Material Safety Data Sheets: Pollution Prevention and You!

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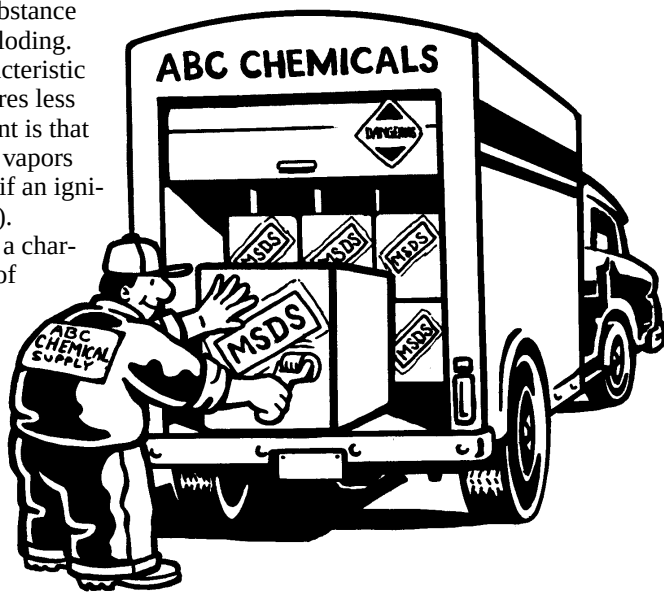
Material Safety Data Sheets (MSDS) are a means of conveying information about a hazardous product to people who use that product. They can also be used to "screen" products before buying.

MSDS are required by OSHA and especially important to have on hand when a material is considered hazardous – capable of causing harm or injury to workers under normal use. Every manufacturer or importer of a product must supply a Material Safety Data Sheet with that product if:

> It contains **more than 1 percent of a hazardous substance** or
>
> More than **0.1 percent of a carcinogen**, or
>
> If there is evidence that it could **present a health hazard to anyone under normal use...**

Before we explore the information contained in an MSDS we should first look at what makes a material hazardous. The definition of a hazardous material is that it will have one or more of the following properties:

- **Can cause cancer** or cancer-like growths.
- Is **considered toxic or highly toxic** by its LD_{50} value – this value is the "lethal dose" of material given to a specific animal species that will cause death in 50 percent of the animals receiving the dose; LD_{50} values may be given for different ways the dose may enter the body, known as "exposure routes" – such as ingestion, skin (dermal) absorption, or by inhalation into the lungs.
- May be a **reactive** substance that is capable of exploding.
- Is **flammable** – characteristic flash point temperatures less than 100°F (flash point is that temperature at which vapors will "burn" or ignite if an ignition source is present).
- Is **combustible** – has a characteristic flash point of vapors higher than 100°F but less than 200°F.
- Is **corrosive** – the product can cause severe "burns" upon contact.
- Is an **irritant** – will cause redness and swelling in contact area, or result in redness or swelling of the eye lid.
- Is **radioactive** – a substance that gives off or "emits" harmful energy that causes radiation burns or genetic mutations.
- Is a **biohazard** – these agents can cause infections that cause detrimental health effects or death.



What kind of information can be found on a MSDS?

MSDSs have **eight** required sections of information that can be used in the following ways:

- **Section I** is used to identify the **manufacturer's name and address**. This section will help you match the MSDS with the corresponding material at the work place. It lists the manufacturer of the chemical, an emergency phone number for information about the product, a nonemergency phone number, and the signature of the person responsible for developing the MSDS.

  If additional information is needed call the number listed here. Remember: Be prepared, don't wait for an emergency, call before an accident occurs to get as much information as possible!

The MSDS must be supplied by the chemical manufacturer to the business that uses that product. It is the business owner's responsibility, under OSHA's Hazard Communication Standard, to have MSDS on hand for all hazardous materials used at the facility.

- **Section II** helps you and your employees identify the **hazardous ingredients** in the product. This is the most important section of the MSDS and gives you the information needed to determine the physical and

health hazards of the product. The common name and the chemical name will be listed, for example: "Carbon Dioxide" and "CO_2," and the percent (%) of that chemical in the product.

Details about recommended exposure limits to protect employee health and safety are given.

Exposure limits refer to concentrations of a contaminant in the air, and represent conditions under which it is believed nearly all workers may be repeatedly exposed day after day without adverse health effects. Permissible Exposure Limits (PEL) are established by OSHA and are legally enforcable. Threshold Limit Values (TLV) are recommended exposure limits established by the American Conference of Governmental Industrial Hygienists (ACGIH).

These values are based on the "best available information" from industrial experience, from experimental human or animal studies, and when possible, from a combination of the three. Non-carcinogenic ingredients less than 1 percent do not have to be listed.

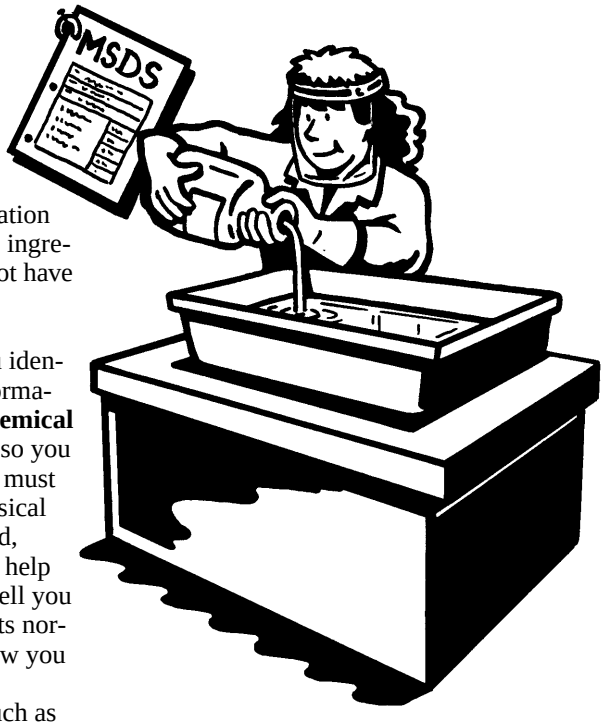
- **Section III** is used to help you identify the material and gives information about the **physical** and **chemical** characteristics of a compound so you can evaluate how this material must be safely stored and used. Physical appearances (color, odor, liquid, gas or solid under normal use) help identify the material and will tell you how it will behave outside of its normal container and indicates how you can be exposed to it.

  Chemical characteristics such as boiling point, vapor pressure, solubility in water, specific gravity and evaporation rates will be given. Liquids with high evaporation rates – greater that one – and high vapor pressures indicate how fast a liquid will become a gas at normal temperatures. If these numbers are high they may be particularly hazardous in confined or enclosed areas and may create more of an inhalation hazard.

  This section of the MSDS is often used by fire fighters to help determine how the compound will react when spills or fires have occurred.

- **Section IV** identifies **fire** and **explosion hazards** associated with the product and can be used to help you plan how to prevent these occurrences. This section is particularly useful to firefighters as it will list the type of extinguishing media or any special fire fighting procedures, the flash point of the material, and the upper and lower explosive limits (UEL and LEL, respectively).

  The UEL is the concentration level of vapors which will no longer support combustion (said to be too rich) and the LEL is the lowest possible concentration that will support a fire (said to be too lean below this point). The value between these two points is the "flammable range."



Businesses are also responsible for training employees on the hazards and acceptable handling procedures associated with the use of a product, keeping records of that training, and maintaining copies of the Material Safety Data Sheets for employee use at all times. MSDS must be accessible to employees, preferably in an area away from chemical storage areas, and close to the area where they are used.

If there is any special fire or explosion hazards associated with the compound it will be noted in this section.

- **Section V** will list **reactivity** data, note special handling procedures, conditions to avoid, incompatibilities (materials to avoid coming in contact with), and potential polymerization circumstances.

  If there is any chance a substance will break down or react to create a new, more hazardous compound it will be listed here along with the conditions under which this may occur, and what the new hazards may be. Stability of the compound under heat and stress will also be given to help you plan for safe storage, handling, and emergency response procedures.

- **Section VI** of the MSDS contains **health hazard information**; including how exposure to the chemical would most likely occur, called routes of entry, such as: inhalation, skin absorption, or ingestion. Additional overexposure signs and symptoms, as well as emergency and first aid procedures may also be given.

  Characteristics of acute exposure (single incident, usually high exposure dose) and chronic effects (low doses over a long period of time – like the effects of cigarette smoking) will be listed if known. This information is used by workers and supervisors to recognize overexposure symptoms, by engineers for equipment design to minimize exposures, and by on-site or off-site health personnel to preplan for overexposure incidents that require medical treatment.

- **Section VII** lists spill response procedures to be taken if the material is spilled or otherwise released into the environment. **Safe handling** and **storing precautions**, and **waste disposal** methods are recommended here.

  Enough information should be given to help plan necessary emergency response actions. This information is extremely important to your worker training and awareness program required by the OSHA Hazard Communication Standard.

  It is also important in helping

emergency spill responders prepare for spill or release incidents, and in minimizing employee dangers and threats to the surrounding environment.

Information given here can help you choose equipment or activities necessary to evacuate personnel and get the spills cleaned up and disposed of, without hazard to the health of workers or the environment.

Special attention should be given to this area as it may indicate disposal requirements that are expensive and regulated by law.

- **Section VIII** consists of **control measures to prevent exposure** to workers during normal use. These may be engineered controls designed to reduce or eliminate exposure at the point of use, or personal protective equipment (PPE).

  Required personal protective equipment such as gloves, goggles, clothing and shoes, and recommended work and hygienic practices will be listed to control the possibility of exposure. If ventilation is recommended with the use of this chemical, guidelines will be given here.

Testing is not required to create an MSDS, although extensive testing is usually involved. Companies may use the best available industry information about their product to put together their MSDS, an important fact that may affect the amount, or quality of information supplied.

Some products you use may not have arrived with an MSDS which should be ordered as soon as possible. Basic information supplied by these documents is an essential component of, and a good starting point for comprehensive health and safety and waste reduction programs at your business.

If you have products in use at your business you suspect may be associated with worker hazards, the MSDS can be ordered by calling or writing the manufacturer or distributor on the product label.

Note: Manufacturers are not required to supply MSDS to consumers, but will usually do so if requested.

Using MSDS to prevent pollution

Understanding the MSDS is important to the health and safety of you and your employees as well as the environment. By using the MSDS to evaluate a product *before* it is brought to your facility, you can prevent unnecessary health risks, and reduce amounts of hazardous waste generated at your facility.

Generally, if a material is considered "hazardous" when purchased, it will retain this character when it becomes a waste. Careful examination of the product and the process it will be used with should be performed as accurately as possible to assess its hazardous nature during use and at the time of disposal.

Always choose a less or non-hazardous product for your processes, if possible.

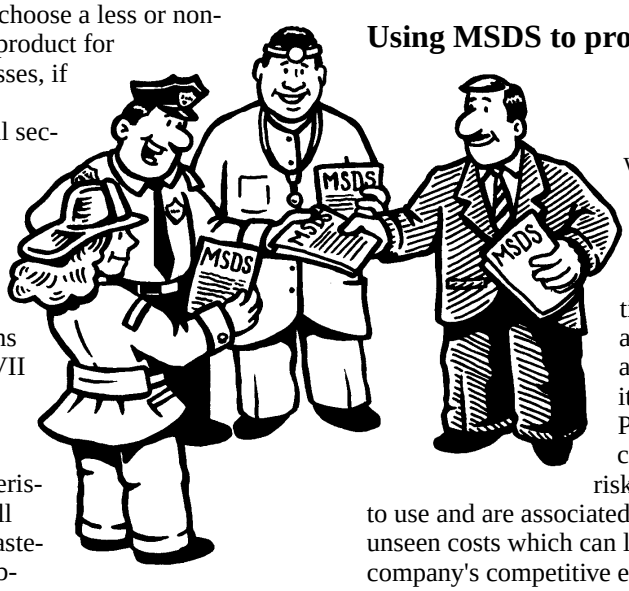
While all sections of the MSDS should be used to evaluate a product, Sections II, III and VII should be examined carefully for characteristics that will increase waste-related problems.

Section II: If the compound is listed as a hazardous air pollutant (HAP) or a volatile organic compound (VOC) and is a high percentage of the product, it is an air emission that may lead to expensive permitting and record keeping.

Section III: The volatility or vapor pressure tells you how easily this compound will evaporate. High vapor pressures and evaporation rates mean more product will be lost to the air and may require expensive control or recapture devices that can lower your company's profits. Note that if two chemicals are associated with toxicity, the chemical with the higher evaporation rate or vapor pressure will present more of a hazard because there will be more of it in the air.

Section VII: Beware of statements saying "waste must be disposed in accordance with federal, state, and local environmental regulations;" or "contain spills to prevent entry to public waterways." These statements are good indications that disposal of the product may involve permits or special procedures that may increase spill cleanup and disposal costs.

Make copies of MSDS for supervisors, firefighters and medical personnel in case of emergencies which involve a hazardous material so appropriate emergency preplanning can be coordinated.



Using MSDS to protect worker health

In addition to waste reduction opportunities, MSDS should be used to identify health risks associated with a product before it is purchased. Products that create health risks are expensive to use and are associated with many unseen costs which can lower your company's competitive edge.

Hidden costs such as increased training and record keeping, engineering controls or personal protective equipment, unfavorable public opinion, and worker health liabilities must be included in the cost of using a product. If you have large quantities of toxic compounds or highly toxic compounds onsite, your company may also have to comply with the emergency planning and community right-to-know acts to protect the public.

Areas of the MSDS to examine closely for health and safety issues are:

Section II: Look at Threshold Limit Values and any other notations here that indicate exposure problems, such as "Ca," which means it is a proven or suspected carcinogen. Very low TLV can be associated with compounds that can be immediately dangerous to life and health or lead to long term exposure problems. Low exposure limits and high

toxicity of a chemical can create increased training costs, may require expensive control equipment or PPE, and increase record keeping duties.

Section IV and V: Check for explosion hazards or incompatibilities that may create a problem at your facility. Be especially aware of products that require high cost storage precautions and fire control methods as these may increase fire insurance costs for your facility.

Section VI: This area should be examined carefully by people familiar with the process it will be used in. Carefully examine the listed health effects. Does your process have controls to prevent employee exposures? Be wary of chemicals associated with serious symptoms such as asphyxiation, death or convulsions through any or all routes of exposure. These materials require special handling techniques and safety training, engineering controls and personal protective equipment, and could be associated with future liabilities for your workers' health.

Section VIII: If this area recommends air-supplied respirators to be used with the product, you may wish to consider an alternative if possible. Not only does this imply a dangerous toxicity problem, but also means that you will have to implement and maintain a yearly respirator training and certification program in order for your employees to use that product. Products that require respirators can cost your company more money than the initial purchase price and may lower your company's profitability.

Remember:

Order the MSDS first (number is usually on the product label) before your company buys a product. Careful use of Material Safety Data Sheets can increase bottom line profits by saving on disposal costs, reducing health risks and decreasing the possibility of short- and long-term liabilities associated with the use of hazardous materials.

Once a material is on-site, the business owner – **you** – will be responsible for the safe use and disposal of that product. Set up a MSDS program in your purchasing department now that prevents a material being ordered until the MSDS has been examined and accepted by all of the key players at your business. *Beware of hidden environmental costs associated with extremely hazardous products!*

Questions about MSDS use?
Call the Pollution Prevention Institute at 913-532-6501

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