Chemical Safety and Material Safety Data Sheets
Lab worksheet

Discussion:
Chemicals and other hazardous materials are an integral component of the laboratory environment. Lab workers are faced with significant risks from these materials, particularly when they are handled improperly. For this reason it is vital that workers and students follow established guidelines and procedures for safe handling and use of hazardous materials to minimize the risk of exposure.

In January 1991, The Occupational Health and Safety Administration (OSHA) released a standard governing occupational exposure to hazardous materials in biology and chemistry laboratories. This regulation requires companies to implement a training program that identifies potential hazards in the lab, provides instruction on the precautions to prevent accidents and injuries from occurring, and procedures to minimize damages.

OSHA defines a hazardous chemical as any liquid, solid, or gas that could present a physical or health hazard to an employee. Examples include cleaning agents, degreasers, flammables, greases, paints, pesticides, aerosols, and compressed gases.

1) Name at least two occupations outside the sciences that may be exposed to hazardous chemicals in the workplace. Explain your answer.

Many people do not realize that many of the same products they use at home are considered by OSHA to be hazardous chemicals. Exemptions are made for consumer products if they qualify for two criteria. 1) The product must be used in the same quantity and concentration as it would be at home. 2) It must not be used with greater frequency or for longer duration than it would be at home. For example, the average American does not buy a 5-gallon bucket of degreaser, nor does the average American clean their bathroom twice a day.

2) If you shop for cleaning supplies at a store catering to businesses such as Smart and Final and find a cleaner that says it is "industrial strength", would you take any special precautions and read the directions more carefully or would you use it the same as any other cleanser?” Explain.
Steps Necessary for Compliance with OSHA:
1) Develop a written Hazard Communication plan.
2) Make an up to date and complete hazardous chemical inventory
3) Label all hazardous chemicals properly
4) Maintain accessible Material Safety Data Sheets (MSDS) for every chemical that is covered by the OSHA standard
5) Properly train employees

The key to compliance is proactivity!

This lab will focus on the MSDS.

What is a MSDS?
A Material Data Safety Sheet (MSDS) is designed to provide both workers and emergency personnel with the proper procedures for handling or working with that substance. MSDS will include information such as physical data (melting point, boiling point, flash point, etc.) toxicity, health effects, first aid, reactivity, storage, disposal, protective equipment, and spill/leak procedures. These are of particular use if a spill or other accident occurs. Notice that while the format of MSDS tends to vary, they usually convey the same basic kinds of information.

Where are the MSDS?
The MSDS for the chemicals used in chemistry labs are found in a file cabinet in the chemistry stockroom. Other MSDS can be found in the Maintenance and Operations building down by the baseball fields. Each department such as chemistry, biology, photography, ceramics, are required to maintain MSDS sheets readily available by employees.

3. What will an OSHA officer look for during an inspection of a worksite?
How to Read a Material Safety Data Sheet (MSDS):
At first glance most material safety data sheets are confusing. However, by knowing what is in each section you can find the information that you are looking for quickly. Mainly a Safety Director will use some sections such as Hazardous Ingredients, Transportation Information and Regulatory Information
Each MSDS is broken up into approximately eight sections. Those sections include the following:

**PRODUCT IDENTIFICATION:** Gives the name of the chemical which is the same name as the name on the corresponding label as well as other synonyms or trade names, the chemical formula, and the Chemistry Abstract Service (CAS) registry number.

**HAZARDOUS INGREDIENTS:** Lists names of chemicals that make up this particular hazardous material.

**PHYSICAL CHARACTERISTICS:** Lists information such as odor and appearance.

**FIRE AND EXPLOSION HAZARDS:** Gives the flash points (which determines if it is a flammable, combustible, or neither) and fire fighting procedures.

**REACTIVITY:** Lists types of chemicals that shouldn't be stored with this particular chemical.

**HEALTH HAZARDS:** Look in this section for symptoms of overexposure and first aid procedures.

**PRECAUTIONS FOR SAFE HANDLING AND USE:** This section lists the personal protective equipment that should be used when handling or using this chemical.

**SPILL OR LEAK PROCEDURE:** What should be done to control a spill or leak.

**SPECIAL PRECAUTIONS:** Special handling or use instructions are documented in this section.

**TRANSPORTATION DATA:** Used for DOT classifications.

**REGULATORY INFORMATION:** Does the SARA Title III cover this chemical or RCRA Hazardous Waste Acts.
NFPA ratings:
These ratings are the blue, red, yellow, and white diamonds you see on many of the labels of hazardous chemicals.

**HEALTH HAZARD--BLUE:**
4 - Deadly
3 - Extreme Danger
2 - Hazardous
1 - Slightly Hazardous
0 - Normal Material

**FIRE HAZARD (flash points)--RED:**
4 - Below 73°F
3 - Below 100°F
2 - Above 100°F not Exceeding 200°F
1 - Above 200°F
0 - Will Not Burn

**REACTIVITY--YELLOW:**
4 - May Detonate
3 - Shock and Heat May Detonate
2 - Violent Chemical Change
1 - Unstable if Heated
0 - Stable

**SPECIFIC HAZARD**
OX - Oxidizer
ACID - Acid
ALK - Alkali (Base)
COR - Corrosive
N - Use NO Water
放射 - Radioactive
Using the MSDS for SODIUM HYDROXIDE answer the following:

4. List other names that are synonyms of sodium hydroxide and its formula.

5. What is its boiling point?

6. What is done in case of contact with eyes?

7. What procedure should be done if the substance is swallowed?

8. What are the health effects that may occur when swallowing this material?

9. What are the NFPA Ratings for Health? Fire? Reactivity? and Specific Hazard?

10. List three chemicals that should not be stored with NaOH.

11. What is the recommendation concerning contact lenses and eyes when working with this chemical?
Using the MSDS for ETHANOL answer the following:

12. What is the name and formula of your chosen Chemical Substance include three synonyms unless fewer are listed.

13. Give three physical characteristics of your substance.

14. What are the NFPA ratings for your material?

15. What type of personal protective clothing or equipment should one wear when working with this chemical?

16. List three types of chemicals (unless fewer are listed) that should not be stored with this particular chemical.

17. What are the symptoms of overexposure and what health hazards are associated with this chemical?

18. What first aid procedures should be followed if the substance affects a person. (Choose one: inhalation, eye contact, skin contact, and ingestion)

19. If there are any special handlings or use instructions write them here.

20. What should be done to control a leak or spill?
<table>
<thead>
<tr>
<th>Name of Compound</th>
<th>Common Name</th>
<th>Chemical Formula</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Reagent Bottle</th>
<th>MSDS Sheet</th>
<th>Merck Index</th>
<th>CRC Handbook</th>
</tr>
</thead>
<tbody>
<tr>
<td>Formula Weight</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>State of matter</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Melting point</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Boiling point</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Density</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>% Composition</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>if not 100% pure</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Soluble solvents</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manufacturer</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chemical Properties</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Toxicity</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Summarize the differences between the four reference materials, be specific.