Material Safety Data Sheets

The Material Safety Data Sheet (MSDS) has become a major source of chemical information. It is the key document used to provide hazard information to employees and can become an invaluable tool for emergency personnel when used in a chemical emergency.

Occupational Safety and Health (OSHA) Hazard Communication Standard (29 CFR 1910.1200) requires all manufacturers of pure chemicals and/or mixtures to evaluate their products and relate, via MSDS, any hazards that may be encountered while handling these materials. This standard is intended for all workplaces, manufacturing and non-manufacturing alike. The Environmental Protection Agency's (EPA) Emergency Response and Community Right-to-Know Act of 1986 ensures the availability of MSDS to emergency response personnel such as fire departments, first aid crews, and hospital emergency room staff.

MSDS contain a wealth of information which may be understood with a minimum of training. It is the purpose of this document to briefly explain the format and information found in properly prepared MSDS.

Section 1

This section identifies the material by product or trade name and chemical name. It is the product or trade name that is usually found on the container labels although the chemical name is also required by some states. Section I will also contain the manufacturer's name, address, and telephone number.

Section 2

This section lists the chemical ingredients of the material if they are known or suspected to be hazardous. Hazardous materials which are not carcinogens must be reported if they represent 1 percent or more of the product. Carcinogens must be reported and identified as such if their levels are 0.1 percent or higher. Also included in this section are Threshold Limit Values (TLV) and OSHA Permissible Exposure Limit (PEL).

Section 3

Section 3 provides physical data about the product that can be utilized for proper identification. Included are specifics such as color, odor, specific gravity (weight), vapor pressure, and boiling point.

SECTION 4

Section 4 includes fire and explosion hazard data. This information is especially useful when devising both in-house and community contingency plans. Plant first responders, local fire departments, and HAZMAT teams need unlimited access to this information.

SECTION 5

This section contains information on the reactivity of the product. It will list other chemicals which, when mixed with the product, will result in a chemical reaction. If a product is water reactive it will be noted in this section.

Also, hazardous decomposition products such as carbon monoxide and other hazardous gases formed and emitted during chemical reactions or during fires are listed. It is imperative that this section be carefully noted by firefighters, both in-house and local.

SECTION 6

Section 6 contains health hazard data. It will describe any acute (short-term exposure) and/or chronic (long-term exposure) effects on the body. These will include routes (inhalation, skin, ingestion) of overexposure and the bodily organs affected as well as the signs and symptoms of overexposure. First aid procedures will also be found in this section.

SECTION 7

Section 7 lists the procedures that should be used if the product spills or leaks, including waste disposal methods.

SECTION 8

Section 8 contains information regarding the proper personal protective equipment (PPE) necessary to handle the product in a manner which will minimize exposure. Ventilation practices are also listed in this section.

SUMMARY

A Material Safety Data Sheet can aid in making the right decisions on health and safety issues in a plant or in a community. Yet, it must be noted that it is but one of many references that should be used to make final determinations. MSDS are offered by manufacturers for identification and verification and are not the last word on safety and health practices.

·May impair movement in confined spaces.

1. MATERIAL SAFETY DATA SHEET

PRODUCT NAME:	CAS #
CHEMICAL NATURE:	
% ACTIVITY:	

2. PHYSICAL DATA

BOILING POINT, 760 MM HG		FREEZE POINT	
SPECIFIC GRAVITY		VAPOR PRESSURE AT 20 C	
VAPOR DENSITY		SOLUBILITY IN H20	
PER CENT VOLATILES BY WEIGHT		IONIC NATURE	
APPEARANCE AND ODOR			

3. CHEMICAL INGREDIENTS

MATERIAL	%	TLV (Units)

4. FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (test methods)		AUTOIGNITION TEMPERATURE			
FLAMMABLE LIMITS IN AIR, % by volume		Lower		Upper	
EXTINGUISHING MEDIA					
SPECIAL FIRE FIGHTING PROCEDURES					
UNUSUAL FIRE AND EXPLOSION HAZARDS					

SAMPLE MATERIAL SAFETY DATA SHEET

5. HEALTH HAZARD DATA

TRESHOLD LIMIT VALUE
EFFECTS OF EXPOSURE
EMERGENCY AND FIRST AID PROCEDURES

6. REACTIVE DATA

STABILITY		CONDITIONS TO AVOID	
UNSTABLE	STABLE		
COMPATIBILITY			
HAZARDOUS RECOMPOSITION PRODUCTS			
HAZARDOUS POLYMERIZATION		CONDITIONS TO AVOID	

7. SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN OR MATERIAL IS RELEASED OR SPILLED	
WASTE DISPOSAL METHOD	

8. SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION				
VENTILATION	LOCAL EXHAUST		SPECIAL	
	MECHANICAL		OTHER	
PROTECTIVE GLOVES			EYE PROTECTION	
OTHER PROTECTIVE EQUIPMENT				

9. SPECIAL PRECAUTIONS

PRECAUTIONARY LABELING	
OTHER HANDLING AND STORAGE CONDITIONS	

SAMPLE MATERIAL SAFETY DATA SHEET

Appendix B
Types of Respiratory Protection

Type of Respirator	Advantages	Disadvantages
Air Purifying		
Air-Purifying Respirator (Including powered air-purifying respirators [PAPRs].)	Enhanced mobility.	Cannot be used in IDLH or oxygen-deficient atmospheres (less than 19.5% oxygen at sea level).
	Lighter in weight than an SCBA. Generally weighs 2 pounds (1 kg) or less (except for PAPRs).	Limited duration of protection. May be hard to gauge safe operating time in field conditions.
		Only protects against specific chemicals, and up to specific concentrations.
		Use requires monitoring of contaminant and oxygen levels.
		Can only be used: (1) against gas and vapor contaminants with adequate warning properties or (2) for specific gases or vapors provided that the service is known and a safety factor is applied, or if the unit has an ESLI (end-of-service-life-indicator).
Atmosphere-Supplying		
Self-Contained Breathing Apparatus (SCBA)	Provides the highest available level of protection against airborne contaminants and oxygen deficiency.	Bulky, heavy (up to 35 pounds).
		Finite air supply limits work duration.
	Provides the highest available level of pro- tection under strenuous work conditions.	May impair movement in confined spaces.
Positive-Pressure Supplied-Air Respirator (SAR) (also called air line respirator)	Enables longer work periods than an SCBA.	Not approved for use in atmospheres immediately dangerous to life or health (IDLH) or in oxygen-deficient atmospheres unless equipped with an emergency egress unit, such as an escape-only SCBA that can provide immediate emergency respiratory protection in case of air line failure.
	Less bulky and heavy than an SCBA. SAR equipment weighs less than 5 pounds (or around 15 pounds, if escape SCBA protection is included).	
	Protects against most airborne contaminants	Impairs mobility.

Appendix B (cont.)
Types of Respiratory Protection

Type of Respirator	Advantages	Disadvantages
SAR (continued)		Mine Safety and Health Administration/ NIOSH certification limits hose length to 300 feet (90 meters). As the length of the hose is increased, the minimum approved airflow may not be delivered at the faceplate. Air line is vulnerable to damage, chemical contamination, and degradation. Decontamination of hoses may be difficult. Worker must retrace steps to leave work area. Requires supervision/monitoring of the air supply line.

Appendix C. Levels of Protection*

Level of Protection	Equipment	Protection Provided	Should be used when:	Limiting Criteria
A	Recommended: Pressure-demand, full-facepiece SCBA or pressure-demand, supplied-air respirator with escape SCBA. Fully-encapsulating, chemical-resistant suit. Inner chemical-resistant gloves. Chemical-resistant safety boots/shoes. Two-way radio communication. OPTIONAL: Cooling unit. Coveralls. Long cotton underwear. Hard hat. Disposable gloves and boot covers.	The highest available level of respiratory, skin, and eye protection.	The chemical substance has been identified and requires the highest level of protection for skin, eyes, and the respiratory system based on either: - Measured (or potential for) high concentration of atmospheric vapors, gases, or particulates or - Site operations and work functions involving a high potential for splash, immersion, or exposure to unexpected vapors, gases, or particulates of materials that are harmful to skin or capable of being absorbed through the intact skin. Substances with a high degree of hazard to the skin are known or suspected to be present, and skin contact is possible. Operations must be conducted in confined, poorly ventilated areas until the absence of conditions requiring Level A protection is determined.	Fully-encapsulating suit material must be compatible with the substances involved.

*Reprinted from NIOSH/OSHA/USCG/EPA
Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities, Department of Health and Human Services, October 1985.

Appendix C. Levels of Protection*

Level of Protection	Equipment	Protection Provided	Should be used when:	Limiting Criteria
B	**Recommended:** Pressure-demand, full-facepiece SCBA or pressure-demand, supplied-air respirator with escape SCBA. Chemical-resistant clothing (overalls and long-sleeved jacket; hooded, one- or two-piece chemical splash suit; disposable chemical-resistant one-piece suit). Inner and outer chemical-resistant gloves. Chemical-resistant safety boots/ shoes. Hard hat. Two-way radio communication. **Optional:** Coveralls. Disposable boot covers. Face shield. Long cotton underwear.	The same level of respiratory protection, but less skin protection than Level A. It is the minimum level recommended for initial site entries until the hazards have been further identified.	The type and atmospheric concentration of substances have been identified and require a high level of respiratory protection, but less skin protection. This involves: - Atmospheres with IDLH concentrations of specific substances that do not represent a severe skin hazard or - Atmosphere containing less than 19.5% oxygen. Presence of incompletely identified vapors or gases is indicated by direct-reading organic vapor detection instrument, but vapors and gases are not suspected of containing high levels of chemicals harmful to skin or capable of being absorbed through the intact skin.	Use only when the vapor or gases present are not suspected of containing high concentrations of chemicals that are harmful to skin or capable of being absorbed through the intact skin. Use only when it is highly unlikely that the work being done will generate either high concentrations of vapors, gases, or particulates or splashes of material that will affect exposed skin.

Appendix C. Levels of Protection*

Level of Protection	Equipment	Protection Provided	Should be used when:	Limiting Criteria
C	**Recommended:** Full-facepiece, air-purifying, canister-equipped respirator. Chemical-resistant clothing (overalls and long-sleeved jacket; hooded, one- or two-piece chemical splash suit; disposable chemical-resistant one-piece suit). Hard hat. **Optional:** Gloves. Escape mask. Face shield.	No respiratory protection. Minimal skin protection.	The atmosphere contains no known hazard. Work functions preclude splashes, immersion, or the potential for unexpected inhalation of or contact with hazardous levels of any chemicals.	This level should not be worn in the Exclusion Zone. The atmosphere must contain at least 19.5% oxygen.
D	**Recommendations:** Coveralls. Safety boots/shoes. Safety glasses or chemical splash goggles. Hard hat. **Optional:** Gloves. Escape mask. Face shield.	No respiratory protection. Minimal skin protection.	The atmosphere contains no known hazard. Work functions preclude splashes, immersion, or the potential for unexpected inhalation of or contact with hazardous levels of any chemicals.	This level should not be worn in the Exclusion Zone. The atmosphere must contain at least 19.5% oxygen.

COMMENTS

The Agency for Toxic Substances and Disease Registry would greatly appreciate your comments and suggestions for improving future editions of this guidance material. They may be addressed to:

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