

# Material Safety Data Sheets



A Material Safety Data Sheet (MSDS) is designed to provide both workers and emergency personnel with the proper procedures for handling or working with a particular substance. MSDSs include information such as physical data (melting point, boiling point, flash point, etc.), toxicity, health effects, first aid, reactivity, storage, disposal, protective equipment, and spill/leak procedures. These are of particular use if a spill or other accident occurs, but should also be reviewed prior to working with a new product. When reviewing an MSDS for a substance, there are three key issues to be addressed:

- What are the hazards associated with the substance?
- How do I protect the environment, myself and those around me?
- How do I act if an accident occurs?

An MSDS does not have to be in a specific format. Hazard Communication (Right-To-Know) laws only require an MSDS contain certain types of information. However, there are two formats primarily used for organizing information on an MSDS. They are the Occupational Safety and Health Administration (OSHA) and American National Standards Institute (ANSI) formats. Below is an outline of what information can be found in each section of an MSDS in the OSHA format, with the corresponding ANSI section(s) format provided in parentheses.

## Section 1. Product Identity (ANSI Section 1)

- The name of the product (must match the name on label)
- The name and location of the manufacturer
- The date the MSDS was produced

## Section 2. Hazardous Ingredients and Exposure Limits (ANSI Sections 2, 3 and 9)

Products are usually a mixture of different chemicals. Many chemical products contain water or other substances which are not dangerous. These do not have to be listed on the MSDS.

- The MSDS must list all chemicals in the product which can cause harm
- The MSDS must include legal and recommended exposure limits

## Section 3. Chemical Characteristics (ANSI Sections 2 and 9)

- The temperature at which a liquid changes into a gas (boiling point)
- Whether a chemical vapor will rise or sink in the air (vapor density)
- Other physical properties

### EXPOSURE LIMITS

The Occupational Safety and Health Administration (OSHA) has rules to limit workers' exposure to hundreds of chemicals. These limits are called **Permissible Exposure Limits**, or **PELs**. These are the exposure levels that OSHA can legally enforce.

PELs are calculated based on an exposure for a full 8-hour shift. This is called an 8-hour **Time-Weighted-Average**, or **TWA**.

Some chemicals are so dangerous that the exposure limits cannot be averaged over a full shift. Instead, the **Short-Term Exposure Limits**, or **STELs**, are based on 15- or 30- minute periods.

Other chemicals have **Ceiling Limits**. The Ceiling Limit must not be exceeded at any time during the work shift. Ceiling limits take precedence over all TWAs and STELs.

The amount of a chemical a person is exposed to is usually measured in **parts per million**, or **ppm**. For every 1 million parts of air, there can be a certain number of parts of a chemical. One ppm is approximately equivalent to 1 teaspoon of water in a full bath tub.

A material with a PEL of 100 ppm means you could be exposed to 100 ppm for the entire 8-hour shift. Conversely, you could be exposed to 200 ppm for 4 hours, if your exposure was 0ppm for the remainder of the 8-hour shift, as long as you have not exceeded the ceiling limit for the chemical.



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## Section 4. Fire and Explosion Information (ANSI Section 5)

- Identifies any unusual fire or explosion hazards
- The lowest temperature at which a liquid will generate sufficient vapor to flash (ignite) when exposed to a source of ignition. (flashpoint)
- The amount of a chemical vapor that must be in the air to burn (lower explosive or flammable limit and the upper explosive or flammable limit)

## Section 5. Reactivity (ANSI Section 10)

- Whether a chemical is stable and what conditions to avoid
- Identifies other chemicals or materials to avoid mixing together

## Section 6. Health Effects (ANSI Sections 2, 3 and 11)

- Identifies the way a chemical enters the body (ingestion, inhalation, absorption)
- Lists the acute and chronic health effects that might occur

## Section 7. Handling and Storing Instructions (ANSI Sections 6, 7 and 13)

- What to do in case of a spill
- How to safely store and dispose of the chemical
- Refer to the UIUC Waste Management Guide for chemical disposal instructions on campus.  
<http://www.drs.illinois.edu/css/guidesplans/wasteguide/>  
DRS will make sure your waste is disposed of properly

## Section 8. Control Measures (ANSI Section 8)

Identifies ways to protect workers from exposure:

- If you read "use with adequate ventilation" or "do not breathe vapors (or dust)," then you need Engineering Controls (exhaust ventilation) or Personal Protective Equipment (respirator).
- Always implement Engineering Controls first. By removing the hazard through exhaust, the risk for exposure would be greatly reduced.
- If you read "avoid contact with skin," then protective gloves are necessary. Detailed information on what type of gloves provide adequate protection is not always available on the MSDS. In that case, you will need to consult a glove selection guide. The DRS Home Page has one available at <http://www.drs.illinois.edu/images/chempics/glove.qif>.

### ACUTE VS. CHRONIC HEALTH EFFECTS

Exposure to hazardous materials can produce adverse health effects. These can be either acute or chronic, with many chemicals capable of producing both.

An **acute health effect** occurs soon after the initial exposure. Usually related to a comparatively large and brief exposure.

These can include:

- Eye irritation
- Nasal, throat, and mucous membrane irritation
- Headaches
- Dermatitis or skin irritation and dizziness

A **chronic health effect** is often not noticed until long after the initial exposure. Effects may not be noticed for years, or even decades, after exposure. Generally, chronic health effects occur after repeated, low-level exposures.

Examples of chronic health effects include, but are not limited to:

- Cancer
- Skin damage
- Chronic obstructive pulmonary disease



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The general goal of MSDSs is to reduce the number of chemical-related illnesses, injuries and accidents in all sectors.

As such, MSDSs are many times written for bulk-scale (rail cars or 55 gallon drums) users, not for the small quantity end user. This does not mean you should disregard MSDS information, but rather use good judgment in reading an MSDS.

## Questions?

Contact the Division of Research Safety, Chemical Safety Section (333-2755 or [via e-mail at css@illinois.edu](mailto:css@illinois.edu)) or visit our web site: <http://www.drs.illinois.edu/css/>.

Other Chemical Safety Fact Sheets are available from the Chemical Safety Section at our web site: <http://www.drs.illinois.edu/css/factsheets/>.

