Who Am I?

• I’ve been a high school chemistry teacher since 2005
• I spent a brief period as adjunct instructor at local community college
• My master’s work focused on how chemistry is taught and working on ways to supplement lab instruction with handheld computers
• During my doctoral work at WVU, I assisted with research for a paper on chemical safety in the high school laboratory that appeared in Journal of Chemical Health and Safety
• I am currently serving on the Task Force for Education Safety Guidelines at ACS
Tonight’s Agenda

1. About Me
2. Chemical Safety in Practice
3. Techniques for Teaching Chemical Safety
4. Resources
5. Q&A
Keeping it safe: Chemical safety in the high school laboratory (2010)

• A survey was sent to a sample of WV high school chemistry teachers in order to
  – “explore the current state of laboratory safety at the high school level”
  – “explore the necessity for laboratory safety training”
  – “garner feedback from in-service teachers on current laboratory safety issues and concerns”
Keeping it safe: Chemical safety in the high school laboratory

• Findings:
  – Teachers reported
    • Too many students per lab
    • Teachers don’t have the power to limit class sizes (in many cases)
    • No eyewash stations or safety showers (or that they were not in working, inspected order)
    • Chemical spill kits are not available or working
    • Laboratory ventilation system is not separate from the classroom ventilation system
**Findings:**

- Teachers reported
  - A common concern was “the safety actions of younger chemistry teachers and other science teachers within their schools”
  - Chemical storage was adequate, incompatible chemicals were stored separately, and student access to chemical was limited
- New science personnel indicted a general lack of safety training
• Findings:
  – Respondents would like an easy-access guide to safe handling and disposal
  – Safety training while in college was inadequate
  – Many teachers are working with minimal safety training and were not comfortable in delivering a quality lab experience to their students
I hesitate to share this story...

- Potassium nitrate + sucrose →
That’s why teaching lab safety is important!!

• It’s worth some class time for many reasons
  – We want to keep our students (and ourselves!) safe
  – We want to prepare our students for safety in future courses/jobs
  – We teach different types of students with different needs
    • The same rules/concepts may need to be presented different ways in order to “stick”
Where do we begin?

- Lab equipment is generally new and uncharted territory for beginning chemistry students.
- It’s tempting to assume you can show them different types of equipment and glassware as you go, but that usually doesn’t end well!
1. **PowerPoint filled with pictures from the lab to introduce commonly used items**
   - This is a good project for students after the AP exam!
   - After presenting these objects and explaining why we use them, you can quiz them
     • The last slide could be a word bank, then you have a tray of various lab equipment that they have to identify

2. **Scavenger Hunt**
   - I like to make two
     • Safety equipment/features
     • Lab equipment/glassware
   - Put students in lab groups at their tables and make it a race!
   - At the end, as you call out the names and explain the purpose of the items, have students hold up the item
Introducing safety rules

• No one wants to hear a list of rules, and more importantly, no one remembers a list of rules!
• However, rules must be carefully and COMPLETELY covered
• None of us have time for elaborate games and activities
Matching game

• Print and cut out the following safety rules
  – You may not need all of these rules (especially the one about biological agents), or may want to supplement with further information
  – Put students in small groups or in their lab groups; discuss each rule with students

• Print and cut out the following safety scenarios
  – Have one student be the recorder, and ask each group to match the safety rules to the scenarios
  – I have the students do the first seven scenarios and save the last for...
Lab safety writing assignment

- Many districts would like to see more writing across all subject areas
- Our school had a push for “Argumentative Writing,” so we decided to have students use the eighth scenario as a starting point for a brief writing assignment
- Using the rules, they had to identify which ones were broken and justify how it was broken
Safety videos

• If you teach AP or have a resource period of some kind, it may be possible to make your own safety video
• Identify with the students which rules MUST be covered, but leave creative direction to them (within reason)
• The students enjoy seeing their peers in these videos!
For developing readers...

- A teacher at my school drew a picture of a girl in a lab setting and asked kids to circle what they saw wrong and then they talked about what rules were broken.

- Role-playing and re-enactments are excellent ways to model appropriate lab safety behaviors:
  - Show how to enter a lab, work with chemicals, dispose of chemicals, what to do in an emergency, etc.
  - Make slips of paper directing students and ask classmates to identify what they see that is wrong.
• MSDS sheets are an excellent resource
  – Honors/AP required to provide and summarize for every chemical in a particular lab
  – Provide copies to the class and read through, but black out chemical name...this is fun to do for common chemicals, such as salt or rubbing alcohol
  – Help students make tables to organize chemical information

<table>
<thead>
<tr>
<th>Chemical Name and Formula</th>
<th>Properties and Reactivity</th>
<th>Safety Precautions</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
In conclusion...

• Lab safety is important for all of us, teachers and students

• Take the time to assess your students’ safety concepts before setting them free
  – After teaching safety rules
  – During pre-lab briefing
  – During post-lab discussions

• We can pool and share resources
Resources

- **Flinn Scientific**
  - Our county uses these videos as training; also instruction on new SDS sheets
- **ACS “Starting with Safety” video**
  - [http://vimeo.com/6170550](http://vimeo.com/6170550)
  - From 1991, but contains information pertinent to today’s students!
- **West Virginia Science Teachers**
  - [http://wvhschemteachers.wvu.edu/resource](http://wvhschemteachers.wvu.edu/resource)
  - Interesting reading on mishaps in the lab
- **ACS Chemical Safety**
  - Includes a safety quiz, safety blog, guidelines, and more
- **AACT**
  - [http://www.teachchemistry.org/content/aact/en/classroom-resources/external-resources/safety.html](http://www.teachchemistry.org/content/aact/en/classroom-resources/external-resources/safety.html)
- **NSTA**
  - [http://www.nsta.org/safety/](http://www.nsta.org/safety/)
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http://ow.ly/DLdbd

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