

# LESSON 3

## Preventing Workplace Injuries and Illnesses



### Description:

Students are introduced to the ABC's of preventing workplace injuries or illnesses. They then brainstorm ways to apply the ABC prevention strategies to example hazards. They also discuss the reasons workers choose to take risks in the workplace, even when they know hazards are present.

### Learner Outcomes:

Students will be able to do the following:

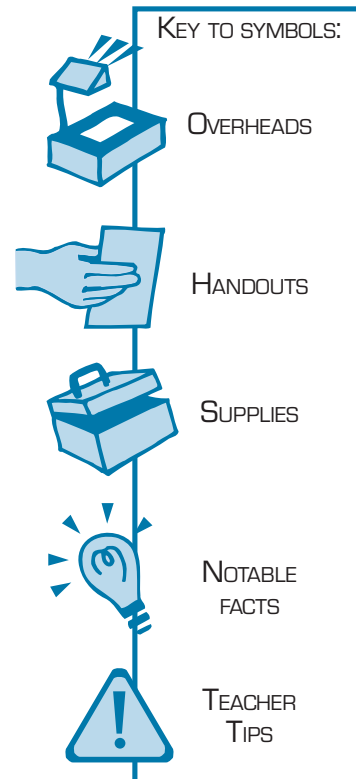
1. Describe three strategies used to prevent workplace injuries or illnesses.
2. List examples within each prevention strategy.
3. Identify the pros and cons of taking risks in the workplace.
4. Perceive that workplace injuries or illnesses can be prevented.
5. Identify the attitudes that help a person remain safe in the workplace.

### Key Concepts:

1. Most workplace injuries and illnesses can be avoided by taking the right preventative steps.
2. Three main ways to prevent workplace injuries or illnesses are represented by the letters ABC:
  - **A**dministration
  - **B**uilding barriers
  - **C**ommunication
3. The **best** way to prevent workplace injuries is to design engineering controls (part of **Building barriers**), such as shields, guards, etc. This strategy is the best prevention strategy because it does not depend on people making safe choices every time. You change the environment, which is easier to control and more reliable than people.

### Fact:

*Of those 14- to 16- year olds who were injured in the workplace, more than half reported they had not received any training on how to prevent the injury. A supervisor was present at the time of the injury in only about 20% of the cases.<sup>1</sup>*



## Materials

### Needed:

- Overhead 1.1 (from each class period, Lesson 1 and 2)
- Overheads 3.1-3.5
- “ABC Prevention Strategies” fact sheet
- “Hazard Prevention Worksheet”
- Chalkboard or easel
- “Material Safety Data Sheet”
- “Material Safety Data Sheet Questions and Key”
- Bottle of ammonia cleaner

## Preparation Needed:

1. Review the “ABC Prevention Strategies” fact sheet, so you are familiar with the three main prevention strategies and the examples of each. You may want to make class sets of these fact sheets rather than individual sets.
2. Review the “Workplace Safety Attitude Survey” (distributed to students at the end of Lesson 2), so you are familiar with these attitude statements.
3. Think through the costs and benefits of different safety measures.
4. Make copies of the “Material Safety Data Sheet” (MSDS). You may want to make class copies or put this form on an overhead. The ammonia cleaner is a concrete example of a chemical with an MSDS.

## Directions:

### The ABC’s of Injury Prevention (25 minutes)

1. Give each student a copy of the “ABC Prevention Strategies” fact sheet.

Explain:

This fact sheet outlines three basic ways to prevent injuries or illnesses in the workplace. These three ways are represented by the letters A, B, and C.

Allow students about five minutes to read through the fact sheet.

2. Show Overhead 3.1. Review each strategy using Overheads 3.2, 3.3, and 3.4.

3. Explain:

Since it is easier and more reliable to change the workplace than the worker, the most important prevention strategies will be those that involve engineering controls (part of **Building barriers**). Employers should apply these strategies first.

For example, if workers often get burns when making french fries in a hot oil fryer, you could teach workers a different way to handle the equipment. To prevent burns, however, people would have to apply this training every time they worked with the fryer.



“ABC PREVENTION STRATEGIES” HANDOUT



OVERHEADS 3.1-3.4

It would be better to build a barrier, like a shield that prevents oil from splattering on workers. The shield would always be in place, so you wouldn't have to depend on workers doing something correctly to keep themselves safe. The shield does the work. The workers don't have to. That method is the **safest** way to design a workplace.

Distribute the "Hazard Prevention Worksheet" to the students. Allow students time to read the handout. Select several of the hazards listed to review with the students. Allow the opportunity for students to practice the ABC's of prevention by talking through the classification process.



- In order to further practice the ABC's of prevention, draw three columns on the chalkboard or easel. Label them "Administration," "Building Barriers," and "Communication." Say:

Let's work through some hazard situations to show how we may apply the three ways of preventing injuries or illnesses.

- Show Overhead 1.1, which partially was filled out by this class during Lesson 1. Say:

Let's take one of the injuries or illnesses we identified during our first session. First, what are the hazards that caused each of these injuries or illnesses?



Write students' answers in the right-hand column on the overhead. Select one of the hazards from the right-hand column. Ask:

Using the ABC's of prevention, how could we prevent injuries or illnesses from this hazard? Since building barriers is the best prevention, let's begin with "Building barriers." What kind of engineering controls could be built to protect workers?

Write barrier strategies for this hazard on the chalkboard. A variety of hazards are used as examples below. The following are some possible answers:

### **Building barriers:**

#### **Engineering Controls**

- Build a shield on application equipment to reduce exposure to fertilizer.
- Purchase equipment with guards around moving parts.
- Install seat belts and rollover protection equipment (ROPS) on tractors.
- Install nonslip flooring.
- Store chemicals in a locked cabinet.
- Install vents to get rid of smoke.

### **Personal Protective Equipment**

- Use protective gear such as gloves, respirators, and safety clothing.
- Wear gloves when using cleaning products.

7. Fill in the “Administration” and the “Communication” examples as well. The following are some possible answers for each column:

#### **Administration:**

Administration involves the rules and procedures put in place to protect workers. Most administrative activities will be done by your employer or supervisor.

- Set up procedures stating where and how cleaning products should be stored.
- Require that everyone working in a noisy area wear earplugs.
- Limit the amount of time each person spends typing.
- Allow no food in the work area.
- Set a time limit for how long workers must wait before going into a field after it has been sprayed with pesticides.
- Set an age limit for working with an auger.

#### **Communication:**

- Train workers to apply pesticides safely.
- Teach people about the potential health problems caused by contact with human blood.
- Train people to store and dispose of cleaning products safely.
- Post safety reminders on bulletin boards and in hallways and areas frequented by the workers.

8. Go through a number of hazards discussed by students in the first lesson using this ABC process.

9. Explain:

Last session we identified hazards in a workplace. Once a hazard has been identified, we can take steps to prevent it from injuring someone by using the ABC's.

Some preventative actions, such as setting up rules and procedures, are your employer's responsibility. But if you see a hazard in the workplace, you can bring the hazard to the attention of your employer.

Most employers encourage their workers to identify workplace hazards. Some even offer bonuses for employees who come up with good safety ideas. Be aware that some employers try to save money or time by allowing their employees to work in unsafe situations. All workers have the right to a safe workplace.

# Understanding A Material Safety Data Sheet

## (10 minutes)

1. Hold up a bottle of ammonia. Ask:  
How many of you use ammonia or some type of cleaner at work? What are the potential hazards of using a product such as this? How can you find out?
2. Explain:  
Your employer should always tell you the hazards in your workplace. If you are working with chemicals such as ammonia, they should also provide you with a form called a Material Safety Data Sheet.

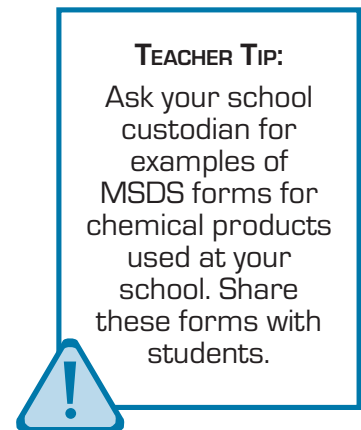
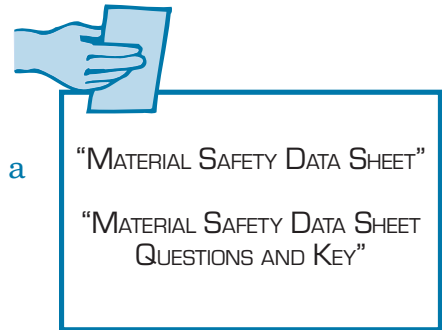
Give each student a “Material Safety Data Sheet” or display the overhead.

An MSDS form, as they are called, lists all the hazards related to using a particular chemical. This MSDS form is for an ammonia cleaner. This form tells you what the chemical is made of, what the health effects from being exposed to this chemical could be, and how to store and dispose of the chemical.

You can see, just by looking at this form, that it’s not easy to read. But if you read carefully, it tells you what the health concerns are with using ammonia.

3. Read questions from the “Material Safety Data Sheet Questions and Key” out loud to the group. Then have students locate the answers on the MSDS form. Use the key to check students’ answers. Ask as many questions as time or interest permits.
4. Explain:  
If you are ever in a work situation in which you are using chemicals, be sure to ask for an MSDS form and have your employer explain it to you.

Working around hazardous chemicals is very serious. You may not feel the effects right away. Health problems may present themselves later in life. Some of the immediate effects of working with hazardous chemicals are fatigue, headaches, and sleep disturbances. Some effects that show up later may be cancers, memory problems, birth defects, and sterility.



5. Explain:

Information on an MSDS may be complicated. If you have any questions, be sure to ask your employer. Your employer is required by law to share this information with you.

## Analyzing Workplace Attitudes (15 minutes)

Note: The purpose of this discussion is not to persuade students to your point of view but to help them discover for themselves what their own level of acceptable risk in the workplace is.

Even if students come to a conclusion that you do not agree with, it is important to give students that freedom in this discussion. Do not take an argumentative stance. Your role is to facilitate discussion.

1. Ask:

Even if an employer does everything they can to prevent work injuries and illnesses, people still become injured while working. Why do you think that is?

*(Possible answers: A worker may not recognize that something is a hazard; even if workers recognize a hazard, they may still continue working around that hazard without using the prevention strategies.)*

2. Ask:

Why might a person work around hazards without setting up prevention measures?

Look over the workplace safety attitude survey from Lesson 2 you filled out before class. Discuss some of the attitude statements and how those attitudes may affect health.

*(Possible answers: Prevention is uncomfortable; busyness and rushing; concern over what the boss or other workers may think; underestimating the danger; not knowing how to fix the danger; habit.)*

3. Ask:

People sometimes take risks with things they know are hazards. Can you name some things you or other people do, even though they may be risky?

*(Possible answers: Drive fast; smoke; boat without wearing a life jacket; ride a motorcycle without a helmet; drink and drive.)*

4. Ask:

Can you name some things you or other people would not do, because they are too risky?

*(Possible answers: Jumping out of a plane without a parachute; racing across railroad tracks right in front of a train.)*

How do you decide how much of a risk you are willing to take? How do you know where to draw the line?

5. Explain:

Each of us has to weigh the costs and benefits of being safe or taking a risk. We have to decide what balance between these two things is acceptable to us.

Let's take the situation of whether to install a guard on a piece of equipment. A guard is a device that prevents you (usually your hand) from getting caught in moving equipment. What are the benefits **for you** of taking this safety measure?

6. Show Overhead 3.5. Write "machine guard" in the "Safety Measures" column. Write the benefits that students describe in the second column.



*(Possible answers: Won't lose an arm or finger; won't lose your job due to injury; you can work fast without worrying; don't feel as stressed.)*

7. Ask:

What are the costs **to you** in having the machine guard in place? Write these in the third column.

*(Possible answers: It may be inconvenient; it may slow you down; it may take more effort to work around it; the chances of you getting hurt may seem so small, it seems like a waste of time.)*

Looking at these benefits and costs, how would you weigh the two? Would you leave the machine guard on or take it off? Would you be willing to risk losing your arm, for example, if you thought you could work faster?

*(Again, allow students to give an honest, serious answer. Do not try to argue with them.)*

8. Work through several examples of safety measures. Discuss the benefits and costs of each measure. Other possible examples could include not wearing hearing protection or not using gloves while using cleaning products.

*(Possible answers: Benefits of hearing protection: don't lose hearing; protect ears from having reduced hearing. Costs of hearing protection: can't hear other people; can't listen for other hazards or machinery that sounds wrong; they are hot; they hurt your ears.)*

*(Possible answers: Benefits of wearing gloves with cleaning products: protect skin from chemicals; hands don't dry out, get chapped, or dirty; can work with a chemical longer; can clean harder. Costs of wearing gloves with cleaning products: hard to grab objects with them; hot; work may take longer; other people may think you are overly concerned.)*







# The ABC's of Injury and Illness Prevention

**A**Administration

**B**uilding barriers

**C**ommunication



# B

## uilding barriers

- **Engineering Controls**

Protecting an employee by putting a barrier between a person and the hazard

- Shields
- Guards
- Ventilation
- Removal of the hazard
- Locked cabinets

- **Protective equipment**

- Earplugs
- Masks
- Gloves
- Respirators
- Boots



Safety

Measures

Benefits

Costs

# ABC Prevention Strategies

Once workplace hazards have been identified, strategies can be used to prevent these hazards from causing injuries or illnesses. Three main prevention strategies are listed below. They are easily remembered by thinking of the letters ABC. Most often, the employer will use these strategies to make the workplace safe. Workers can also suggest these strategies to their employers. Once these strategies are in place, workers should use them.

Prevention Strategies	Examples
<p><b>A</b> <b>Administration</b></p> <p>Definition: The rules and procedures put in place by an employer to limit workers' exposures to hazards.</p>	<ul style="list-style-type: none"> <li>• Establishing a rule that requires workers to wear personal protective equipment, such as gloves, goggles, or respirators.</li> <li>• Requiring people to rotate jobs, so a worker is only exposed to a hazard for a short time.</li> <li>• Disciplining workers, if they remove protective guards on machinery.</li> <li>• Setting a rule that workers should not lift more than a certain weight.</li> <li>• Establishing a rule that requires workers to wash their hands after working with hospital patients.</li> </ul>
<p><b>B</b> <b>Building barriers</b></p> <p>Definition: Creating a physical barrier between a hazard and a worker by the following means:</p> <ul style="list-style-type: none"> <li>• Removing the hazard.</li> <li>• Putting space between the worker and the hazard.</li> <li>• Putting a physical object between the hazard and the worker.</li> </ul>	<p><b>Engineering Controls</b> (removing the hazard or changing equipment to eliminate the hazard):</p> <ul style="list-style-type: none"> <li>• Using less toxic cleaners or pesticides (removing the hazard from the workplace).</li> <li>• Installing ventilation to remove toxic gases or smoke.</li> <li>• Using machines that require two hands to start, so both hands are out of the way.</li> <li>• Properly storing hazardous chemicals in a locked cabinet.</li> <li>• Keeping controls a safe distance from the hazard (e.g., x-ray machines).</li> </ul> <p><b>Guards and Shields:</b></p> <ul style="list-style-type: none"> <li>• Putting shields or guards in front of dangerous equipment (e.g., saws or augers).</li> </ul> <p><b>Personal Protective Equipment:</b></p> <ul style="list-style-type: none"> <li>• Wearing personal protective equipment such as hard hats, steel-toed boots, gloves, hearing protection, respirators, goggles, and face shields.</li> </ul>
<p><b>C</b> <b>Communication</b></p> <p>Definition: Training and information provided to workers, so they understand what hazards are found in the workplace and how to avoid them.</p>	<ul style="list-style-type: none"> <li>• Requiring safety training for all workers.</li> <li>• Providing each employee with a written safety manual.</li> <li>• Giving copies of Material Safety Data Sheets to workers. These sheets give hazard information about chemicals that workers may be using.</li> <li>• Notifying an employer when equipment is not functioning properly.</li> <li>• Establishing a safety committee which includes workers.</li> </ul>

# Hazard Prevention Worksheet

The following are examples of ways the ABC's of prevention may be used to prevent injuries or illnesses from different hazards.

<b>Hazard</b>	<b>Administration</b>	<b>Building Barriers</b>	<b>Communication</b>
<b>Heavy Boxes</b>	<ol style="list-style-type: none"> <li>1. Require heavy boxes to be stored on middle shelves.</li> <li>2. Limit the amount of weight a person is allowed to carry.</li> </ol>	<ol style="list-style-type: none"> <li>1. Store boxes close to where they need to be carried.</li> <li>2. Move heavy boxes with a forklift.</li> <li>3. Replace heavy boxes with smaller, lighter boxes.</li> </ol>	<ol style="list-style-type: none"> <li>1. Train workers to carry heavy objects correctly.</li> </ol>
<b>Cash Register</b>	<ol style="list-style-type: none"> <li>1. Require at least two employees to be in the store at all times.</li> </ol>	<ol style="list-style-type: none"> <li>1. Install bulletproof glass around the cash register.</li> <li>2. Store most of the money in a safe, for which only security (and not even the manager) knows the combination.</li> </ol>	<ol style="list-style-type: none"> <li>1. Show workers how to transfer money from the cash register to a safe.</li> <li>2. Teach workers what to do in emergencies.</li> </ol>
<b>Cleaning Products</b>	<ol style="list-style-type: none"> <li>1. Develop cleaning procedures that protect the worker.</li> </ol>	<ol style="list-style-type: none"> <li>1. Use the least toxic cleaning products possible.</li> <li>2. Use protective equipment (e.g., gloves, mask).</li> <li>3. Store cleaning products in a cabinet away from workers.</li> </ol>	<ol style="list-style-type: none"> <li>1. Train employees to use cleaning products correctly.</li> </ol>
<b>Lawn-mower</b>	<ol style="list-style-type: none"> <li>1. Set procedures for using the mower.</li> </ol>	<ol style="list-style-type: none"> <li>1. Use machines that automatically turn off when the handle grip is released.</li> <li>2. Install guards on all rotating equipment, with which employees may come into contact.</li> <li>3. Provide protective equipment (e.g., steel-toed shoes, earplugs, gloves).</li> </ol>	<ol style="list-style-type: none"> <li>1. Train employees to recognize and avoid unsafe conditions associated with operating lawn mowers.</li> </ol>
<b>Indoor Paint</b>	<ol style="list-style-type: none"> <li>1. Rotate work whenever possible, so workers spend less time around toxic fumes.</li> <li>2. Require workers to take breaks.</li> </ol>	<ol style="list-style-type: none"> <li>1. Open windows and doors to allow ventilation.</li> <li>2. Use the least toxic paints possible.</li> <li>3. Provide protective equipment (e.g., respirators).</li> </ol>	<ol style="list-style-type: none"> <li>1. Train workers to work with paints in the safest way possible.</li> </ol>



## Hazard Prevention Worksheet (continued)

Hazard	Administration	Building Barriers	Communication
<b>Outdoor Work</b>	<ol style="list-style-type: none"> <li>1. Provide shaded rest areas.</li> <li>2. Rotate workers to minimize exposure to sun.</li> </ol>	<ol style="list-style-type: none"> <li>1. Wear protective creams to avoid exposure to ultraviolet light.</li> <li>2. Wear broad-brimmed hats that shade head, neck, face, and ears.</li> <li>3. Provide drinking water.</li> </ol>	<ol style="list-style-type: none"> <li>1. Teach workers about the hazards associated with sun exposure.</li> </ol>
<b>Deep Fryer</b>	<ol style="list-style-type: none"> <li>1. Require employees to allow oil to cool before cleaning the fryer.</li> <li>2. Require employee training before use.</li> </ol>	<ol style="list-style-type: none"> <li>1. Set up shields, so workers do not come into contact with splattered hot oil.</li> <li>2. Provide protective equipment for workers.</li> <li>3. Purchase a fryer that is easier to use and clean.</li> </ol>	<ol style="list-style-type: none"> <li>1. Train workers to properly use and clean the fryer.</li> </ol>
<b>Human Infections</b>	<ol style="list-style-type: none"> <li>1. Require workers to wash their hands after contacting contaminated materials.</li> <li>2. Set up procedures for proper disposal of contaminated materials.</li> </ol>	<ol style="list-style-type: none"> <li>1. Use needles that do not require recapping.</li> <li>2. Provide protective equipment (e.g., gloves, masks).</li> <li>3. Provide infectious waste containers.</li> <li>4. Provide clothing different from regular street clothes.</li> <li>5. Provide proper ventilation and disinfection of work areas.</li> </ol>	<ol style="list-style-type: none"> <li>1. Train workers to properly work with infected persons and waste products.</li> </ol>
<b>Power Auger</b>	<ol style="list-style-type: none"> <li>1. Require use of safety guards whenever the machine is operated.</li> <li>2. Set up procedures for proper use of a power auger.</li> </ol>	<ol style="list-style-type: none"> <li>1. Provide protective guards on the power auger.</li> <li>2. Set controls at a distance from the power auger.</li> <li>3. Set up controls so a person has to use both hands to start the auger.</li> </ol>	<ol style="list-style-type: none"> <li>1. Train workers to properly use the auger.</li> </ol>

# Material Safety Data Sheet

24 Hour Emergency Telephone:  
ACME Chemical: 1-800-XXX-XXXX

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## Ammonia Solution, Strong

MSDS Number: A5472 --- Effective Date: 10/01/97

### 1. Product Identification

Synonyms: Ammonia Aqueous; Aqua Ammonia.  
CAS No.: Not applicable to mixtures.  
Molecular Weight: Not applicable to mixtures.  
Chemical Formula: Not applicable to mixtures.  
Product Codes: 9724, 9726

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### 2. Composition/Information on Ingredients

<u>Ingredient</u>	<u>CAS No.</u>	<u>Percent</u>	<u>Hazardous</u>
Ammonia	7664-41-7	27 - 31%	Yes
Water	7732-18-5	69 - 73%	No

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### 3. Hazards Identification

#### Emergency Overview

**POISON! DANGER! CORROSIVE ALKALINE SOLUTION. CAUSES BURNS TO ANY AREA OF CONTACT. HARMFUL IF SWALLOWED, INHALED OR ABSORBED THROUGH SKIN.**

J. T. Baker SAF-T-DATA(tm) Ratings (Provided here for your convenience)

**Health Rating:** 3 - Severe (Poison)  
**Flammability Rating:** 1 - Slight  
**Reactivity Rating:** 2 - Moderate  
**Contact Rating:** 3 - Severe (Corrosive)  
**Lab Protective Equip:** GOGGLES & SHIELD; LAB COAT & APRON; VENT HOOD; PROPER GLOVES  
**Storage Color Code:** White Stripe (Store Separately)

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#### **Potential Health Effects**

Ammonia is very alkaline and reacts corrosively with all body tissues.

#### **Inhalation:**

Corrosive. Extremely destructive to tissues of the mucous membranes and upper respiratory tract. Symptoms may include burning sensation, coughing, wheezing, laryngitis, shortness of breath, headache, nausea and vomiting. Inhalation may be fatal as a result of



## 5. Exposure Controls/Personal Protection

### Airborne Exposure Limits:

For Ammonia:

—OSHA Permissible Exposure Limit (PEL) - 50 ppm (TWA)

—ACGIH Threshold Limit Value (TLV) - 25 ppm (TWA), 35 ppm (STEL).

### Ventilation System:

A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, Industrial Ventilation, A Manual of Recommended Practices, most recent edition, for details.

### Personal Respirators (NIOSH Approved):

If the exposure limit is exceeded, a full facepiece respirator with an ammonia/methylamine cartridge may be worn up to 50 times the exposure limit or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. For emergencies or instances where the exposure levels are not known, use a full-facepiece positive-pressure, air-supplied respirator. **WARNING:** Air purifying respirators do not protect workers in oxygen-deficient atmospheres.

### Skin Protection:

Wear impervious protective clothing, including boots, gloves, lab coat, apron or coveralls, as appropriate, to prevent skin contact.

### Eye Protection:

Use chemical safety goggles and/or a full face shield where splashing is possible. Maintain eye wash fountain and quick-drench facilities in work area.

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# Material Safety Data Sheet Questions and Key



1. What chemical is this MSDS for?

*Strong Ammonia Solution*

**This chemical is common ammonia cleaner found in most grocery stores.**

2. What are the ingredients that make up this chemical?

*Ammonia and water*

3. What “warning words” would you find on the chemical’s label (see Section 3 of the MSDS)?

***POISON! DANGER! CORROSIVE ALKALINE SOLUTION. CAUSES BURNS TO ANY AREA OF CONTACT. HARMFUL IF SWALLOWED, INHALED OR ABSORBED THROUGH SKIN.***

4. Is this chemical . . . (Fill in the words listed in the MSDS Section 3)

Flammable: *slightly*

Corrosive: *severely*

Reactive when mixed with other chemicals: *moderately*

5. What protective equipment should you wear when using this chemical?

*Goggles and shield; lab coat & apron; vent hood; proper gloves*

6. What would happen to you if you ingested this chemical?

*Swallowing could cause severe burns of the mouth, throat, and stomach, leading to death. Ingestion could also cause sore throat, vomiting, and diarrhea.*

7. What would happen if this chemical came into contact with your skin or eyes?

*May produce pain, redness, severe irritation or full thickness burns. May be absorbed through the skin with possible systemic effects. May cause blurred vision, redness, pain, severe tissue burns and eye damage. Eye exposure may result in temporary or permanent blindness.*

8. What would happen to you if you were exposed to this chemical over a long period of time (chronic exposure)?

*Prolonged exposure may cause dermatitis. Prolonged or repeated exposure may also cause eye, liver, kidney, or lung damage.*

9. What are some first aid measures you should take if the chemical is inhaled?

*Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention immediately.*

10. What do you think is the purpose of a MSDS?