

LESSON 3: TYPES OF PHYSICAL AND HEALTH HAZARDS

INTRODUCTION

In the preceding lesson, you saw that The Hazard Communication Standard covers both physical hazards and health hazards. This lesson introduces you to the different types of hazards in each of these two categories. It helps you understand how each type of hazard can affect your health and safety.

LEARNING OBJECTIVES

When you have completed this lesson, you should be able to do the following

- Identify the basic types of physical hazards.

- List and define types of fire hazards,

- List and define two types of unstable/reactive chemicals.

- Identify eight basic types of health hazards.

LEARNING RESOURCES

- . Videotape Segment 3A Types of Physical Hazards
- . Workbook Application Exercise 3A-1: Defining Physical Hazards
- Workbook Application Exercise 3A-2: DOS and DON'TS
- . Videotape Segment 3B: Types of Health Hazards
- Workbook Application Exercise 3B-1: Defining Health Hazards
- . Workbook Application Exercise 3B-2: Recognizing Workplace Health Hazards
- Lesson Summary

DIRECTIONS FOR PROCEEDING

Complete the following steps in order. You might want to check off each step as you complete it.

- 1) Read the workbook introduction to Videotape Segment 3A.
- ___ 2) Watch Videotape Segment 3A.
- 3) Complete Application Exercise 3A-1 in this workbook.
- 4) Complete Application Exercise 3A-2 in this workbook.
- 5) Read the workbook introduction to Videotape Segment 3B.
- 6) Watch Videotape Segment 3B.
- 7) Complete Application Exercise 3B-1 in this workbook.
- 8) Complete Application Exercise 3B-2 in this workbook.
- 9) Read the lesson summary.

INTRODUCTION TO VIDEOTAPE SEGMENT 3A: Types of Physical Hazards

Physical hazards are chemicals that can cause explosion, fires, violent chemical reactions, or other hazardous situations.

As you watch this videotape segment, learn to recognize the different types of physical hazards in the workplace. Notice how compressed gases, explosives, fire hazards, and unstable or reactive chemicals can affect your safety.

Now, watch Videotape Segment 3A.

NOTES

APPLICATION EXERCISE 3A-1: Defining Physical Hazards

Directions: Check or circle your answer(s) to each question, or write your answer in the blank provided. When you complete the exercise, fold over the right side of the page to check your answers. Then turn the page to get more information about each question.

1) What are the four basic types of *PHYSICAL* hazards?

_____	_____
_____	_____

2) Match the description with the type of physical hazard.

- | | |
|--|----------------------|
| Contains a lot of stored energy | A) Fire hazard |
| Ignites and burns easily | B) Compressed gas |
| Causes a sudden release of pressure and heat. | C) Reactive chemical |
| Causes a dangerous situation when mixed with other chemicals | D) Explosive |

3) Which type of physical hazard causes or supports fire in other materials?

- A) Combustible liquid
- B) Pyrophoric
- C) Flammable liquid
- D) Oxidizer

APPLICATION EXERCISE 3A-1: Defining Physical Hazards

Answer	Additional Information
---------------	-------------------------------

1)	The four basic types of <i>PHYSICAL</i> hazards are —
----	---

- compressed gases;
- **explosives**;
- **fire hazards**, including combustibles and
- unstable or reactive chemicals.

2) B	Contains a lot of stored energy
------	---------------------------------

A	Ignites and burns easily
---	--------------------------

D	Causes a sudden release of pressure and heat
---	--

C	Causes a dangerous situation when mixed with other chemicals
---	--

Compressed gases contain a great deal of stored energy. They are physical hazards because the sudden release of this energy is dangerous. Explosives and reactive chemicals can cause a sudden release of energy.

Chemicals that ignite and burn easily are **fire hazards**. So are chemicals that cause or support **fire** in other materials. Explosives are chemicals that can cause a sudden and violent release of pressure, gas, and heat.

Reactive chemicals produce or release a hazard when allowed to contact certain other chemicals.

3) D	Oxidizers are fire hazards that supply the oxygen required to start or support a fire. Oxygen itself is an oxidizer. Many materials that contain oxygen, such as peroxides, are also oxidizers.
------	--

4) Match each liquid with the type of fire hazard it presents.

- | | |
|--|---|
| ___ Turpentine ignites at 95°F. | A) Flammable liquid |
| ___ Kerosene ignites at 100-165°F. | B) Combustible liquid |
| Auto lubricating oil ignites at 300-450°F. | C) Neither flammable
nor combustible |
| Toluene ignites at 40°F. | |
| Methyl cellosolve ignites at 115°F. | |
| ___ Ethylene glycol ignites at 232°F. | |

5) A label on a can of drain opener reads:

NEVER USE OR MIX WITH OTHER CHEMICALS. KEEP AWAY FROM ALUMINUM UTENSILS AND ALUMINUM-CONTAINING MATERIALS.

Which type(s) of physical hazard does this product present?

- A) Flammable B) Oxidizer C) Pyrophoric D) Reactive
-

Now go back to page 3-5, fold over the right side of the page, and check your answers. Look on the back of the question page for more information on each question. If you are taking this course as a self-study, continue to Application Exercise 3A-2, "DOS and DON'Ts" when you have finished. If you are taking this course in a classroom situation, wait for further instructions from your trainer when finished.

Answer	Additional Information
4) A	The <i>FLASH POINT</i> is the temperature at which a liquid gives off enough vapor to burst into flame when exposed to an ignition source.
B	<i>FLAMMABLE LIQUIDS</i> have a flash point below 100°F. Turpentine and toluene are examples.
C	<i>COMBUSTIBLE LIQUIDS</i> have a flash point of 100°F or greater, but below 200°F. Kerosene and methyl cellosolve are examples.
A	Liquids that don't ignite easily at temperatures below 200°F are neither flammable nor combustible. Auto lubricating oil and ethylene glycol are examples.
B	
C	
5) D	Chemicals that must be kept away from other chemicals are reactive. The warning does not identify any specific type of fire hazard.

APPLICATION EXERCISE 3A-2: DOS and DON'Ts

Directions: Check or circle your answer(s) to each question; or write your answer in the blank provided. When you complete the exercise, fold over the right side of the page to check your answers. Then turn the page to get more information about each question.

Larry works in the painting/coating operation of a manufacturing facility. He does spray painting with a solvent-based paint.

- 1) What physical hazard is associated with Larry's job?
 - A) Compressed gas
 - B) Pyrophoric
 - C) Flammable liquid
 - D) Explosive

- 2) Circle all the DOS and DON'TS associated with the physical hazard in Larry's job.
 - A) DON'T throw paint-covered rags into open trash containers.
 - B) DO have a portable fire extinguisher available at all times.
 - C) DON'T use an electric heater in the work area,
 - D) DO provide ash trays in the work area.

APPLICATION EXERCISE 3A-2: DOS and DON'Ts

Answer	Additional Information
1) c	Like paints, many liquids used in solvent-based painting and coating operations are flammable . Ignition occurs easily at temperatures below 100°F.
2) ABC	<p>Proper disposal of waste containing flammable liquids is essential. Covered waste containers should be used to reduce the danger of exposure to an ignition source that could start a fire. Failure to properly dispose of paint-covered rags could also present a spontaneous combustion hazard, Fire extinguishers should be provided whenever a fire hazard exists.</p> <p>Smoking and electric heaters are potential ignition sources and are not allowed in areas where flammable liquids are present.</p> <p>No ash trays should be provided in the area because no one should smoke in there. Ash trays should be provided in the outer area so that cigarettes may be disposed of properly before entering the area.</p>

Marilyn works as a supervisor in a plant that uses ammonium nitrate to make gunpowder and blasting agents.

- 3) What physical hazard is associated with the ammonium nitrate in the plant where Marilyn works?
- A) Flammable liquid
 - B) Explosive
 - C) Oxidizer
 - D) Water-reactive chemical
- 4) What DOS and DON'TS are associated with the physical hazard of ammonium nitrate in Marilyn's plant?
- A) DON'T carry matches or lighters into the work area.
 - B) DON'T store ammonium nitrate in the same warehouse where flammable or combustible chemicals are stored.
 - C) DO stop any surface operations during thunderstorms.
 - D) DO keep warehouse aisles wide and clear at all times.

Now go back to page 3-9, fold over the right side of the page, and check your answers. Look on the back of the question page for more information on each question. If you are taking this course as a self-study, proceed to Videotape Segment 3B when you have finished. If you are taking this course in a classroom situation, wait for further instructions from your trainer when finished.

Answer	Additional Information
3) B C	Ammonium nitrate is explosive and is an oxidizer. Heat or reaction with certain other chemicals (but not water) can cause an explosion.
4) A B C D	<p>Special precautions and training are required to work safely with explosives. Extreme care must be taken to prevent contact with an ignition source. Handling explosives outdoors during a thunderstorm is hazardous because lightning could detonate the material.</p> <p>Special regulations also apply to warehousing explosive materials. Wide, clear aisles are required to make sure firefighting equipment can be brought in without delay. Explosives must be stored away from materials that ignite easily — a fire could detonate the explosive, and an explosion could ignite the fire hazard.</p>

INTRODUCTION TO VIDEOTAPE SEGMENT 3B: Types of Health Hazards

Health hazards are chemicals that can cause injury or illness when you are exposed by skin or eye contact, skin absorption, inhalation, or ingestion. The type of injury or illness —

- ranges from short-term irritation to permanent damage or death; and
- depends on the type of health hazard.

As you watch this videotape segment, look for the different types of health hazards and the health effects each type can produce.

Now, watch Videotape Segment 3B.

NOTES

APPLICATION EXERCISE 3B-1: Defining Health Hazards

Directions: Check or circle your answer(s) to each question, or write your answer in the blank provided. When you complete the exercise, fold over the right side of the page to check your answers. Then turn the page to get more information about each question.

1) Match the description with the type of health hazard.

- | | |
|---|--------------------------|
| <input type="checkbox"/> Burns skin on contact | A) Irritant |
| <input type="checkbox"/> Causes cancer | B) Corrosive |
| <input type="checkbox"/> Causes the skin to itch on contact | C) Target organ chemical |
| <input type="checkbox"/> Damages genes in sperm and egg cells | D) Sensitizer |
| <input type="checkbox"/> Can cause an allergic-like response | E) Carcinogen |
| <input type="checkbox"/> Causes liver damage | F) Teratogen |
| <input type="checkbox"/> Damages the fetus during its development | G) Mutagen |
| <input type="checkbox"/> Freezes the skin on contact | H) Cryogenic |

APPLICATION EXERCISE 3B-I: Defining Health Hazards

Answer	Additional Information
1) B	Burns skin on contact
E	Causes cancer
A	Causes the skin to itch upon contact
G	Damages genes in sperm and egg cells
D	Can cause an allergic-like response
C	Causes liver damage
F	Damages the fetus during its development
H	Freezes the skin on contact

CORROSIVES burn on contact, causing visible damage or irreversible changes to body tissues.

CARCINOGENS are chemicals that can cause cancer.

IRRITANTS react with the body at the site of contact, causing the skin to redden or itch. Repeated contact can crack or break the skin, but the damage is reversible.

MUTAGENS cause genetic changes in sperm and egg cells. This can cause sterility, birth defects, and miscarriages.

SENSITIZERS cause an allergic-like response in many people who are repeatedly exposed to the chemical. The response can happen on the second exposure, or any exposure thereafter.

TARGET ORGAN CHEMICALS damage a specific organ or body system, such as the liver.

TERATOGENS are reproductive hazards that damage the fetus during its development.

CRYOGENICS are very cold materials that cause frostbite by freezing body tissues on contact.

2) Will you know if you have been sensitized to a chemical at the time of your first exposure?

- A) Yes
- B) No

3) Do corrosives damage only skin?

- A) Yes
 - B) No
-

Now go *back to page 3-15, fold over the **right** side of the page, and check your answers. Look on the back of the question page for more information on each question. If you are taking this course as a **self-study**, continue to Application Exercise 3B-2, "Recognizing Workplace Health Hazards," when you have finished. If you are taking this course in a classroom situation, wait for further instructions from your trainer when finished.*

Answer	Additional Information
2) B	<p>There is no way to tell who will become sensitized to a chemical nor how long it may take. The allergic-like response can appear on any exposure after your first exposure.</p> <p>Some workers become sensitized over time. Suddenly they develop symptoms that they never had before — usually itching, a skin rash, or difficulty breathing. Others who are repeatedly exposed to the same sensitizer never develop the allergic-like response.</p>
3) B	<p>Corrosives burn on contact. They can damage your skin, eyes, digestive tract, or respiratory system, The tissue damaged depends on the exposure route.</p>

APPLICATION EXERCISE 3B-2: Recognizing Workplace Health Hazards

Directions: Check or circle your answer(s) to each question, or write your answer in the blank provided. When you complete the exercise, fold over the right side of the page to check your answers. Then turn the page to get more information about each question.

1) Fran uses ammonia water to clean floors and tiled walls. One day, the air conditioning system stopped working in the room where Fran was cleaning. Her eyes got red and irritated, and her nose and throat hurt. What kind of health hazard is the ammonia cleaner?

A) Corrosive

B) Teratogen

C) Cryogenic

D) Irritant

2) Jack works in a metal cleaning operation. He was burned when the caustic cleaner splashed on his arm. What kind of health hazard is the cleaner?

A) Corrosive

B) Sensitizer

C) Irritant

D) Mutagen

Now fold over the right side of the page, and check your answers. Look on the back of the question page for more information on each question. When you have finished, either review Videotape Segment 3B or proceed to the Lesson Summary.

APPLICATION EXERCISE 3B-2: Recognizing Workplace Health Hazards

Answer**Additional Information**

1) D

Like many maintenance cleaning products, dilute ammonia water is an irritant. The vapors cause reddening and irritation on contact.

Proper ventilation is a must when working with irritants that become airborne easily. When the ventilation system is working properly, the vapors are diluted with fresh air. This lowers the exposure hazard by reducing Fran's dosage, and she experiences no irritating symptoms.

Cryogenics are very cold chemicals that can freeze body tissue on contact, causing frostbite.

Corrosives burn on contact. The damage is more severe than that produced by an irritant and maybe irreversible.

Teratogens damage the fetus during its development.

2) A

Corrosives eat away or burn body tissue on contact. Caustic cleaners are corrosives, So are other strong acids and bases.

Skin contact causes burns, like Jack's. Eye contact can permanently damage your eyesight. Breathing corrosive gases, vapors, or mists can severely damage the respiratory tract. When swallowed, corrosives burn the mouth and esophagus.

LESSON 3 SUMMARY

The Hazard Communication Standard helps protect you from both physical hazards and health hazards in the workplace.

PHYSICAL HAZARDS include:

- *COMPRESSED GASES* — contain a lot of stored energy, sudden release produces rocket effect.
- *EXPLOSIVES* — cause a sudden release of pressure and heat.
- *FIRE HAZARDS* — ignite and burn easily or cause/support fire in other materials.
- *UNSTABLE/REACTIVE CHEMICALS* — produce or release hazards under commonly occurring temperatures, pressures, or light conditions.

FIRE HAZARDS include:

- *PYROPHORICS* — ignite spontaneously in air below 130°F.
- *FLAMMABLE LIQUIDS* — ignite easily at temperatures below 100°F.
- *COMBUSTIBLE LIQUIDS* — ignite easily at or above 100°F, but below 200°F.
- *OXIDIZERS* — supply the oxygen required to start or support fire.

UNSTABLE/REACTIVE CHEMICALS include:

- *DECOMPOSITION HAZARDS* — easily break up into simpler substances.
- *POLYMERIZATION HAZARDS* — self-react to form long molecular chains, releasing heat and/or a hazardous chemical in the process.
- *WATER-REACTIVE CHEMICALS* — react violently with water resulting in physical and/or health hazards.

HEALTH HAZARDS include:

- ***IRRITANTS*** — cause reddening, itching, or other irritation on contact.
- ***CORROSIVES*** — burn or eat away body tissues on contact.
- ***CRYOGENICS*** — freeze body tissue on contact.
- Chemicals that damage a *SPECIFIC ORGAN OR SYSTEM*.
- ***REPRODUCTIVE HAZARDS*** — target the reproductive system, causing sterility, miscarriages, fetal injury, or birth defects.
- ***SENSITIZERS*** — cause an allergic-like response in many people who are repeatedly exposed.
- ***CARCINOGENS*** — cause cancer.

REPRODUCTIVE HAZARDS include:

- ***MUTAGENS*** — damage genes in egg or sperm cells.
- ***TERATOGENS*** — *damage the* fetus during its development.