

*REVIEW ARTICLE*

**Material Safety And Data Sheet: A Review**

**Mayur Modh\*, Dr. N.M.Patel , Dr. P.M.Patel**

*Department of Quality Assurance, Shri B.M. Shah College of Pharmaceutical Education and Research , Modasa , Gujarat, India.*

Received 26 Jun 2011; Revised 28 Sep 2011; Accepted 02 Oct 2011

**ABSTRAT**

Material Safety Data Sheets (MSDSs) are essential sources of information regarding health risks from exposure to toxic chemicals. We analyzed the reproductive health hazard descriptions on nearly 700 MSDSs for lead- or ethylene glycol ether-containing products submitted by central Massachusetts firms to the Department of Environmental Protection under provisions of the Massachusetts Right-to-Know Law. Over 60% of the MSDSs made no mention whatsoever of effects on the reproductive system. Those that did were much more likely to address developmental risks than male reproductive effects. The MSDSs from firms employing 100 or more workers mentioned reproductive system effects more frequently than those from smaller companies. While the informativeness of the health hazard descriptions increased over time, 53% of the MSDSs prepared after promulgation of the OSHA Hazard Communication Standard still contained no information on reproductive risks.

**Key Words:** Material safety Data Sheets, Environmental Protection, OSHA Hazard Communication standards.

**INTRODUCTION**

Although the term "material safety data sheet (MSDS)" is used internationally, different jurisdictions have different content requirements. For example, an MSDS prepared in accordance with the United States OSHA Hazard Communication Standard (HCS), does not necessarily comply with regulatory requirements in other jurisdictions.

An internationally-harmonized 16-heading MSDS format has been developed. This "international format" has been adopted by the European Union (EU), the International Standards Organization (ISO) and the International Labor Organization (ILO) and is documented in ANSI (American National Standards Institute) Standard Z400.1-1993. Use of this format meets U.S. OSHA requirements (as long as all required information is included). In Canada, regulatory authorities have agreed to allow the use of the 16-heading format, provided that all of the MSDS information required under the Controlled Products Regulations is included and that a statement on the MSDS indicates that (1) the product was classified in accordance with the hazard criteria of the Canadian Controlled Products Regulations and

(2) the MSDS contains all the information required by those regulations.

The acceptance of the international MSDS format by regulatory bodies makes it possible to incorporate the information requirements of multiple jurisdictions on one data sheet, thus simplifying the requirements for companies who sell products internationally. Caution must be exercised, however, since different jurisdictions may use slightly different definitions or criteria for flammability, toxicity, and so on. In these cases, the international MSDS must make it clear which jurisdictions' definitions have been used in preparing the information. Guidance concerning Canadian and U.S. definitions is provided in the CCOHS publication "The Material Safety Data Sheet - An Explanation of Common Terms". The applicable regulations should also be consulted.

Content requirements for Canadian MSDSs under WHMIS (the Workplace Hazardous Materials Information System) are set out in the federal Controlled Products Regulations. Schedule 1, Column III of these regulations lists 53 subheadings (information items) for material safety data sheets. Three of these are mandatory and must be disclosed in all cases: (1) the

ingredients of the product, (2) the party responsible for preparing the MSDS (name and phone number) and (3) the date the sheet was prepared. All other information items must be included IF AVAILABLE AND APPLICABLE. There is no requirement for a supplier to conduct toxicological testing before classifying the material and publishing an MSDS. However, it is expected that suppliers will conduct tests for flammability, vapor pressure for compressed gases and corrosively to metals, if data are not available.

It is generally recommended that each subheading should be shown on the MSDS and "not applicable" and "not available" should be used as appropriate. It should be noted that, to prevent confusion, the abbreviation "n.a." should not be used for "not available" as some readers may interpret it to mean "not applicable".

A good quality material safety data sheet will use commonly understood language and will minimize the use of technical jargon and unexplained abbreviations.

#### **Purpose:**

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.

"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 over warning' on the MSDS and label as well as the absence of information ('under warning')."

#### **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. 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. Information on composition, physical and chemical characteristics, toxicological and ecotoxicological effects. To multi-national clients we prepare and translate MSDS considering the legislation of the EU as well as the national

#### **Material safety data sheet translation and adaptation**

To multinational companies we translate safety data sheets into the language their business need require, considering local regulations.

Our experts prepare MSDS documents according to national legislation. Direct translation of the documents is rarely sufficient. It is a common experience that modifications in format and content of the original safety data sheet are necessary. We prepare MSDS in English, Czech, French, Polish, Hungarian, German, Italian, Romanian, Spanish, Slovakian, Slovenian, Russian and Chinese.

#### **Periodic review and revision of material safety data sheets**

Continuous tracking of changes in the relevant legislation

Modification of safety data sheets according to changes in legislation

The latest available information provided by the manufacturer/ distributor will be added to the MSDS

Modification the hazard classification of the product in case of changing in chemical composition, necessary content and format changes.

## Downloading material safety data sheets from our side

We offer our clients the option of uploading safety data sheets prepared by our experts into our database to make them available via Internet whenever needed

Additional PR material (company and/or product information) is to be uploaded as well.

We guarantee the security of your documents through password protected access provided only to registered users.

### Free online consultation:

Inter Professional consultation on MSDS preparation

Obligations accompanied by the submission of material safety data sheets to the permit-granting institution in charge.

Relevant legislation, national and European Union regulations

Registration, REACH

Chemical safety related general information pretention of information and data indicated in the material safety data sheet.

## CONTENT OF A MATERIAL SAFETY DATA SHEET

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

Each Material Safety Data Sheet shall be in English, and shall contain at least the following information:

### A.

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, 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, 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;
  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 representatives

## B. STANDARDIZATION OF MATERIAL SAFETY DATA SHEETS

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." 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.

## REFERENCES

1. "Hazard Communication," *29 CFR 1910.1200*. Washington, Occupational Safety and Health Administration 52 FR 31877, August 24, 1987.
2. "National Emission Standards for Hazardous Air Pollutants for Source Categories," *40 CFR Part 63*. Washington, Environmental Protection Agency, 58 FR 61970, Dec.29, 1993.
3. "Emergency Planning and Notification," *40 CFR Part 355*. Washington, Environmental Protection Agency, 52 FR 13395, Apr. 22, 1987.
4. "Hazardous Chemical Reporting: Community Right-To-Know," *40 CFR Part 370*. Washington, Environmental Protection Agency, 52 FR 38364, Oct. 15, 1987.
5. "Toxic Chemical Release Reporting: Community Right-To-Know," *40 CFR Part 372*. Washington, Environmental Protection Agency, 53 FR 4525, Feb. 16, 1988.
6. "Significant New Uses of Chemical Substances." *40 CFR Part 371*. Washington, Environmental Protection Agency, 53 FR 28358, July 27, 1988.
7. "Standards for the Management of Specific Hazardous Wastes and Specific Types of Hazardous Waste Management Facilities," *40 CFR Part 266*. Washington, Environmental Protection Agency, 50 FR 666, Jan. 4, 1985.
8. "Land Disposal Restrictions," *40 CFR Part 266*. Washington, Environmental Protection Agency, 51 FR 40638, Nov. 7, 1986.