

**The CHAMPLIN
Material Safety
Data Sheet**

USER'S GUIDE

**and Glossary of
Common MSDS Terms**



A Subsidiary of Union Pacific Corporation

ACKNOWLEDGEMENT FORM

I acknowledge receipt of Champlin's "Material Safety Data Sheet, User's Guide and Glossary of Common MSDS Terms" for my personal information and use and that I have received the training and understand the content and meaning.

PRINT NAME	_____
SIGNATURE	_____
COMPANY IF OTHER THAN CHAMPLIN	_____
DATE	_____/_____/_____
CHAMPLIN LOCATION	_____

For Champlin employees, this acknowledgement form should be placed in the employee's personnel file.

For non-employees this form should be returned to the designated representative.

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THE MATERIAL SAFETY DATA SHEETS (OR PORTIONS THEREOF) USED IN THIS GUIDE ARE EXAMPLES ONLY. REFERENCE SHOULD BE MADE TO THE MOST CURRENT MATERIAL SAFETY DATA SHEETS FOR INFORMATION REGARDING SPECIFIC PRODUCTS. THIS GUIDE IS INTENDED FOR TRAINING ONLY.

FORWARD

This publication has been developed for Champlin employees who may have occasion to refer to Material Safety Data Sheets (MSDSs) in the course of their work activities.

The information contained in this guide should be equally useful to the Champlin customer, the contractor, the outside physician or others concerned with protection of people, property and the environment. The information is not confidential or proprietary, and may be shared freely with such outside associates and contacts who have a need for this information.

It must be understood that this Guide is intended as a reference, and that much of the information is in condensed form. The MSDS itself may not be sufficient information for those implementing specific safe work practices or purchasing proper protective equipment. The MSDS is intended to alert the user to the potential hazards, and the basic principles or methods to be considered, for the safe use and handling of the material. Other, more detailed sources of information should be consulted when more data is needed.

The purpose of the Material Safety Data Sheet (MSDS) is to provide readily accessible information regarding the characteristics of chemical products and intermediate materials (this includes catalysts and chemicals) and the appropriate safe work habits for each. Since all conditions of material handling cannot be covered, conservative measures are generally described.

The MSDS is a standardized format, organized into nine sections. The sections provide information on each material, such as names, ingredients, health information, occupational exposure limits, emergency and first aid procedures, physical data, fire and explosion hazards, reactivity, employee protection, transportation requirements and other regulatory controls.

CH/W-000682

TYPICAL MATERIAL SAFETY DATA SHEET

(Similar to Form OSHA-20)

SECTION I					
MANUFACTURER'S NAME				EMERGENCY TELEPHONE NO.	
ADDRESS (Number, Street, City, State, and ZIP Code)					
CHEMICAL NAME AND SYNONYMS			TRADE NAME AND SYNONYMS		
CHEMICAL FAMILY			FORMULA		
SECTION II - HAZARDOUS INGREDIENTS					
PAINTS, PRESERVATIVES, & SOLVENTS	%	TLV (Units)	ALLOYS AND METALLIC COATINGS	%	TLV (Units)
PIGMENTS			BASE METAL		
CATALYST			ALLOYS		
VEHICLE			METALLIC COATINGS		
SOLVENTS			FILLER METAL PLUS COATING OR CORE FLUX		
ADDITIVES			OTHERS		
OTHER					
HAZARDOUS MIXTURES					
SECTION III - PHYSICAL DATA					
BOILING POINT (°F.)			SPECIFIC GRAVITY (H ₂ O=1)		
VAPOR PRESSURE (mm Hg.)			PERCENT. VOLATILE BY VOLUME (%)		
VAPOR DENSITY (AIR=1)			EVAPORATION RATE (_____ = 1)		
SOLUBILITY IN WATER			PH		
APPEARANCE AND ODOR					
SECTION IV - FIRE AND EXPLOSION HAZARD DATA					
FLASH POINT (Method used)		AUTO IGNITION		FLAMMABLE LIMITS % IN AIR	
				LEL	UEL
EXTINGUISHING MEDIA CO ₂ _____ WATER _____ FOAM _____ DRY CHEMICAL _____ OTHER _____					
SPECIAL FIRE FIGHTING PROCEDURES					
UNUSUAL FIRE AND EXPLOSION HAZARDS					
NFPA RATINGS (SCALE 0-4): HEALTH = 3 FIRE = 1					
REACTIVITY = 0 CERCLA RATINGS (SCALE 0-3): HEALTH = 3					
FIRE = 1 REACTIVITY = 0 PERSISTENCE = 0					

TYPICAL MATERIAL SAFETY DATA SHEET

(Similar to Form OSHA-20)

SECTION I	
MANUFACTURER'S NAME ABC Chemical Co.	EMERGENCY TELEPHONE NO. (123) 456-7890
ADDRESS (Number, Street, City, State, and ZIP Code) 101 Main St. Anywhere S.D. 000000	
CHEMICAL NAME AND SYNONYMS Ammonia, Anhydrous	TRADE NAME AND SYNONYMS Ammonia
CHEMICAL FAMILY Inorganic Bases	FORMULA N H ₃

SECTION I

Manufacturers Name and Address. Self-explanatory, however, if source of data is provided by other than that of the manufacturer of the substance or mixture, the actual source of the data should be noted in Section IX.

Emergency Telephone Numbers. Entries here include those telephone numbers which can be used in the event of an emergency, to obtain further information about the hazardous substance or mixture.

Chemical Name and Synonyms. Generally includes the name that the product is sold by.

Chemical Family. Listed will be the general class of compounds to which the hazardous substance or mixture belongs, i.e., ethers, acids, ketones, etc.

Formula. Entries here will generally include the chemical formula for single elements and compounds, not the formulation of a mixture; example of a chemical formula is ammonia NH₃.

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SECTION III - PHYSICAL DATA			
BOILING POINT (°F.)	-28° F	SPECIFIC GRAVITY (H ₂ O=1) -33.35°C/4°	0.6891
VAPOR PRESSURE (mm Hg.) 70°F	114.1 psig	PERCENT. VOLATILE BY VOLUME (%)	100
VAPOR DENSITY (AIR=1) 32°F. 1 atoms	0.597	EVAPORATION RATE (_____-1)	N/A
SOLUBILITY IN WATER	Soluble	PH 14	
APPEARANCE AND ODOR	Colorless	ODOR: Pungent	

SECTION III

PHYSICAL DATA

Boiling Point. The temperature at which a liquid changes to a vapor state, at a given pressure; usually in degrees Fahrenheit (°F) at sea level pressure of 760 millimeters (mm) of mercury (Hg). For mixtures, the initial boiling point or the boiling range may be given.

Vapor Pressure. The pressure exerted by a saturated vapor above its own liquid in a closed container, usually stated in millimeters (mm) of mercury (Hg) at 68 degrees Fahrenheit (°F) or 20 degrees Celsius (°C).

Vapor Density. The weight of a vapor or gas compared to the weight of an equal volume of air; and expression of the density of the vapor or gas. Materials lighter than air have vapor densities less than 1.0 (examples: acetylene, methane, hydrogen). Materials heavier than air (examples: propane, hydrogen sulfide, ethane, butane, chlorine, sulfur dioxide) have vapor densities greater than 1.0. All vapors and gases will mix with air, but the lighter materials will tend to rise and dissipate (unless confined). Heavier vapors and gases are likely to concentrate in low places--along or under floors, in swamps, sewers and manholes, in trenches and ditches--where they may create fire or health hazards.

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SECTION IV - FIRE AND EXPLOSION HAZARD DATA						
FLASH POINT (Method Used)	AUTO IGNITION 1204° F	FLAMMABLE LIMITS % IN AIR	LEL	16	UEL	25
EXTINGUISHING MEDIA CO. <u>WATER</u> <u>X</u> FOAM <u> </u> DRY CHEMICAL <u> </u> OTHER <u> </u>						
SPECIAL FIRE FIGHTING PROCEDURES <u> </u> Spray or fog-type water systems						
SCBA may be required						
UNUSUAL FIRE AND EXPLOSION HAZARDS						
NFPA RATINGS (SCALE 0-4): HEALTH = 3 FIRE = 1						
REACTIVITY = 0 CERCLA RATINGS (SCALE 0-3): HEALTH = 3						
FIRE = 1 REACTIVITY = 0 PERSISTENCE = 0						

SECTION IV

FIRE & EXPLOSION HAZARD DATA

Flash Point (Method Used). The lowest temperature in degrees Fahrenheit (°F), at which a liquid will give off enough flammable vapor to ignite. Since flash points vary according to how they are obtained, the method used must be listed. The methods used most extensively include: Tag Closed Cup (TCC); Pensky-Martens Closed Cup (PMCC) and Setaflash (SETA).

Auto Ignition. The auto-ignition temperature of a substance whether solid, liquid or gaseous is the lowest temperature required to initiate or cause, self-sustained combustion in the absence of a spark or flame. This temperature varies considerably, depending upon the nature, size and shape of the igniting surface or containers and other factors. The auto-ignition temperature of a solid is influenced by its physical condition and the rate of heating. Vapors of several common flammable liquids can be ignited under favorable conditions by metal heated to temperatures as low as 500 F. The vapor of carbon disulfide can be so ignited at a temperature of about 257°F.

Flammable Limits. The range of concentrations over which a flammable vapor mixed with proper proportions of air will flash if an ignition source is present.

SECTION V - HEALTH HAZARD DATA

THRESHOLD LIMIT VALUE (Ammonia Vapor) 50ppm		AIR SAMPLING AND ANALYSIS.
EFFECTS OF OVEREXPOSURE		
Irritation of eyes, upper respiratory tract and skin		
FIRST AID TREATMENT		
A. INHALATION: remove to fresh air, apply artificial		
respiration if not breathing and get medical attention		
B. SKIN CONTACT: flush with water		
C. EYE CONTACT: flush with water for at least 15 minutes,		
get medical attention		
D. INGESTION: get medical attention		

SECTION V

HEALTH HAZARD DATA

Threshold Limit Value. The most current figures of the American Conference of Governmental Industrial Hygienists (ACGIH) used to express air-borne concentration of a material to which nearly all persons can be exposed day after day, without adverse effect. Threshold Limit Values (TLV) may be expressed in three ways, i.e. Time Weighted Average (TWA), based on an allowable concentration exposure averaged over a normal 8-hour workday or 40-hour work-week, Short-term Exposure Limit (STEL) the maximum concentration for a continuous 15 minute exposure period (not to exceed 4 such exposures per day), and the Ceiling (C) Exposure Limit, the exposure concentration that is not to be exceeded under any circumstances.

Effects of Overexposure. List of most common sensations or symptoms a person could expect to experience from over-exposure.

Emergency and First-Aid Procedures. The instructions for treatment of a victim of acute inhalation, ingestion and skin or eye contact. The listed items should be for emergency procedures only as the victim should be examined by a doctor as soon after exposure as possible.

SECTION VII - SPILL OR LEAK PROCEDURES

CONTROL OF LEAKS OR SPILLS	Flush with large quantities of water
	Respiratory protection may be required for vapors.
	Avoid contact with liquid. Disposal should be in accordance with
WASTE DISPOSAL METHOD	local, state and federal regulations

SECTION VII

SPILL OR LEAK PROCEDURE

Control of Leaks or Spills. This should include the methods to be used to control and clean up spills and leaks, i.e., applicable precautions such as: avoiding breathing of gases or vapors; contact with liquids and solids; removing sources of ignition, etc. It should also list the need (if any) for special equipment to be used for clean up, such as glass or plastic scoops, etc.

Waste Disposal Methods. Should describe the acceptable, as well as prohibited methods for disposing of spilled solids or liquids, such as flushing with water, returning to container, burning, etc. Should also alert the user of any potential danger to the environment such as effects on general population, crops, water supplies, etc.

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SECTION IX - SPECIAL PRECAUTIONS

HANDLING AND STORAGE PRECAUTIONS	N/A
OTHER PRECAUTIONS	N/A

SECTION IX

SPECIAL PRECAUTIONS

Handling and Storage Precaution. Any additional or special precautions not addressed elsewhere in the MSDS should be listed here. This may include such items as handling or storing to avoid reaction hazards, safe storage life of the product in relation to reactivity, special packaging requirements, temperature control, etc.

Other Precautions. A catch-all category for any other general precautions that should be taken.

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GLOSSARY OF COMMON MSDS TERMS

Asphyxiant - A vapor or gas which can cause unconsciousness or death by suffocation (lack of oxygen). Most simple asphyxiants are harmful to the body only when they become so concentrated that they reduce oxygen in the air (normally about 21 percent) to dangerous levels (16 percent or lower). Asphyxiation is one of the principal potential hazards of working in confined spaces.

ASTM - American Society for Testing and Materials; voluntary membership organization with members from broad spectrum of individuals, agencies and industries concerned with materials. The world's largest source of voluntary consensus standards for materials, products, systems and services, ASTM is a resource for sampling and testing methods, health and safety aspects of biological agents and chemicals.

----- B -----

Boiling Point - The temperature at which a liquid changes to a vapor state, at a given pressure; usually expressed in degrees Fahrenheit at sea level pressure (760 mmHg, or one atmosphere). For mixtures, the initial boiling point or the boiling range may be given. Flammable materials with low boiling points generally present special fire hazards. Some approximate boiling points:

Propane	-44°F
Anhydrous Ammonia	-28°F
Butane	31°F
Gasoline	100°F
Allyl Chloride	113°F
Ethylene Glycol	387°F

BOM, or BuMines - Bureau of Mines of the U.S. Department of Interior. BOM began approving air breathing apparatus in 1918. Later added all types of respirators. BOM's respirator testing/approval activities have been discontinued; NIOSH now has this responsibility. BOM-approved Type 14F gas masks are still acceptable; all other BOM approvals have expired or been replaced by NIOSH approvals.

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GLOSSARY OF COMMON MSDS TERMS

- 0 = No Toxicity; Sax level 0 or NFPA level 0
Causes no harm under any conditions of normal use, produces toxic effects only under the most unusual conditions or by overwhelming dosage; or; on exposure under fire conditions; offers no hazard beyond that of ordinary combustible materials.
- 1 = Slight toxicity; Sax level 1 or NFPA level 1
Produces changes in the human body which are readily reversible and will disappear following termination of exposure; either with or without medical intervention.
- 2 = Moderate toxicity; Sax level 2 or NFPA level 2
Produces irreversible or reversible changes not of such severity to threaten life or cause serious physical impairment.
- 3 = Severe toxicity; Sax level 3 or NFPA level 3 or 4
Single exposure causes injury of sufficient severity to threaten life or cause permanent physical impairment.

IGNITABILITY/FLAMMABILITY

- U = Unknown
- 0 = Nonflammable or flash point $> 200^{\circ}\text{F}$.
- 1 = Flash point 140 to 200°F .
- 2 = Flash point 80 to 140°F .
- 3 = Flash point $< 80^{\circ}\text{F}$.

REACTIVITY/STABILITY

- U - Unknown
- 0 = Stable under fire conditions and not reactive with water.
- 1 - May become unstable at elevated temperature and pressure; may react nonviolently with water with some release of energy.
- 2 = Unstable and readily undergoes violent chemical change, but does not detonate; undergoes change with rapid release of energy at normal temperature and pressure or undergoes violent chemical change at elevated temperature and pressure; reacts violently or forms potentially explosive decomposition; or explosive reaction at normal or mechanical shock; or reacts explosively with water.

PERSISTENCE/BIODEGRADABILITY

- U = Unknown
- 0 = Nonpersistent compounds
- 1 = Somewhat persistent compounds
- 2 = Persistent compounds
- 3 = Highly persistent compounds

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GLOSSARY OF COMMON MSDS TERMS

Corrosive - A corrosive material is a liquid or solid that causes visible destruction of/or irreversible alterations in living tissue by chemical action at the site of contact. The term shall not refer to action on inanimate surfaces. A solid or liquid waste which exhibits a "characteristic of corrosivity", as defined by RCRA, may be regulated (by EPA) as a hazardous waste.

CPSC- Consumer Products Safety Commission; federal agency with responsibility for regulating hazardous materials when they appear in consumer goods. For CPSC purposes, hazards are defined in the Hazardous Substances Control Act and the Poison Prevention Packaging Act of 1970.

Cutaneous Toxicity - See "Dermal Toxicity".

----- D -----

Decomposition - Breakdown of a material or substance (by heat, chemical reaction, electrolysis, decay or other processes) into parts or elements or simpler compounds.

Dermal - Used on or applied to the skin.

Dermal Toxicity - Adverse effects resulting from skin exposure to a substance. Ordinarily used to denote effects in experimental animals.

DHHS - U.S. Department of Health and Human Services; created in 1980 to replace the Department of Health, Education and Welfare (DHEW) as "parent" for NIOSH, Public Health Service and other agencies related to health and safety.

DOL- U.S. Department of Labor; includes the Occupational Safety and Health Administration (OSHA).

DOT- U.S. Department of Transportation; regulates transportation of chemicals and other substances, to aid in the protection of the public as well as fire, law enforcement and other emergency response personnel, particularly when transportation incidents occur involving hazardous materials. Detailed DOT classification lists specify appropriate warnings--such as Oxidizing Agent or Flammable Liquid--which must be used for various substances.

GLOSSARY OF COMMON MSDS TERMS

FIFRA - Federal Insecticide, Fungicide and Rodenticide Act; regulations administered by EPA under this act require that certain useful poisons, such as chemical pesticides, sold to the public contain labels that carry health hazard warnings to protect users.

Flash Point - The temperature at which a liquid will give off enough flammable vapor to ignite. There are several flash point test methods, and flash points may vary for the same material depending on the method used, so the test method is indicated when the flash point is given (150 PMCC, 200 TCC, etc.).

Flammable - A "flammable liquid" is defined by NFPA and DOT as a liquid with a flash point below 100°F (37.8°C). Solids that will ignite readily or are liable to cause fires under ordinary conditions of transportation through friction or retained heat from manufacturing or processing, and which burn so vigorously and persistently as to create a serious transportation hazard are classified by DOT as "flammable solids." Also see "combustible."

Foreseeable Emergency - Means any potential occurrence such as, but not limited to, equipment failure, rupture of containers, or failure of control equipment which could result in an uncontrolled release of a hazardous chemical into the workplace.

Formula - The conventional scientific designation for a material (water is H₂O, sulfuric acid is H₂SO₄, sulfur dioxide is SO₂, etc.).

----- G -----

General Exhaust - A system for exhausting air containing contaminants from a general work area. Also see "local exhaust."

G - gram; a metric unit of weight. One ounce U.S. (avoirdupois) is about 28.4 grams. 454 grams = 1 lb.

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GLOSSARY OF COMMON MSDS TERMS

----- I -----

Incompatible Materials - Materials which could cause dangerous reactions from direct contact with one another are described as incompatible.

Ingestion - The taking in of a substance through the mouth.

Inhalation - The breathing in of a substance in the form of a gas, vapor, fume, mist, or dust.

Inhibitor - A chemical which is added to another substance to prevent an unwanted chemical change from occurring.

Irritant - Irritants are substances that cause minor or transient but possibly painful injuries that heal without scars and produce no known after effects. Many hydrocarbon and polar solvents are irritants.

----- K -----

kg - Kilogram; a metric unit of weight, about 2.2 U.S. pounds. Also see "g/kg", "g" and "mg".

----- L -----

l - Liter; a metric unit of capacity. A U.S. quart is about 9/10 of a liter.

LC - Lethal concentration; a concentration of a substance being tested that will kill a test animal.

LC₅₀ - Lethal concentration₅₀; the concentration of a material in air which on the basis of laboratory tests is expected to kill 50% of a group of test animals when administered as a single exposure (usually 1 to 4 hours). The LC is expressed as parts of material per million parts of air, by volume (ppm) for gases and vapors, or as micrograms of material per liter of air (ug/l) or milligrams of material per cubic meter of air (mg/m³) for dusts and mists, as well as gases and vapors.

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GLOSSARY OF COMMON MSDS TERMS

mg/kg - milligrams per kilogram; an expression of toxicological dose. See "g/kg".

mg/m³ - milligrams per cubic meter; a unit for measuring concentrations of dusts, gases or mists in air.

ml - milliliter; a metric unit of capacity, equal in volume to one cubic centimeter (cc), or about 1/16 of a cubic inch. There are 1,000 milliliters in one liter (l).

Millimeter - Unit of length equal to one thousandth of a meter.

mmHg - millimeters (mm) of mercury (Hg); a unit of measurement for low pressures or partial vacuums.

mppcf - million particles per cubic foot; a unit for measuring particles of a substance suspended in air. Exposure limits for mineral dusts (silica, graphite, Portland cement, nuisance dusts and others), formerly expressed as mppcf are now more commonly quoted in mg/m³.

MSHA - The Mine Safety and Health Administration of the U.S. Department of the Interior; federal agency with safety and health regulatory and enforcement authorities for the mining industry. Also see "OSHA."

Mutagen - A substance or agent capable of altering the genetic material in a living cell.

----- N -----

N/A - Not Available

NaOH - Sodium hydroxide, or caustic soda.

N₂ - Nitrogen gas; a colorless, odorless and tasteless gas that will not burn and will not support combustion. The earth's atmosphere (air) is about 78 per cent nitrogen; at higher concentrations, nitrogen can displace oxygen and become a lethal asphyxiant. See "asphyxiant".

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GLOSSARY OF COMMON MSDS TERMS

- NIOSH**- National Institute for Occupational Safety and Health of the Public Health Service, U.S. Department of Health and Human Services (DHHS); federal agency which--among other activities--tests and certifies respiratory protective devices and air sampling detector tubes, recommends occupational exposure limits for various substances and assists OSHA and MSHA in occupational safety and health investigations and research.
- NO.**- Oxides of nitrogen; undesirable air pollutants. NO_x emissions are regulated by EPA under the Clean Air Act.
- Olfactory** - Relating to the sense of smell. The olfactory organ in the nasal cavity is the sensing element that detects odors and transmits information to the brain through the olfactory nerves.
- Oral** - Used in or taken into the body through the mouth.
- Oral Toxicity** - Adverse effects resulting from taking a substance into the body via the mouth. Ordinarily used to denote effects in experimental animals.
- OSHA** - Occupational Safety and Health Administration of the U.S. Department of Labor; federal agency with safety and health regulatory and enforcement authorities for most U.S. industry and business. Also see "MSHA."
- Oxidation** - In a literal sense, oxidation is a reaction in which a substance combines with oxygen provided by an oxidizer or oxidizing agent (see definitions below). In a broader sense, based on modern atomic theory, science today defines oxidation as a reaction--brought about by an oxidizing agent in which atoms, molecules or ions lose electrons. In this broader sense, an oxidation reaction may occur even when oxygen is not present. However it may be defined, an oxidation reaction is always accompanied by an offsetting (balancing) reduction reaction in which (1) oxygen is removed from a compound or (2) atoms, molecules or ions gain electrons.

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GLOSSARY OF COMMON MSDS TERMS

- Polymerization** - A chemical reaction in which one or more small molecules combine to form larger molecules. A hazardous polymerization is a reaction which takes place at a rate which releases large amounts of energy. If hazardous polymerization can occur with a given material, the MSDS usually will list conditions which could start the reaction and--since the material usually contains a polymerization inhibitor--the expected time period before the inhibitor is used up.
- ppm** - Parts per million; a unit for measuring the concentration of a gas or vapor in air--parts (by volume) of the gas or vapor in a million parts of air. Also used to indicate the concentration of a particular substance in a liquid, gas or solid.
- ppb** - Parts per billion; a unit for measuring the concentration of a gas or vapor in air--parts (by volume) of the gas or vapor in a billion parts of air. Usually used to express measurements of extremely low concentrations of unusually toxic gases or vapors. Also used to indicate the concentration of a particular substance in a liquid, gas or solid.
- psi** - Pounds per square inch; for MSDS purposes, a unit for measuring the pressure a material exerts on the walls of a confining vessel or enclosure. For technical accuracy, pressure must be expressed as psig (pounds per square inch gauge) or psia (pounds per square inch absolute; that is; gauge pressure plus sea level atmospheric pressure, or psig plus about 14.7 pounds per square inch). Also see "mmHg".

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GLOSSARY OF COMMON MSDS TERMS

----- S -----

Sensitizer - A chemical that causes a substantial proportion of exposed people or animals to develop an allergic reaction in normal tissue after repeated exposure to the chemical.

Seta - Setaflash Closed Tester; a flash point test method.

"Skin" - A notation, sometimes used with PEL or TLV exposure data; indicates that the stated substance may be absorbed by the skin, mucous membranes and eyes--either airborne or by direct contact--and that this additional exposure must be considered part of the total exposure to avoid exceeding the PEL or TLV for that substance.

Skin Sensitizer - See "Sensitizer".

Skin Toxicity - See "Dermal Toxicity".

Solubility in water - A term expressing the percentage of a material (by weight) that will dissolve in water at ambient temperature. Solubility information can be useful in determining spill clean up methods and fire-extinguishing agents and methods for a material. Terms used to express solubility are:

negligible	Less than 0.1 per cent
slight	0.1 to 1.0 per cent
moderate	1 to 10 per cent
appreciable	more than 10 per cent
complete	soluble in all proportions

SO_x - Oxides of sulfur; undesirable air pollutants. SO_x emissions are regulated by EPA under the Clean Air Act.

Species - A biological type; on MSDSs, species refers to the test animals--usually rats, mice or rabbits--which were used to obtain the toxicity test data reported.

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GLOSSARY OF COMMON MSDS TERMS

TLV- Threshold Limit Value; a term used by ACGIH to express the airborne concentration of a material to which nearly all persons can be exposed day after day, without adverse effects. ACGIH expresses TLV's in three ways:

TLV-TWA: the allowable Time Weighted Average concentration for a normal 8-hour work day and 40-hour work week.

TLV-STEL: the Short-Term Exposure Limit, or maximum concentration for a continuous 15-minute exposure period (maximum of four such periods per day, with at least 60 minutes between exposure periods, and provided that the daily TLV-TWA is not exceeded).

TLV-C: the Ceiling Exposure Limit--the concentration that should not be exceeded even instantaneously.

Also see "Skin" in the Glossary relative to TLV's.

TOC - Tag (Tagliabue) Open Cup - A flash point test method.

Toxic - A chemical falling within any of the following categories:

- a) A chemical that has a median lethal dose (LD_{50}) of more than 50 milligrams per kilogram, but not more than 500 milligrams per kilogram of body weight when administered orally to albino rats weighing between 200 and 300 grams each.
- b) A chemical that has a median lethal dose (LD_{50}) of more than 200 milligrams per kilogram but not more than 1,000 milligrams per kilogram of body weight when administered by continuous contact for 24 hours (or less if death occurs within 24 hours) with the bare skin of albino rabbits weighing between two and three kilograms each.
- c) A chemical that has median lethal concentration (LC_{50}) in air of more than 200 parts per million but not more than 2000 parts per million by volume of gas or vapor, or more than two milligrams per liter, but not more than 20 milligrams per liter of mist, fume, or dust, when administered by continuous inhalation for one hour (or less if death occurs within one hour) to albino rats weighing between 200 and 300 grams each.

GLOSSARY OF COMMON MSDS TERMS

----- V -----

Vapor Density - The weight of a vapor or gas compared to the weight of an equal volume of air; an expression of the density of the vapor or gas. Materials lighter than air have vapor densities less than 1.0 (examples: acetylene, methane, hydrogen). Materials heavier than air (examples: propane, hydrogen sulfide, ethane, butane, chlorine, sulfur dioxide) have vapor densities greater than 1.0. All vapors and gases will mix with air, but the lighter materials will tend to rise and dissipate (unless confined). Heavier vapors and gases are likely to concentrate in low places--along or under floors, in swamps, sewers and manholes, in trenches and ditches--where they may create fire or health hazards.

Vapor Pressure - The pressure exerted by a saturated vapor above its own liquid in a closed container. When quality control tests are performed on products the test temperature is usually 100°F. and the vapor pressure is expressed as pounds per square inch (psig or psia)--but vapor pressures reported on MSDS's are in millimeters of mercury (mmHg) at 68°F. (20°C.), unless stated otherwise. Three facts are important to remember:

1. Vapor pressure of a substance at 100°F will always be higher than the vapor pressure of the substance at 68°F. (20°C.).
2. Vapor pressures reported on MSDS's in mmHg are usually very low pressures; 760 mmHg is equivalent to 14.7 pounds per square inch.
3. The lower the boiling point of a substance, the higher its vapor pressure.

Ventilation - See "general exhaust", "local exhaust" and "mechanical exhaust".

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MSDS USER'S GUIDE

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