

UNDERSTANDING CHEMICAL HAZARDS

COURSE OUTLINE

- **You may have heard of hazard communication and "Right-To-Know" before, but you may not have thought about how it affects you.**
 - An ordinary cleanser can actually be toxic, flammable and explosive.
- **You have the "right-to-know" about potentially hazardous materials that may be encountered in your workplace.**
 - That is the reason for OSHA's Hazard Communication Standard and similar state laws.
 - The goal of these laws is to make sure that you have the information, training and equipment needed to work safely around hazardous materials.
- **Chemical hazard information is communicated to you in three different ways:**
 - Safety Data Sheets (SDS).
 - Container labels.
 - Your facility's written "hazard communication program."
- **The SDS is a guide for the safe use of a specific chemical.**
 - Chemical manufacturers and distributors provide an SDS for each of the products they sell.
 - Your facility keeps copies of each SDS on file for reference.
- **The Safety Data Sheet is the primary source for information about a chemical product. The SDS lists:**
 - All of the names which the chemical is known by.
 - The manufacturer.
 - Any hazardous ingredients.
- **The SDS also describes:**
 - The types of hazards that the chemical may present.
 - First aid procedures for chemical exposures.
 - Techniques for cleaning up spills.

- **To help you work with the chemical safely, the SDS also contains information about:**
 - How to handle and store the chemical properly.
 - What types of exposure controls and personal protective equipment (PPE) should be used for protection.
- **SDS's can come in different formats, but they all contain the same information.**
 - Become familiar with the SDS before working with a potentially hazardous material.
 - The few minutes this takes could prevent serious problems in an emergency.
- **Another place to look for "Right-To-Know" information is on a chemical's container label. The label will provide:**
 - The material's name and potential health, fire and reactivity hazards.
 - Specific precautions to take, or situations to avoid, when working with the chemical.
 - What PPE to wear when handling the chemical.
- **Like SDS's, all labels do not present information in the same way. They can:**
 - Be written.
 - Use shapes, numbers or letters as warnings.
 - Use "symbols" or "pictures" to represent hazards or the required PPE.
- **Whichever labeling system that your facility uses, read the label carefully before working with any chemical.**
 - If a chemical is transferred to another container, make sure that the "secondary" container is also labeled properly.
- **Another place where information about hazardous chemicals is located is your facility's "hazard communication program."**
 - It lists the hazardous materials present in your workplace.
 - Other important information is also given.
- **There are some technical terms which are used in communicating hazard information that you need to understand.**
- **The "duration of exposure" is the time that you are exposed to a substance.**
 - For example, the time between spilling a chemical on your arm and when you wash it off.
 - This type of spill would be referred to as a "short-term exposure."

- **"Short-term exposure" to some hazards can cause sudden reactions or "acute effects" such as a rash or a burn.**
 - In most cases, short-term exposure will cause no long-term health problems.
- **"Long-term exposure" to some hazardous chemicals can cause long-term... or "chronic"... health effects.**
 - For example, the chronic effect of smoking for many years might be emphysema or lung cancer.
- **The "dose" (amount) of the substance that you are exposed to is also important when determining possible health effects.**
 - The larger the dose, the more serious your reaction may be.
- **"Routes of entry" are the ways that a substance can get into your body. These include:**
 - Skin contact.
 - Inhalation.
 - Ingestion.
- **Solids, liquids and gases can all be absorbed through the skin.**
 - Liquids pose the biggest threat because they are most easily absorbed.
- **"Inhalation" is when a hazardous substance is breathed in. Substances that can be easily inhaled include:**
 - Dusts.
 - Mists.
 - Fumes.
 - Vapors.
 - Gases.
- **The third route of entry is "ingestion" (swallowing). This happens when:**
 - Food contaminated with a hazardous material is eaten.
 - A material is transferred to your mouth or face (with your hands).
- **Remember that the effects of exposure depend upon both the "dose" and the "duration of exposure".**
 - If these are low enough, a hazardous material may cause no negative health effects at all.

- **Government agencies have set limits for how much of any substance you can be exposed to safely. These limits are called:**
 - "Threshold limit value"(TLV).
 - "Permissible exposure limit"(PEL).
 - TLVs and PELs are listed on a chemical's SDS.
- **Hazardous chemicals have been grouped into classes, based on two things:**
 - The hazards they present.
 - The safety precautions needed when working with them.
- **Unlike many other chemicals, "toxic substances" have the potential to disrupt physical processes such as:**
 - Breathing.
 - Coordination.
 - Other bodily functions.
- **Toxic materials can often be found around the home... as well as in the workplace. They include:**
 - Pesticides.
 - Cleaners.
 - Solvents.
 - Gases.
 - Polymers.
- **Toxic gases include the fumes produced when heating, burning or welding some metals.**
- **"Poisons" are considered toxic substances.**
 - A poison can cause serious illness or death, even with a very small dose.
 - There are very few true poisons.
 - Their use in the workplace is limited.
- **Remember that not all toxic substances are poisonous.**
 - Most are not harmful in small amounts.
 - The danger lies in larger doses and longer durations.
- **"Corrosives and irritants" are two types of chemicals commonly found in many facilities.**
 - Corrosives can cause serious, even permanent, damage to any part of the body coming into contact with the chemical.

- **Most "acids" are considered corrosive substances. Sulfuric acid is one of the most widely used corrosives, and can be found in:**
 - Dyes.
 - Paints.
 - Petroleum processing.
 - Automobile batteries.
- **Many "bases" are also corrosives, such as caustic soda, which is commonly used in:**
 - Soaps.
 - Detergents.
 - Water treatment plants.
- **Skin contact with corrosive substances can cause redness, swelling, blisters and even severe burns.**
 - Contact with the eyes can result in permanent eye damage, even blindness.
- **Inhaling corrosive chemicals can seriously damage the delicate tissues of the:**
 - Nose.
 - Mouth.
 - Throat.
 - Lungs.
- **Swallowing corrosives ("ingestion") is rare in the workplace, but can result in:**
 - Extreme pain.
 - Severe internal injuries.
 - Death.
- **"Irritants" are often diluted forms of corrosive substances, and include:**
 - Ammonia.
 - Antifreeze.
 - Thinners.
 - Degreasers.
 - Acids.
- **Other irritants are by-products generated during combustion.**
 - Such as nitrogen dioxide found in automobile exhaust.

- **Irritants generally cause only minor, temporary inflammation or swelling at the point of contact.**
- **"Flammables and combustibles" are another common group of hazardous chemicals, which include:**
 - Gasoline.
 - Kerosene.
 - Acetylene.
 - Toluene.
- **The key in determining whether a chemical is flammable or combustible is its "flashpoint".**
 - This is the temperature at which the chemical releases vapors that can burn.
 - It is not the liquid that burns, but the vapor.
- **Liquids that have a flashpoint of less than 100 degrees Fahrenheit are considered flammable.**
 - Gasoline, for example, has a flashpoint of -45 degrees, almost always giving off vapors which can ignite.
- **A combustible liquid must have a flashpoint between 100 degrees and 200 degrees Fahrenheit.**
 - Combustibles are easier to control because they have to be heated before they will produce burnable vapors.
- **Liquid fuels are not the only flammables and combustibles we have to watch out for.**
 - Smoking near an open can of paint or a bottle of rubbing alcohol could cause a fire.
 - These and other materials can also ignite easily.
- **"Flammable gases" come with their own unique set of hazards, and include:**
 - Hydrogen.
 - Methane.
 - Propane.
 - Butane.
 - Acetylene.

- **Most gases are usually stored in compressed gas cylinders.**
 - The pressure inside these containers is enormous.
 - The rupture or heating of a cylinder or valve can result in a sudden, violent release of pressure.
 - The cylinder or valve could even become a flying projectile.
- **Another group of hazardous chemicals which we need to be aware of are "carcinogens and suspected carcinogens".**
 - These chemicals are often linked to cancer.
 - Normal cells in the human body follow a pattern to reproduce and grow.
 - Carcinogens disrupt this pattern, causing cells to grow abnormally, which is why cancer is often fatal.
- **Although carcinogens can affect nearly all areas of the body, they most frequently "target" specific organs, such as the:**
 - Lungs.
 - Liver.
 - Kidneys.
 - Reproductive system.
- **Unfortunately there are not usually any immediate symptoms of exposure to these substances.**
 - This is why it is extremely important to know about any carcinogen you may encounter.
- **One carcinogen that has received a lot of attention is asbestos. At one time, asbestos was used in:**
 - Pipe insulation.
 - Floor tiles.
 - Fire-proofing.
 - Automotive brake and clutch linings.
- **When inhaled, microscopic asbestos fibers can damage the lungs... and eventually cause cancer.**
- **"Suspected carcinogens" are commonly believed to increase the chance of getting cancer.**
 - Unlike confirmed carcinogens, no direct link has been established.

- **Examples of "suspected carcinogens" include**
 - Formaldehyde.
 - PCB's.
 - Carbon tetrachloride.
- **There is more to preventing cancer than simply avoiding exposure to carcinogens.**
 - Other "risk factors" affect the chances of getting cancer.
 - For instance, smoking increases the chances of getting cancer by tens or even hundreds of times.
 - Quitting is the biggest step in preventing cancer.
- **Another potential workplace hazard is "radiation".**
 - Radiation is not usually associated with chemicals.
 - But it can cause serious damage to the body's cells and tissues.
- **Radiation hazards include:**
 - Infrared radiation.
 - Ultraviolet (UV) radiation.
 - X-rays.
 - Gamma rays.
- **If you work around radiation hazards, you will need to take steps to protect yourself.**
 - Talk to your supervisor to find out more about any radiation hazards in your workplace.
- **Hazard communication goes beyond simply exercising your "right-to-know".**
 - You must act on what you have learned about potential hazards on the job.
- **Protection begins with selecting and using the appropriate personal protective equipment, such as:**
 - Goggles.
 - Face shields.
 - Gloves.
 - Acid suits.

- **"Respiratory protection" is especially important when working around many hazardous materials.**
 - There are many different types of respirators.
 - It is vital to use the right kind for the job.
 - Make sure your respirator fits properly.

- **When storing hazardous chemicals, a number of other things must be considered, such as:**
 - Ventilation (in case of fumes).
 - Lighting (for reading labels).
 - Identification of storage locations.
 - Strong, stable shelving.
 - Safe and easy access.

- **Small quantities of flammables or combustibles should be stored in U.L. approved cans with spring-loaded caps.**
 - These contain vapors and prevent spills.
 - Larger quantities of flammable materials need to be stored in a flammable materials cabinet.

- **Compressed gas cylinders have special storage considerations as well.**
 - They must be stored upright, with a safety cap over the valve.
 - A safety chain or bracket is required to prevent the cylinder from falling over.

- **In "exposure situations", you need to act quickly to minimize the damage from hazardous materials.**
 - Always know the nearest location of running water (water is usually the first line of defense against chemical injuries).
 - For small chemical splashes, immerse the effected area in running water for at least 15 minutes.
 - For larger exposures, get to a safety shower quickly.
 - Remove contaminated clothing and stay in the shower stream for at least 15 minutes.

- **Getting chemicals in your eyes can cause severe damage. Get to an eye wash station immediately.**
 - Keep you eyes open and flush them for at least 15 minutes.

- **Inhaling hazardous materials can be dangerous, even deadly.**
 - If someone is overcome by fumes, get them out of the area and into fresh air.
 - Check the container label or SDS to see if immediate medical attention is needed.
- **Swallowing a hazardous substance is extremely dangerous.**
 - Consult the SDS immediately.
 - It may be necessary to dilute the chemical with water or milk, or induce vomiting.
 - In some cases, however, vomiting may cause more damage.
- **Seek medical attention after any exposure to a hazardous material, no matter how minor.**
 - Some chemicals have delayed or long-term effects.
 - Supply medical personnel with the chemical's SDS.
- **In the event of a leak or a spill of a hazardous chemical, you must act quickly.**
 - The first concern is people's health and safety.
 - Tend to injuries immediately.
 - Evacuate the area if necessary.
 - Notify appropriate personnel.
- **If the spill is of a flammable or combustible substance, you should immediately remove sources of heat or ignition.**
 - But do not unplug machinery or equipment (this could cause sparks).
- **If you are going to be involved in cleaning up a hazardous spill, make sure to use the proper PPE and cleanup equipment.**
 - Check the SDS or your company's hazard communication plan.
- **First, work to contain the spill and minimize contamination.**
 - Create a barrier around the spill with an absorbent material.
 - Use a cleanup kit, if available.
 - In most cases you will need to absorb the spill with a neutral material.
- **Spills of some substances require special procedures.**
 - For example, use non-sparking tools when cleaning up a Flammable.

- **Hazardous materials cannot just be thrown into the trash.**
 - Many chemicals are classified as regulated waste.
 - They must be removed by licensed disposal companies.
 - Check with your supervisor or your facility's safety manager.
- **OSHA's Hazard Communication Standard and other "Right-To-Know" laws are there to get us the information we need to work safely.**
 - But only you can take the necessary steps to protect yourself from hazardous chemicals.