Goals for GHS Training

• Describe the importance of chemical labeling for community safety
• Provide an overview of the GHS system
• Show specific examples of what its terms mean
• Describe next steps for Cornell labs
What are Chemicals?

Chemicals are the most common laboratory hazards. From a regulatory point of view, “chemicals” are materials that retain their physical and health properties when they change their shape.
The Importance of Communication
The U.N.’s Globally Harmonized System

Hazard Classification Criteria
- Definitions for “toxic”, “flammable”, “corrosive” and other important chemical words
- An English label on a Chinese chemical said: “Hurts skin hardly”

Hazard Communication
- Labels
- Safety Data Sheets
GHS Labeling Overview

- Chemical Name
- 9 pictograms in 3 groups
  - Physical Hazards
  - Health Hazards
  - Environmental Hazards
- 2 signal words: Danger and Warning
The GHS system also lays out a specific format for chemical labels and **Safety Data Sheets**

<table>
<thead>
<tr>
<th>GHS Pictograms and Hazard Classes</th>
</tr>
</thead>
<tbody>
<tr>
<td>![Pictogram]</td>
</tr>
<tr>
<td>Oxidizers</td>
</tr>
<tr>
<td>- Oxidizers</td>
</tr>
<tr>
<td>- Self Reactives</td>
</tr>
<tr>
<td>- Pyrophorics</td>
</tr>
<tr>
<td>- Self-Heating</td>
</tr>
<tr>
<td>- Emits Flammable Gas</td>
</tr>
<tr>
<td>- Organic Peroxides</td>
</tr>
<tr>
<td>Acute toxicity (severe)</td>
</tr>
<tr>
<td>- Acute toxicity (severe)</td>
</tr>
<tr>
<td>Carcinogen</td>
</tr>
<tr>
<td>- Carcinogen</td>
</tr>
<tr>
<td>- Respiratory Sensitizer</td>
</tr>
<tr>
<td>- Reproductive Toxicity</td>
</tr>
<tr>
<td>- Target Organ Toxicity</td>
</tr>
<tr>
<td>- Mutagenicity</td>
</tr>
<tr>
<td>- Aspiration Toxicity</td>
</tr>
</tbody>
</table>
The GHS established specific international definitions of the hazards. One example is flammability.

### An Example of Signal Words:
**GHS Flammable Liquid Classification Criteria**

<table>
<thead>
<tr>
<th>Classification Criteria</th>
<th>Category 1</th>
<th>Category 2</th>
<th>Category 3</th>
<th>Category 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flash point less than 23°C (73°F) and boiling point less than 35°C (95°F)</td>
<td>Flash point less than 23 and boiling point greater than 35</td>
<td>Flashpoint between 23°C (73°F) and 60°C (140°F)</td>
<td>Flash point between 60°C (140°F) and 93°C (200°F) degrees</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Flame</th>
<th>Flame</th>
<th>Flame</th>
<th>No symbol</th>
</tr>
</thead>
<tbody>
<tr>
<td>Signal word</td>
<td>Danger</td>
<td>Danger</td>
<td>Warning</td>
<td>Warning</td>
</tr>
<tr>
<td>Hazard statement</td>
<td>Extremely flammable liquid and vapor</td>
<td>Highly flammable liquid and vapor</td>
<td>Flammable liquid and vapor</td>
<td>Combustible liquid</td>
</tr>
</tbody>
</table>
A boiling liquid expanding vapor explosion is an explosion caused by the rupture of a vessel containing a pressurized liquid above its boiling point.
The Importance of Chem Storage

- Flammable liquids need to be protected from the possibility of a fire in the lab
- And remember that cooling flammable chemicals requires a special refrigerator.

This refrigerator was used to store a flammable liquid; the cooling compartment filled with vapors from the loosely capped bottle. The fumes exploded when the refrigerator switch caused a spark.
What are Oxidizers?

Oxidizers are chemicals that can react with solvents to cause a fire. Examples of oxidizers are nitric acid and dichromates.
Oxidizers in Action

★ Hazmat situation at high school
ROCKY HILL, Conn. (WTHN) -- Police, fire, and DEEP personnel responded to a hazmat situation at Rocky Hill High School Tuesday morning.

Department of Energy & Environmental Protection (DEEP) officials said there was a minor acid spill that occurred when an acid cabinet was being moved. Nitric acid spilled from a beaker.

Officials said janitorial staff initially attempted to clean the spill, until the acid reacted with the water in the mop.

The building was evacuated as a result of the ... [more]
us_CT laboratory release response nitric_acid
6 days ago by dchas edit delete

★ Corrosive chemical overheats, spills from Dallas truck
DALLAS — Dallas Fire-Rescue dispatched a hazardous materials team to check on a truck that was leaking a fluid and emitting a brownish-orange smoke early Tuesday evening.

The situation was reported shortly after 5:30 at the Penske Truck Rental facility in the 10800 block of Goodnight Lane, just west of Interstate 35E in Northwest Dallas.

The ChemStation truck also bore markings indicating it has a carload of corrosive liquid. According to its website, ChemStation specializes in "... [more]
us_TX transportation release response cleaners nitric_acid
4 weeks ago by dchas edit delete

★ UK Alert issued over chemical leak
LEXINGTON, Ky. (WKYT) - The University of Kentucky issued an alert for the Veterans Drive area Saturday morning.

The Lexington Fire department and several crews including Hazmat were on the scene at 1095 Veterans drive for a chemical spill.

The Lexington Fire department tells WKYT that the UK Police Department placed a call shortly before 11am involving a spill in one of their research labs.

When fire crews arrived they found two gallons of diluted nitric acid had been spilled. They ... [more]
us_KY education release response nitric_acid
5 weeks ago by dchas edit delete
A Closer Look at the Irritant Classification
The Impact of Concentration on Hazard

- **At home:**
  Chloraseptic: Phenol 0.5%

- **On campus:**
  Preservative solutions in gross anatomy labs (around 2%)

- **At home:** Paint strippers – 20% phenol
- **In the lab:** phenol – chloroform solutions are 50% phenol
A laboratory technician had been exposed to vapors containing phenol and had often spilled phenol on his trousers. The spills resulted in skin irritation; symptoms related to these exposures included loss of appetite, darkened urine, and muscle pain in the legs and arms.

He stayed away from his job for several months during which time his health gradually improved. He returned to the lab and in a period of 45 minutes had an immediate recurrence of muscle pain and subsequent darkened urine.
Specific Toxic Organ Toxicity

The **Specific Target Organ Toxicity** is a reminder that certain chemicals can have effects on specific organs. Consult the SDS on which organ the chemicals you use can affect in order to understand the symptoms associated with such exposures.
Beyond the Label

• The Safety Data Sheet to identify any unusual properties (for example, forming peroxides in storage).

• Safety Data Sheets also provide specific health information such as signs and symptoms associated with exposure to the chemical and any government standards that apply to those chemicals.

• Remember that this information applies to that specific chemical and not to reactions and chemicals that may form as a chemical process proceeds.
GHS in Real Life

- GHS is designed for chemical users. It does not replace other regulatory requirements for other settings.

- For example, Department of Transportation labels for shipping containers are not changing.
What You Need to Do Next

• OSHA’s goal for 2013 is the workers understand GHS labels in their workplaces

• Cornell EHS are installing a chemical inventory platform which will provide easy access to GHS information and labels for chemicals. It be available in 2014.
Labeling Experimental Samples

In house containers must be labeled with:

• Chemical identification, including an approximate concentration of the chemical
• Hazards associated with the chemicals
• The name of the person to contact for information about the materials
• Date the material was made
Labeling Laboratories

- **HASP: the Hazard Assessment and Signage Program**
- Identifies a variety of lab hazards and the associated risk level in each lab room
- Posted at room entry
- Includes room contact information and warnings for emergency response information
What Happens in Laboratories?

• Google reported 148 laboratory responses in the US in 2011 (3 per week):
  ▪ 45% were in research labs,
    25% in high school labs,
    20% in industry and
    10% in teaching labs
  ▪ 45% were explosions and fires
  ▪ 36% of the time someone was hurt,
    1 person died immediately
Questions?

If you have questions, contact us at AskEHS@cornell.edu