How to Translate a Material Safety Data Sheet (MSDS)

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EH&S
Call Us for Help

Department Front Office……...4-4636

Bio-Hazard- Lee Zacarias……..4-6119

Chem-Hazard- D. Wolfe-Lopez…….5-2964
(Also Laser, Noise, Non-ionizing Radiation, Asbestos)

Spills/Waste- Ed Pozniak……...4-6224

Physical Safety- Alton Chin-Shue……..5-0263
(Electrical Safety, Ergonomics, Lock-out-tag-out)

There is No "Legal" Format for an MSDS

- However, a generally accepted format , from American National Standards Institute is:
  - Section 1- Product and Manufacturer Identification
  - Section 2- Chemical and common names of hazardous ingredients
  - Section 3- Physical and Chemical Properties

Sections 4-10

- Section 4- Physical Hazards (fire & explosion)
- Section 5- Toxicity Data
- Section 6- Health Hazards
- Section 7- Storage and Handling Procedures
- Section 8- Emergency First Aid Procedures
- Section 9- Disposal Considerations
- Section 10- Transportation Information

More Sections

- Other Sections Sometimes Seen
  - Fire fighting Measures
  - Reactivity Data
  - Ecological Data
  - Disposal Information
  - Regulatory Information
  - Miscellaneous Information

Section I Product Identification

- Product Name
- Synonyms
- Name Address and Phone number of the Manufacturer or *Distributor*

Section II Hazardous Ingredients

- OSHA regulates 400 hazardous chemicals- many manufacturers won't list the stuff as hazardous if its not on the OSHA list
- Much information is withheld here because the material is proprietary

Section III
Physical Characteristics

Solubility

The ability of a solid, liquid, gas or vapor to dissolve in water. Also, the ability of one material to blend uniformly with another (solid in liquid, liquid in liquid, etc..).

Expressed as soluble, slightly soluble or non-soluble.

<u>Examples</u>: Isopropyl Alcohol, Ethanol

Solubility is important because…

- Solubility in water is an indicator of how easily a substance can pass into the body from the digestive tract and the lungs and tells us where we will find it in the body after it is absorbed.

Vapor Density

The weight of a gas or vapor compared to the weight of an equal volume of air at the same pressure and temperature.

Air = 1,

If #<1, the material is lighter than air and may rise

If #>1, the material is heavier than air and may stay low to the ground

Examples: Air = 1, Propane =1.6, Hydrogen = 0.1, Gasoline = 3.0 - 4.0

Vapor Density is Important Because…

- It tells you where a contaminant will be found after a spill and dictates what you will do next.
- For example-
  - hydrogen and "spills up" and dissipates
  - Organics typically spill down and produce vapor plumes that can travel large distances-downhill (toward a source of ignition)

Specific Gravity

The weight of a material as compared to an equal volume of water.

Water = 1

If # < 1, the material will float

If # > 1, the material will sink

Examples: Water = 1, Gasoline = 0.8

Specific Gravity is Important Because…

- If the material should get in to water- such as mix with storm water, specific gravity will determine how to get it out before it reaches the water system.

Vapor Pressure

The pressure exerted by a saturated vapor above it's own liquid. Reported in millimeters of mercury (Hg) or pounds per square inch (psig or psia). Test temperature is usually 100F (38C).

Examples:
Acetone = 184 mm Hg (20C),
Isopropyl Alcohol = 33 mm Hg (20C)

Vapor Pressure is Important Because…

- It determines how easily a substance becomes airborne and presents an inhalation hazard.
- For example- acetone
  - VP 184 mm Hg
  - PEL= 1,000 ppm
  - IDLH 10,000 ppm

Saturation Concentration

- (VP/SP) 10^6 ppm=
  saturation concentration
- (184/760) $10^{6=}$ 242,105 ppm

What does this tell you?- That this material is capable of causing dangerous conditions if spilled at normal room temperatures.

Melting Point

The temperature at which a solid substance changes to a liquid state.

Examples:
Water (ice) = 32F(0C),
Acetic Acid = 62F(16.7C)

Boiling Point

The temperature at which the material's vapor pressure equals atmospheric pressure.

Examples:
Water = 212F(100C),
Propane = 44F(6.67C),
Butane = 31F(-0.56C)

Corrosive

A solid, liquid, or gaseous chemical that causes visible destruction or irreversible alterations in tissue at the site of contact.

Examples:
Acetic Acid, Hydrochloric Acid, Sulfuric Acid, Potassium Hydroxide, Sodium Hydroxide

Corrosive

pH Scale

0	7	14
Acid	Neutral	Base

Remember pH is a logarithmic scale: 7 is neutral, 6 is 10X stronger than 7, 5 is 100X stronger than7, 4 is 1,000X stronger than 7, and so on...

Acid Strength

Acid strength is determined relative to the degree of molecular ionization (separation) in water.

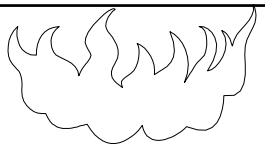
Example:
Hydrochloric Acid = strong acid
Acetic Acid = weak acid

pH of Some Common Solutions

• Hydrochloric Acid 4%	0
• Gastric Juices	1.6-1.8
• Lemon Juice	2.3
• Vinegar	2.4-3.4
• Soft Drinks	2.0-4.0
• Milk	6.3-6.6
• Blood	7.35-7.45
• Milk of Magnesia	10.5
• Sodium Hydroxide	13.0

Section IV
Fire and Explosion Data

Flash Point



Flash point- minimum temperature at which a liquid gives off sufficient vapor to form an ignitable mixture with air near the surface of the liquid

This value is the most important indicator of flammability!

Examples:

Gasoline = -45F(-42.8),

Benzene = 12F (-11C),

Kerosene = 100-162F(37.8-72.2C)

Fire and Explosion Data

- Flammable-
  - fp < 100^{o}F or 37.8^{o}C
  - <73^{o}F = class IA-C and is a 4 on an NFPA diamond
- Combustible-fp >100^{o}F or 37.8^{o}C
- Flammable and Combustible materials need to be stored in a flammable cabinet
- 29 CFR 1910.106

Explosive Limits (LEL, UEL)

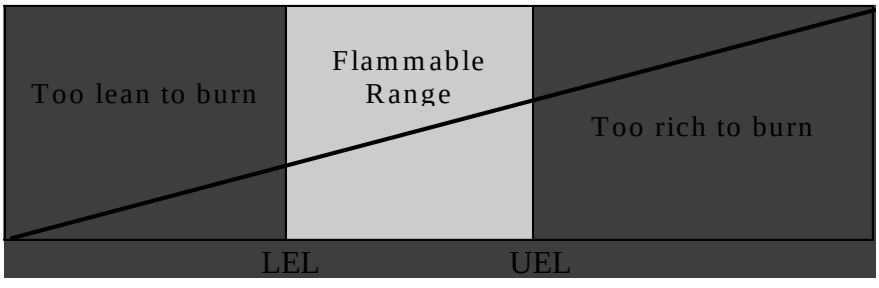
Lower Explosive Limit (LEL): The lowest concentration in air at which ignition can occur.

Upper Explosive Limit (UEL): The highest concentration of vapor in air at which ignition can occur.

Flammable Range

Examples:

Hydrogen	LEL = 4.0%,	UEL = 75%
Gasoline	LEL = 1.4%	UEL = 7.6%
Propane	LEL = 2.1%	UEL = 9.5%



LEL and UEL are Not Relevant as Health Hazard Indicators Because

- Most flammable substances reach IDLH levels (Immediately Dangerous to Life and Health) in the 100-1000 ppm range.
- LEL is usually at 1-2% or 10,000 ppm.

Section VI Health Hazard Data

- Especially Important- Routes of Exposure
  - an “S” or “Skin” notation on an MSDS indicates that this material can be absorbed through the skin
- Signs and symptoms of exposure – frequently, the only way to tell if you are being over exposed

Other Terms You May See in This Section

- In reference to exposure limits
  - PEL, TLV, STEL, Excursion Limit, Ceiling
- In reference to degree of toxicity:
  - LD_{50}, LC_{50}, LD_{Lo},Highly Toxic, Extremely Toxic
- In reference to duration of exposure:
  - Chronic, acute

Exposure Terms

- Permissible Exposure Limit (PEL)
  - Set by Federal Government (OSHA)
  - 8 hour TWA
  - Is the LAW- but still doesn't apply here at GA Tech, except as a guideline
- Threshold Limit Value (TLV)
  - Set by American Conference of Governmental Industrial Hygienists
  - Just a suggestion
  - Sometimes lower than PEL

More Exposure Limit Terms

- Short Term Exposure Limit (STEL) (OSHA)
  - Concentration to which a worker can be exposed for no more than 15 minutes at a time, no more than 4 times in an 8 hours shift, with exposures being separated by at least 1 hour at a lower concentration.
- Excursion Limit (OSHA)
  - Concentration to which a worker can be exposed for no more than 30 minutes during a work shift

More Exposure Limit Terms

- Ceiling (OSHA)
  - Highest concentration of contaminant allowed in the workplace, ever.
  - Sometimes incorporated into an 8 hr TWA. When written this way, the PEL=ceiling, but concentration must never go above this level.

Toxicity Levels- Human

- Extremely Toxic (LD_{50} Rat= 5mg/kg)
  - Lethal dose for a human= a taste-< 7 drops
- Highly toxic (LD_{50} Rat= 5-50mg/kg)
  - Lethal dose for a human= 7 drops-1 tsp.
- Moderately toxic (LD_{50-} Rat= 50-500mg/kg)
  - Lethal dose for a human= 1 tsp- 1 oz
- Slightly (LD_{50} Rat= 500mg-5g/kg)
  - Lethal dose for a human= 1 oz-1pt.
- Practically Non-toxic (LD_{50} Rat= >5g/kg)
  - Lethal dose for a human > 1 pt.

Toxicity Testing

- TD_{Lo} refers to the lowest dose at which adverse effects were seen.
- Chronic- refers to repeated low dose exposures.
- Acute- refers to a single high dose exposure.

Section VII & VIII
Precautions for Safe Handling and Use and Control Measures

- Information here is frequently contradictory to the hazardous ingredients section and must be carefully evaluated for example-
  - Material not listed as hazardous but pH is 12 and special precautions are advised

Gloves and Non-Information

- They tell you to use “appropriate chemically resistant gloves”- but don’t tell you what kind of glove is appropriate for this chemical.
- Remember that a skin notation frequently means that latex won’t work

More Info/Non-Info

- Section 8- Emergency First Aid Procedures
  - Emergency refers to acute exposures, but advice here is usually very good
- Section 9- Disposal Considerations
  - Will only tell you to follow local regulations- it's up to you to decide which ones apply
- Section 10- Transportation Information
  - For our purposes- this generally means we can't move it.

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