

REFERENCE DATA SHEET ON MATERIAL SAFETY DATA SHEETS

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REQUIRED AND POTENTIAL USES

- [OSHA Hazard Communication Standard](#)¹
 - General Industry
 - Shipyard Employment
 - Marine Terminals
 - Construction
 - Agriculture
 - Federal Employees
- [EPA](#) Regulations
 - Air Programs²
 - Superfund, Emergency Planning, and Community Right-To-Know Programs³⁻⁵
 - Toxic Substance Control Act⁶
 - Solid Wastes^{7, 8}
- DOT - Emergency Response Information⁹
- Employee Training

The purpose of a Material Safety Data Sheet (MSDS) is to inform industrial purchasers and users of hazardous chemicals of the reasonably foreseeable physical and chemical hazards that may arise from the use of those chemicals. Most materials packaged for consumer use are exempt from the requirements of the Hazard Communication Standard (HCS). The MSDS should include precautions for normal use, handling, storage, disposal, and spill cleanup. It should not include recommendations for protective measures that are more strict than needed. OSHA states, in the inspection procedures for the HCS,¹⁰ "Some MSDSs include recommendations for protective measures that are for 'worst case scenarios,' e.g., recommending supplied air suits for products of relatively low toxicity. The HCS requires that accurate information be provided on the MSDSs. This applies as much to 'overwarning' on the MSDS and label as well as the absence of information ('underwarning')."

HISTORY

In the 1940s the Manufacturing Chemists' Association, now known as the Chemical Manufacturers Association (CMA), began producing "Chemical Safety Data Sheets" containing "Properties and Essential Information for Safe Handling and Use" of some of the more important hazardous chemicals used in commerce. Ultimately about 100 of these Data Sheets were produced. They were very detailed in their coverage of each chemical, to the point of being almost a stand-alone book on the product. The longest Data Sheet was 46 pages. Later, some chemical

companies began to produce data sheets for some of their high volume or hazardous chemicals. CMA no longer produces or supports the "Chemical Safety Data Sheets."

On November 25, 1983 OSHA published the Hazard Communication Standard as 29 CFR Part 1910, adding §1910.1200. This initial standard applied only to Standard Industrial Classification (SIC) Codes 20 through 39. The requirement that manufacturers and distributors provide MSDSs to their customers became effective on November 25, 1985. The standard does not require a particular format for the MSDS, but does specify what information must be included. Effective September 23, 1987, the requirements of the standard were extended to include "... all employers with employees exposed to hazardous chemicals in their workplaces."

In 1986 the U.S. Environmental Protection Agency (EPA) published the "Emergency Planning and Community Right-To-Know Act of 1986," and in 1988 "Toxic Chemical Release Reporting: Community Right-To-Know." The use and distribution of MSDSs is an important part of these regulations. The "Toxic Chemical Release Reporting" regulation requires that MSDSs for chemicals requiring reporting by these regulations contain specific language notifying users that these chemicals are subject to these regulations. These and other EPA regulations have been promulgated under Title III C Emergency Planning and Community Right-To-Know Act of the Superfund Amendments and Reauthorization Act of 1986 (EPCRA).

OSHA's definition of a hazardous chemical is broad, and includes many materials that might otherwise be considered innocuous. Because of the potential for product liability suits, and the demands of customers for MSDSs for almost all materials they purchase, manufacturers usually prepare MSDSs for even relatively harmless materials.

IMPLICATIONS:

OSHA requires manufacturers and importers of hazardous chemicals to distribute Material Safety Data Sheets with information concerning reasonably foreseeable health and toxicity concerns arising from their use. Users of these chemicals are required to ensure that these MSDSs are received with chemicals they purchase, and that they are used and available in the workplace.

CONTENT OF A MATERIAL SAFETY DATA SHEET

Paragraph (g) of the OSHA Hazard Communication Standard specifies what must be contained in MSDSs. OSHA publishes a form that can be used for the MSDS, but does not require its use, as long as all of the required information is included. A condensed version of the language in the standard follows. Chemical manufacturers and importers shall obtain or develop a Material Safety Data Sheet for each hazardous chemical they produce or import. Employers shall have a Material Safety Data Sheet in the workplace for each hazardous chemical they use.

- A. Each Material Safety Data Sheet shall be in English, and shall contain at least the following information:
 1. The identity (product name) used on the label, and chemical and common name(s) of ingredients which have been determined to be health hazards, and which comprise 1% or greater of the composition, except carcinogens shall be listed if the concentrations are 0.1% or greater; and,
 2. The chemical and common name(s) of all ingredients which have been determined to present a physical hazard when present in the mixture;
 3. Relevant physical and chemical characteristics of the hazardous chemical (such as vapor pressure, flash point);
 4. Relevant physical hazards, including the potential for fire, explosion, and reactivity;
 5. Relevant health hazards, including signs and symptoms of exposure, and any medical conditions generally recognized as being aggravated by exposure to the chemical;

6. The primary route(s) of entry into the body;
 7. The OSHA permissible exposure limit and ACGIH Threshold Limit Value. Additional applicable exposure limits may be listed;
 8. Whether the hazardous chemical is listed in the National Toxicology Program (NTP) Annual Report on Carcinogens (latest edition) or has been found to be a potential carcinogen in the International Agency for Research on Cancer (IARC) Monographs (latest editions), or by OSHA;
 9. Precautions for safe handling and use, including appropriate hygienic practices, protective measures during repair and maintenance of contaminated equipment, and procedures for clean-up of spills and leaks;
 10. Appropriate control measures, such as engineering controls, work practices, or personal protective equipment;
 11. Emergency and first aid procedures;
 12. The date of preparation of the Material Safety Data Sheet or the last change to it; and,
 13. The name, address and telephone number of the chemical manufacturer, importer, employer or other responsible party preparing or distributing the Material Safety Data Sheet, who can provide additional information on the hazardous chemical and appropriate emergency procedures, if necessary.
- B. If no relevant information is found for any given category, it should be marked to indicate that no applicable information was found.
- C. If significant new information becomes available regarding the hazards of a chemical, or ways to protect against the hazards, this new information shall be added to the Material Safety Data Sheet within three months.
- D. A Material Safety Data Sheet must be provided with the initial shipment of a hazardous chemical, and with the first shipment after a Material Safety Data Sheet is updated.
- E. Material Safety Data Sheets shall also be made readily available, upon request, to designated employee representatives and to OSHA representatives.

IMPLICATIONS:

OSHA requires an extensive amount of specific information to be included, but the MSDS should not be a complete scientific work on the hazardous chemical. Employers may accept the content of an MSDS from a supplier unless they know it is incorrect. However, the employer must ensure that an MSDS is available for each hazardous chemical, and that it contains all of the required information. If an MSDS is not received, the employer must contact the supplier to request one. If the information is still not received, OSHA should be contacted for assistance.

The quality and accuracy of MSDSs varies widely. One recent study showed that of 150 randomly selected MSDSs, information was accurately identified in Health Effects in 37%, in First Aid Procedures in 76%, in Personal Protective Clothing in 47%, and in Occupational Exposure Limits in 47%.¹¹ A Material Safety Data Sheet is for the benefit of people who work with hazardous chemicals. If it is not in a reasonably accurate, useful, and understandable format, it will not achieve its purpose.

STANDARDIZATION OF MATERIAL SAFETY DATA SHEETS

Since the OSHA Hazard Communication Standard does not impose a format on MSDSs, there is a wide variation in the order in which the information is presented, and in the number of pages. The length of an MSDS can range from two pages to eight pages or even more. Some companies, in order to make the MSDS more uniform for their training programs, have transferred the information on vendor MSDSs into their own uniform format. The hazard of handling the information in this way is that the company then becomes the "responsible party" for the content of the MSDS.

In an effort to improve the completeness, accuracy, and consistency of MSDSs, the Chemical Manufacturers Association (CMA) has developed a voluntary standard for their preparation. The standard was published in 1993 as ANSI Z400.1-1993, "American National Standard for Hazardous Industrial Chemicals -- Material Safety Data Sheets -- Preparation."¹² The Standard is 179 pages long. It establishes an MSDS format containing sixteen sections. A very brief description of the purpose and scope of each section follows.

Section 1: Chemical Product and Company Identification Names the material and relates the MSDS with the label and shipping documents. Must also have a mailing address and telephone number for the manufacturer or distributor.

Section 2: Composition, Information on Ingredients Identifies the hazardous components of the material. If non-hazardous ingredients are listed, they should be listed separately. Chemical Abstract Service (CAS) numbers should be included, as well as OSHA Permissible Exposure Limits and American Conference of Government Industrial Hygienists (ACGIH) TLVs. If the identity of any ingredient is claimed to be a trade secret, it should be so indicated in this section.

Section 3: Hazards Identification Describes the material's appearance, odor, and health, physical, and environmental hazards that may be of concern for emergency response personnel.

Section 4: First Aid Measures This section should include emergency and first aid procedures. It should be in layman's language, easy to understand, and procedures for each potential route of exposure should be included. A "Notes to Physicians" subsection should be included if such information is available.

Section 5: Fire Fighting Measures This section should describe fire and explosive properties of the material, extinguishing media to be used, and fire-fighting instructions. It applies to anyone who may be in the area of the fire.

Section 6: Accidental Release Measures This section should have information needed to prevent or minimize adverse effects on employees, neighbors, property, and the environment, including waterways. It is intended for emergency response personnel.

Section 7: Handling and Storage This section provides guidelines for minimizing any potential hazards from storing the material. It should include information to minimize handling when appropriate, and conditions such as temperature, inert atmosphere, and conditions to avoid.

Section 8: Exposure Controls, Personal Protection Discusses the degree of engineering control that may be needed when handling the material, and the personal protective equipment that should be used if there is a potential for exposure above the regulatory or suggested limits. Exposure guidelines, such as OSHA PELs and ACGIH TLVs should be included in this section.

Section 9: Physical and Chemical Properties These properties should be included to assist users to determine proper handling and storage. Appearance, odor, physical state (liquid, solid, gas), pH, vapor pressure and density, melting and freezing point, solubility, and specific gravity should be included. Additional properties may be included if they are useful.

Section 10: Stability and Reactivity This section should describe conditions that may result in a potentially hazardous reaction, such as evolution of hazardous gases, production of heat, or other hazardous conditions.

Section 11: Toxicological Information This section should include any known information resulting from animal testing or human experience on the toxicity of the material. Also included would be information on its potential for causing cancer. Data should be included for acute, subchronic, and chronic exposures, if available.

Section 12: Ecological Information This section should list impacts to the environment that may occur if the material is released to the environment, or in evaluating waste treatment practices.

Section 13: Disposal Considerations This section is intended to provide guidance to environmental and other technical people responsible for waste management for the product.

Section 14: Transport Information This section should provide information concerning classification for shipping the material. It should include U.S. Department of Transportation (DOT) classifications, or an indication that it is not regulated. It may include information for shipment into other countries.

Section 15: Regulatory Information This section should contain information regarding the regulatory status of the material. It should include OSHA AND EPA regulations. It may also include other regulatory agencies, and state agencies, if appropriate.

Section 16: Other Information This section is intended for other material the preparer feels is pertinent, and that should not be included in the other fifteen sections. For example, it may include label information, hazard ratings, revision dates, and references to other related information.

IMPLICATIONS:

Although the OSHA Hazard Communication does not require the use of a specific format for the preparation of MSDSs, many suppliers may request them in the ANSI format in the interest of having a more uniform placement of information. This may aid them in training their people to use these chemicals and materials safely.

REFERENCES

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11. Kolp, P., P. Williams and R. Burtan, "Assessment of the Accuracy of Material Safety Data Sheets," *American Industrial Hygiene Association Journal* 56 (2):178-183 (1995).
12. *American National Standard for Hazardous Industrial Chemicals -- Material Safety Data Sheets -- Preparation*, ANSI Z400.1-1993. New York, American National Standards Institute, 1993.

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