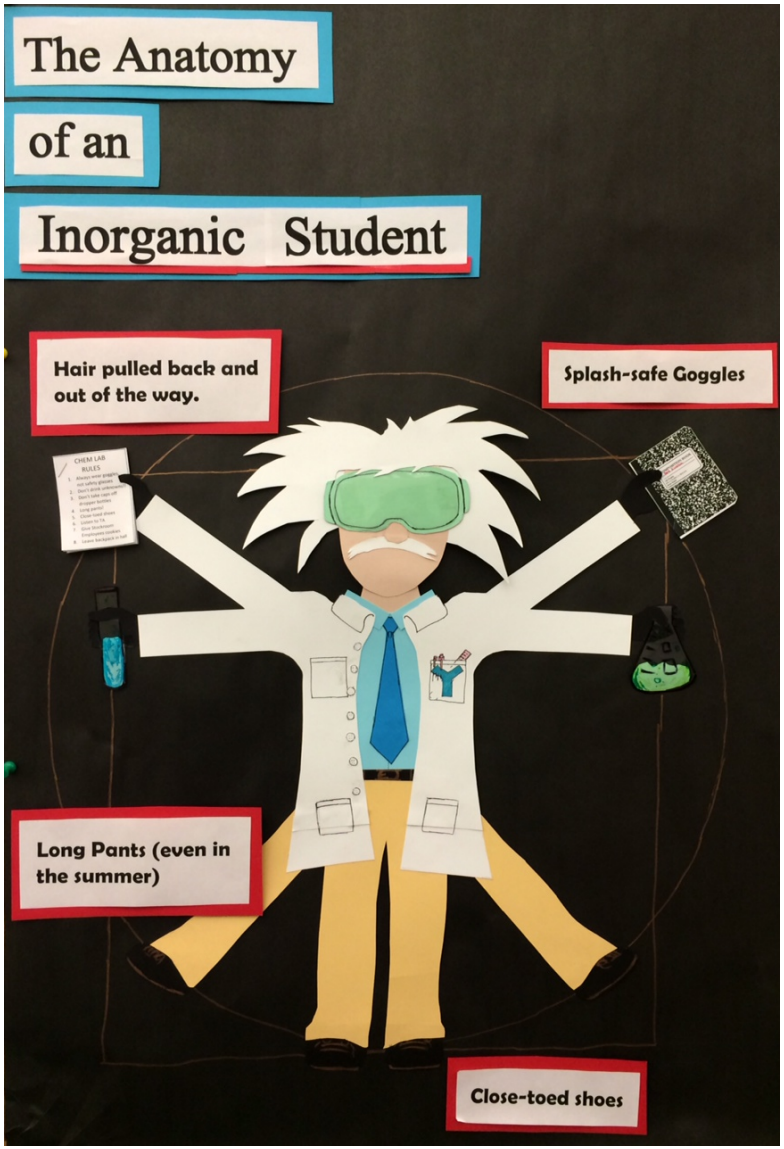
- Safety information for each lab embedded in the background and procedure
- Precautions and procedures reviewed by instructor in pre-lab lecture
- Key ideas reviewed again by TA in the lab

Example Safety Considerations

- Wear long pants, closed-toed shoes, lab coats, goggles, and gloves throughout the experiment.
- Tetramethylammonium hydroxide is *corrosive* and can cause severe burns to skin and eyes. It is also *acutely toxic* and can be fatal if swallowed or in contact with skin. Take extreme caution when using this chemical and be sure to wash hands thoroughly after completing the experiment and before leaving the lab.
- Hydrochloric acid, iron(II) chloride, and iron(III) chloride are *corrosive* and can cause severe burns to skin and eyes, and are *acutely toxic by ingestion.*
- Ammonia is mildly *corrosive* and is *acutely toxic* when inhaled. This solution must be used under the down draft on your lab bench.
- The ferrofluid that you will make in the lab today will stain virtually all fabrics.

PPE Requirements

- Only goggles were required previously
- We added lab coats and gloves
- Concern about cost
- Students buy lab coats, we provide gloves



What are the barriers?

- "It's unnecessary"
  - Liability
  - Duty of Care
  - Ethical Responsibility
- "It's too expensive"
  - Split the cost
  - Negotiate with vendors
  - Benefit outweighs the cost

Thank you!

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Questions?