

Understanding Material Safety Data Sheets (MSDS) AND SAFETY DATA SHEETS

Material Safety Data Sheets (MSDS) and Safety Data Sheets are created by producers and/or suppliers of chemicals to serve as a primary source of information about the safety, health, and environmental aspects of their product. The documents are normally written in a non-mandatory format created by OSHA/PEOSH and are broken into eight (8) or more sections. Much of the language is straightforward and readily understandable. However, some chemical terms may need to be explained to people. The document *Glossary of Chemical Terms, Document 234*, published by Lab Safety Supply www.labsafety.com will be helpful for this purpose. Also confusing to some will be certain technical data. These will be explained below.

The sections of the standard MSDS/SDS form, along with technical terms, are as follows:

I. Identity and Contact Information

- Provides any common, trade, and chemical names for the chemical
- Gives manufacturer's/suppliers contact information and an emergency contact number to call for more information.
- The chemical formula
- The United Nations (UN) number—also known as the DOT identification number, is a unique four digit (xxxx) identification number for chemicals regulated by the US DOT.
- The Chemical Abstracts Service (CAS) number—another unique set of numbers (xxx-xx-x) used within the chemical community to identify that particular material.
- The US DOT hazard classification

II. Hazardous Ingredients/Identity Information

- Lists all the chemical components of the material
- Provides exposure limits below which no harm should come to employees from exposure. Typically, this will include:
 - OSHA PEL—The permissible exposure limit (PEL) is the airborne concentration of the material under which nearly all workers may be repeatedly exposed without adverse effect. This level is mandatory and is specified in OSHA 1910.1000 (Subpart Z)
 - The ACGIH TLV—The American Conference of Governmental Industrial Hygienists threshold limit value (TLV) is similar to the PEL and can be expressed both as a time weighted average (TWA) or a short-term exposure limit (STEL). Both the OSHA PEL and the STEL are considered to be maximum allowable exposures for any length of time. This may also be called the ceiling limit. The TWA TLV typically allows a lower concentration over a workday (8 hours).
- Both PEL's and TLV's are expressed using various concentration measures depending on the nature of the material. For example:
 - Dusts (mineral or organic) are expressed as mass per unit of air (milligram/cubic meter of air) = mg/m³ or as millions of particles per cubic foot.
 - Mists (such as acid mist) and fumes (such as welding fumes) are expressed as mass per unit of air (milligram/cubic meter of air) = mg/m³

- Fibers (such as cotton dust and asbestos) are expressed as mass per unit of air (milligram/cubic meter of air) = mg/m³ or as fibers per unit of air (fibers/cubic centimeter of air) = f/cc.
- Gasses (such as carbon monoxide) are expressed as parts per million parts of air = ppm.
- Vapors (such as solvents) are expressed as parts per million parts of air = ppm or as mass per unit of air (milligram/cubic meter of air) = mg/m³.

III. Physical/Chemical Characteristics

- Boiling point is the point at which the vapor pressure of a liquid is equal to the pressure of the atmosphere on the liquid. In other words, it is the temperature at which a liquid begins to change its state to a gas. The lower the boiling point, the more readily it will change to a gas under normal workplace conditions.
- Vapor Density is the weight of the vapor of the chemical in relation to air, which is equal to 1. If the vapor density exceeds 1, the vapor will settle to the floor. If it is less than 1, it will tend to rise to the ceiling. Be sure people understand that all gasses do not rise. Knowing the vapor density allows one to decide where the clear air is most likely to be during an unanticipated release of a chemical.
- Specific Gravity is the weight of the liquid in relation to water which is 1. Liquids with specific gravity greater than 1 will tend to settle under a layer of water that may then suppress any vapor development.
- Appearance and odor are critical components of spill or leak identification.

IV. Fire and Explosion Hazard Data

- Flash Point is the minimum temperature at which a liquid gives off vapor in sufficient concentration to form an ignitable mixture with air near the surface of the liquid.
- Flammable limits are the minimum (LEL) and maximum (UEL) concentrations of a vapor or gas in air within which propagation of flame will occur when in contact with an ignition source. Below the LEL, the gas/air mixture is too “lean” to burn; above the UEL, the mixture is too “rich” to burn.

V. Reactivity Data

VI. Health Hazard Data

- Routes of entry into the body can include absorption (through the skin), ingestion (by swallowing), inhalation (breathing) and injection (punctures).
- Acute health hazards are those that occur rapidly or over a very short exposure.
- Chronic health hazards are those that have a long-term effect from a long-term exposure.
- Carcinogens are those chemicals which cause, or are believed to cause, cancer.

VII. Precautions for Safe Handling and Use

VIII. Control Measures

- These are the hazard controls to be used to reduce or eliminate the possibility of adverse human effects from the chemical. They include engineering controls, work practices, and PPE.

When explaining MSDS/SDS information to people, it is important to show them how to focus on the critical data. MSDS/SDS are often very confusing for people, but much of the information is relevant only to chemists, managers, and environmental and emergency responders. People should understand that a quick look at sections IV, V, and VI would tell them whether the chemical burns, reacts with

other materials, or creates health problems upon exposure. Sections VII and VIII tell them how to deal with the hazards identified. In most cases, there will be two or three key pieces of data that will be critical to their safety when working near or with the material. It is these points they need to understand and focus on, rather than trying to memorize the entire MSDS/SDS.