

Generally, waste is considered hazardous if it is:

- Ignitable (i.e. burns readily)
- Corrosive
- Reactive (i.e. explosive)
- Waste may also be considered hazardous if it contains certain toxic chemicals.

Most hazardous products are labeled with key words to identify them. Some signal words are:

- Caution
- Poison
- Warning
- Danger
- Flammable
- Combustible
- Corrosive

Understanding Hazardous Waste & Special items

1. What is a hazardous material
2. Categories of hazardous waste
3. Product labeling
4. Exposure and health effects
5. Common hazardous materials and the dangers associated
6. Safe handling of hazardous materials
7. Purchasing products

I. What is a hazardous material?

There are five things that can make a material hazardous:

1. **Flammable/Ignitable:** Any substance that can be easily set on fire. Flammable liquids have a flash point of less than 100 degrees F. Ignitables have a flash point of less than 140 degrees F, The flash point is the minimum temperature at which a liquid or solid gives off sufficient vapors to form an ignitable mixture of vapor/air near the surface of the substance. Any source of spark, flame or heat could ignite this mixture in a flash fire. Examples include gasoline, paint strippers or thinners, furniture polish, and some adhesives.
2. **Explosive/reactive:** Any substance that can cause an explosion or violent reaction when subjected to heat, sudden shock, pressure or contact with an incompatible substance. Examples include fireworks, ammunition, and swimming pool chemicals.
3. **Corrosive:** Corrosives are substances that can burn and destroy living tissues and, when brought into contact with metals, will begin to dissolve them. If a substance has a pH value of less than or equal to 2.0, or greater than 12.5, it is considered corrosive. Examples include some rust removers, drain cleaners, oven cleaners, and swimming pool chemicals.
4. **Toxic:** Any substance that can cause injury or death through ingestion, inhalation, or skin absorption. Most products that exhibit one of the other characteristics are also toxic. Examples of toxics include pesticides, heavy metals, corrosives and some solvents.
5. **Radioactive:** Any substance that can damage the nuclei of cells, interfering with cell reproduction by changing the genetic cell structure. Examples of radioactive household products include ionizing smoke detectors (Americium-241), gas lantern mantles (Thorium), and static eliminators (Polonium-210).

II. Categories of hazardous waste

1. **Automotive products:** Almost everything used in the operation of automobiles and other engines use hazardous materials. Gasoline, motor oil, diesel fuel, kerosene, transmission fluid and other fuels and lubricants are derived from crude petroleum and contain chemical additives. Other hazardous products used in cleaning and maintenance of automobiles include antifreeze, windshield washer fluid, car wax, brake fluid and vinyl cleaner.
2. **Household cleaners:** Cleaners are not comprised of just one class of chemicals. They may contain organic solvents (examples-furniture polish, floor wax, spot remover), strong corrosives (examples - oven cleaner, drain opener, rust remover), or a number of synthetic chemicals that are mostly irritants unless accidentally ingested (examples - tub and tile cleaner, dishwasher and laundry detergents).

3. Home Improvement Products: This category includes protective and decorative coating materials and solvents used in the construction and maintenance of buildings. Examples include paint, varnish, stain, paint thinner, paint stripper, adhesives, caulk, and driveway sealer.
4. Pesticides: Pesticides are substances which destroy or repel plants and animals that humans consider to be "pests." This group includes insecticides, insect repellants, herbicides, mildicides, rodenticides, wood preservatives, and fertilizers with added pesticides.
5. Miscellaneous: The miscellaneous category is reserved for the many products that do not easily fit into the other four categories. Included as miscellaneous are batteries and personal care products (cosmetics, pharmaceuticals), swimming pool chemicals, art and craft materials, ammunition, and fireworks.

III. Product labeling

How do you identify if a product is hazardous?

Read the label:

- May be harmful if swallowed: Indicates a risk of exposure through ingestion. Do not eat, drink or smoke while using this product, and wash hands thoroughly when finished.
- Use with adequate ventilation: Indicates a risk of exposure through inhalation. Work outdoors, use in an area with very good airflow to the outdoors, or wear an appropriate respirator.
- Avoid skin contact: Indicates a risk of exposure through skin absorption or that the product could damage the skin. Wear appropriate gloves and protective clothing.
- Avoid eye contact: Indicates a risk of eye damage. Wear chemical splash goggles.
- Avoid if pregnant: Indicates that the product could harm a developing fetus.

Signal Words:

Non-Pesticide Signal Words

- Danger: The product is extremely flammable, extremely corrosive or highly toxic.
- Poison: The product is highly toxic.
- Warning or Caution: indicates products with lesser hazards.
- No Signal Word: The product is probably not hazardous.

Pesticide Signal Words

- **Danger:** Poison: Highly toxic, a few drops to one teaspoon can be fatal (based on ingestion).
- **Warning:** Moderately toxic, one teaspoon to one ounce can be fatal (based on ingestion)
- **Caution:** Slightly toxic, more than one ounce can be fatal (based on ingestion) Any product marketed as a pesticide must at least bear the word CAUTION on the label.

IV. Exposure and health effects

Types of Exposure

- **Acute exposure:** An immediate reaction from a single exposure to a hazardous substance. The symptoms range from minor to severe and may include headaches, dizziness, skin or eye irritation, allergy or flu symptoms, vomiting, coma, or death.
- **Chronic exposure:** A slow reaction from repeated exposure to a hazardous substance over an extended period of time. Symptoms of chronic exposure include cancer, liver or kidney failure, birth defects or central nervous system damage. Because it takes so long for the symptoms to manifest, the exposure that caused these symptoms may be difficult to pinpoint.

Routes of Exposure and Body Responses

- **Inhalation:** Exposure through breathing hazardous gases, vapors, dusts or sprays. Inhalation is the most common way that adults are exposed to hazardous materials. Our bodies have several defense mechanisms to protect our respiratory system from harmful materials, including mucus membranes that trap contaminants so that they can be coughed out of the body. Also, irritating gases and vapors can cause spasms in the muscles around the lungs, causing them to close off airways. This results in the choking feeling that you might have experienced around ammonia. The impact of the chemical on the respiratory system relates to the water-solubility of the chemical. Highly soluble chemicals, such as ammonia and alcohol, affect the upper respiratory system because they quickly dissolve in the throat and upper part of the lungs. They produce immediate symptoms: including pain, hoarseness, sore throat and coughing.
- **Water insoluble chemicals,** such as gasoline and other petroleum distillates, affect the lower respiratory system because their vapors reach deeper before dissolving into the pulmonary linings. Exposure can result in asthma or chemical pneumonia.
- **Some chemicals,** such as organic solvents, can enter the bloodstream through the lungs and be transported to the brain. Many people have experienced solvent intoxication while painting. Symptoms of exposure include feeling high, fatigued, dizzy, nauseous, uncoordinated, confused and sleepy. Very high concentrations may result in coma or death. Long term exposure can

result in irreversible central nervous system depression. Symptoms include memory loss, mood swings, loss of coordination, and impaired brain functions.

- **Ingestion:** Most young children are poisoned by intentionally eating or drinking a hazardous substance that was left within their reach. Children should never be left alone in a room with hazardous products - even for a minute. Adults are more commonly poisoned by less direct means. Eating, drinking or smoking while using hazardous products increases the chance of swallowing the wrong thing, contaminating food and drink, and carrying traces of chemicals to the mouth. Failure to thoroughly clean hands, or using food or beverage containers and kitchen utensils to mix, store or transport hazardous materials can also increase the possibility of exposure through ingestion.
- **Skin Contact:** The skin is not a perfect barrier. It is similar to a sponge, with many pores leading from the surface to the bloodstream. Contact with corrosives can damage the skin and result in irritation, skin reddening, itching, blistering or burns. Hazardous products can enter the bloodstream through damaged skin, or when a sharp object contaminated with a hazardous substance breaks the skin and injects the substance into the bloodstream. To prevent exposure through "injection," broken or sharp objects (for instance, a broken pesticide bottle or thermometer) should be sealed in a puncture-proof can before disposal in the trash. Some hazardous materials, such as pesticides and solvents, can penetrate unbroken and undamaged skin.
- **Eyes:** The most vulnerable part of our skin is our eyes. If corrosive substances come in contact with the eyes, damage can occur very quickly. The result may be tearing, irritation of the cornea, inflammation, or blindness. Storing hazardous materials overhead, or working with aerosols or reactives without eye protection, increases the chances for serious eye damage.

V. Common hazardous materials and the dangers associated

The Center for Disease Control report on [Human Exposure to Environmental Chemicals](#), a study of chemicals that are found in humans, is an important resource for the dangers associated with hazardous materials.

Below is a summary of the known health risks posed by some of the toxic chemicals in the CDC survey.

Chemicals and health risks:

- **Lead** - Lead is found in lead-based paint, old pipes, electronics, lead-glazed pottery, and contaminated soil. It is a well-recognized reproductive and developmental toxin. It reduces fertility and can cause miscarriage.
- **Mercury** - Inorganic mercury is used in electrical equipment and some fungicides. Mercury is also used in dental fillings. Incineration of medical waste, batteries, fluorescent bulbs, and other

products emits mercury. Organic mercury is the most dangerous form because it is absorbed into the body and crosses the brain and placenta easily. Most organic mercury exposure comes from eating fish high on the food chain, such as tuna, swordfish, shark and pike. Like lead, mercury is a reproductive and neurological toxin.

- Organophosphate pesticides - Organophosphate pesticides account for about half of all insecticides used in the United States. They are sprayed on crops including corn, cotton, fruits, and vegetables, and used in household pest control products and lawn and garden sprays. They are derived from phosphoric acid and were developed as nerve agents during WWII. Last summer, the US Environmental Protection Agency cancelled registrations of many uses of chlorpyrifos—which was widely sprayed on fruits and vegetables to kill insects and is used in termite control and lawn care products—citing health risks to children. 77 million pounds of organophosphates are used annually.
- Phthalates - Phthalates are additives in plastics, particularly polyvinyl chloride (PVC) plastic, which give plastics a range of characteristics from flexibility to flame retardation. Because phthalates are not chemically bonded to the plastic, they can leak into the environment. In wildlife and laboratory animals, they have been linked to reproductive health effects including reduced fertility, miscarriage, birth defects, abnormal sperm counts, and testicular damage, as well as liver and kidney cancer. Over 1 billion pounds are produced in the US annually.
- Cotinine - Cotinine provides an indication of nicotine exposure. Two-thirds of smoke from cigarettes is not inhaled by smokers but is released into the surrounding air. As a result, nonsmokers breathe in the same toxic chemicals in tobacco smoke as the smokers do, with similar, although smaller effects. Some 4,000 toxic chemicals—including 50 known carcinogens—have been identified in cigarette smoke, including benzene, cyanide, cadmium, lead, radioactive polonium, benzo(a)pyrene, ammonia, carbon monoxide, and nicotine. These chemicals can cause cancer, heart disease and asthma, among other diseases.
- Other chemicals and health risks:
 - Gasoline - Exposure to automotive gasoline most likely occurs from breathing its vapor at a service station while filling a car's fuel tank. Many of the harmful effects seen after exposure to gasoline are due to the individual chemicals in the gasoline mixture, such as benzene and lead. Inhaling or swallowing large amounts of gasoline can cause death.
 - Inhaling high concentrations of gasoline is irritating to the lungs when breathed in and irritating to the lining of the stomach when swallowed. Gasoline is also a skin irritant. Breathing in high levels of gasoline for short periods or swallowing large amounts of gasoline may also cause harmful effects on the nervous system. (CDC)
 - Huffing - The chemicals involved in huffing can kill brain cells, cause personality changes, memory loss, hallucinations, learning disabilities, impair balance and coordination, cause slurred speech, tremors, uncontrollable shaking, damage to your vision, block oxygen in your blood,

cause damage to your lungs, heart, muscle tone and strength, liver, kidneys, bone marrow, can cause leukemia, and cause death. (National Inhalant Prevention Coalition)

VI. Safe handling of hazardous materials:

Sometimes there are not readily available alternatives to hazardous materials.

1. Safe handling Use:

Read the entire label before purchase. Only use chemicals for their specified use. Purchase only enough to get the job done. Wear the proper safety equipment when using the chemical (respirator, gloves, eye protection, dust mask). Use proper ventilation (should blow air out of work area). Do not spray pesticides outdoors on a windy day. Do not use pesticides near children or pets. Never mix chemicals together. (Chlorine and ammonia form a poisonous gas). Wash your hands after using a hazardous material.

2. Storage:

Keep materials in their original container with labels intact. If container is leaking, be sure to re-label the new container that the material is transferred to. Store in separate, locked cabinet or area out of reach from children and pets. Do not store hazardous materials near food, water, or medical supplies. Store flammable chemicals separately and away from heat, flame, or spark. Do not store hazardous materials in food or beverage containers.

3. Disposal:

Use up as much of material as possible. Give left over products to someone who can use them. Never pour hazardous materials down the drain unless it is specified on the label or okayed by a hazardous waste professional. They can damage wastewater treatment facilities. Never pour hazardous waste down a storm drain. These often lead directly to a lake, stream, or other body of water. If you cannot use up or give away a hazardous material, bring it to a household hazardous waste collection site in the county or a satellite collection. (Maps are available on the recycling website).

4. Equipment:

- Respirator: Should be used when exposed to toxic vapors, gases, fumes, dusts or other airborne hazardous materials. Respirators should have NIOSH approval (National Institute for Occupational Health and Safety). Respirators do not remove all the hazardous chemicals from the air you are breathing, but they do reduce the chemical's concentration to target levels set by NIOSH. Types of cartridges and filters you will need depend upon the hazardous product you are using.
- Dust Masks: should be used when working with airborne particulates or mists. NIOSH approved dust masks have two straps and a NIOSH approval number. When a dust mask becomes difficult to breathe through or the ingredient can be smelled through the mask, the mask should be replaced.

- Eye protection: Contact lenses (especially soft lenses) should not be worn when working with hazardous products in a poorly ventilated area. The hazardous vapors or mists may be absorbed by the lenses, holding the irritant against your eye and increasing the potential for eye damage. Wear chemical splash goggles to protect eyes from chemical splashes, mists, vapors and particulates. Splash goggles should meet the requirements of the American National Standards Institute (ANSI). If the eyewear meets these standards, the packaging will state ANSI approval and the eyewear will have the imprint "Z87"
- Skin protection: If more than your hands will come in contact with a hazardous material, such as when spraying pesticides, you should protect all exposed skin. Cheap disposable suits are available at hardware and safety equipment stores. Or use clothing other than your everyday clothing when working with hazardous products. These should be washed separately after use in hot water and detergent. Rinse the washing machine thoroughly after laundering and line dry the clothing. Leather should not be used when working with hazardous materials because the chemicals will be absorbed into the leather and will come in contact with your skin and the chemicals are impossible to clean out of the leather. Nitrile gloves are effective protection against most household products, except for strong acids or bases, which require heavy rubber gloves. Nitrile and other chemical resistant gloves are available at safety equipment stores.

VII. Purchasing products

Read the label

Consider purchasing products that say "caution" rather than "warning" or "danger." Products in a spray bottle rather than an aerosol can. Non-aerosols don't use flammable or ozone depleting propellants and are less likely to end up in your lungs. Chlorine-free scouring powder "No Fumes" oven cleaners without lye (sodium hydroxide) Non-toxic or water based spot removers Vinegar glass cleaners Mildew cleaners without phenols Polishes without petroleum distillates Latex, acrylic, or low VOC paints Citrus or vegetable oil based solvents and strippers White glues and pastes Water-based inks and markers Insecticidal soaps, bacterials, botanicals and growth regulators Remember that manufacturers produce what consumers demand. By purchasing less toxic materials, consumers send the message that we prefer safer alternatives to hazardous products.