Pre-Test

- *Read each question CAREFULLY and completely before choosing the best answer.*
- *Try to answer every question, even if you are unsure about the correct response.*
- *Please answer all questions on the Answer Sheet provided.*
- *Do not write on this test booklet.*
- *After completing the test, follow the instructors' directions on how to proceed.*

1. Which of the following describes the ***Analyze, Plan, Implement and Evaluate (APIE): A Risk-Based Response Process***?

    a. The goal is safe, competent response.
    b. Actions or decisions should be based on risk-benefit analysis.
    c. Responders should consider the facts, science and the circumstances at each step.
    d. All of the above.

2. Which of the following describes the goal of the ***Analyze the Problem*** step of the APIE process?

    a. Identify the problem and likely behaviors of hazmats and containers.
    b. Develop and communicate an Incident Action Plan (IAP).
    c. Observe operations and outcomes.
    d. Assess response effectiveness.

3. The decontamination corridor is located in which of the following zones?

    a. Cold zone
    b. Warm zone
    c. Hot zone
    d. Exclusion zone

4. Which of the following describes why the Incident Action Plan (IAP) is a critical part of the ***Plan the Response*** step of the APIE process?

   a. The IAP assesses the response actions of emergency response personnel.
   b. Incident priorities and objectives are identified in the IAP.
   c. The IAP establishes the incident management system.
   d. The IAP defines necessary resources and identifies at risk resources prior to incidents.

5. Which of the following actions is NOT a part of the termination of an incident?

   a. Record keeping
   b. Debriefing
   c. Post-incident analysis
   d. Pre-incident planning

6. The Incident Command Post (ICP) is located in which of the following zones?

   a. Cold zone
   b. Warm zone
   c. Hot zone
   d. Exclusion zone

7. Why is it important to monitor weather conditions throughout the duration of an incident?

   a. Emergency response actions are easier in poor weather.
   b. High temperatures coupled with humidity result in higher flash points.
   c. Weather conditions may change significantly over the course of an incident.
   d. Temperature extremes and precipitation rarely affect the outcome of an incident.

8. Which of the following is a method of determining the probability of a victim's survival?

    a. Calls for help
    b. Visual confirmation
    c. Lack of severe conditions
    d. All of the above

9. Which of the following describes why pre-incident plans are a necessity in managing chemical process industry incidents?

    a. Pre-incident plans allow chemical process industry facilities to rely solely on emergency response personnel for their emergency planning needs.
    b. Pre-incident planning eliminates the need for chemical process industry facilities and local fire companies to work in close coordination with one another.
    c. Pre-incident plans allow the collection of information about a facility and its processes and planning for potential incident in a non-stressful environment.
    d. Pre-incident planning eliminates the need for in-house emergency response teams.

10. When actions are directed toward property conservation only, first responders should be subjected to which of the following risk environments?

    a. Low
    b. Moderate
    c. High

11. Which of the following situations would dictate that an Incident Action Plan (IAP) should be adjusted?

    a. The incident commander is relieved.
    b. The media has entered the exclusion zone.
    c. The number of victims requiring rescue changes.
    d. The public is demanding answers.

12. Which of the following is an action most likely taken during the ***Plan the Response*** step of the APIE process?

    a. Perform control options.
    b. Perform protective actions.
    c. Select response options.
    d. Identify the container type.

13. Which is the next action after the Incident Action Plan (IAP) is developed for an incident at a chemical process industry site?

    a. Determine incident objectives and strategies.
    b. Communicate the plan.
    c. Evaluate actions and modify the plan.
    d. Analyze the situation.

14. Which of the following is an example of a defensive response action that could be performed by operations-level responders, after consulting site personnel, to stabilize an incident at a chemical process industry site?

    a. Pressure isolation
    b. Product transfer
    c. Remote valve shut-off
    d. Patching and plugging

15. What action does the APIE process prescribe immediately after initiating the Incident Command System (ICS) at an incident at a chemical process industry site?

    a. Implement the best options for incident management.
    b. Determine the strategy and tactics.
    c. Identify and request other resources.
    d. Survey the incident.

16. Which of the following describes the goal of the ***Evaluate the Progress*** step of the APIE process?

    a. Identify the problem and likely behaviors of hazmats and containers.
    b. Develop and communicate an Incident Action Plan (IAP).
    c. Observe operations and outcomes.
    d. Assess response effectiveness.

17. Which of the following should be the first action taken upon arrival on scene (during the ***Analyze the Problem*** step in the APIE process)?

    a. Perform protective and control actions, and decontamination.
    b. Initiate an Incident Command System (ICS) and establish command.
    c. Describe response options and decontamination issues.
    d. Evaluate the effectiveness of the actions in the Incident Action Plan (IAP).

Valero Energy Corporation Incident[1]

Read the scenario.

At 2:09 p.m. on Friday, February 16, 2007, plant personnel and contractors working in the (propane deasphalting) PDA unit heard a “pop,” and saw what appeared to be steam blowing from a control station near ground level at the No. 1 Extractor tower at Valero’s McKee Refinery. Plant personnel quickly determined that the escaping cloud was propane and directed workers in the area to evacuate.

The propane escaping from the high-pressure system formed a vapor cloud that traveled downwind toward the boiler house, where it likely ignited. The flames flashed back to the release point. Within minutes, the fire damaged piping and pipe rack supports, spreading the fire. The fire grew rapidly and threatened surrounding units, including a liquefied petroleum gas (LPG) storage area.

The fire alarm was activated at 2:10 p.m., about one minute after employees heard the “pop” of the initial release. The refinery’s emergency response team approached the fire, staging from the south. They attempted to activate stationary fire water monitors, but the high, shifting winds and the rapid growth of the fire hampered their efforts. Heat from the fire kept responders from reaching the fire water deluge system valve for the sphere, preventing them from establishing a protective flow of water over its surface.

1 Investigation Report: LPG Fire at Valero-McKee Refinery. United States Chemical Safety and Hazard Investigation Board (CSB) Case Study. Report No. 2007-05-I-TX. July 2008. <http://www.chemsafety.gov/>

Use the 2008 Emergency Response Guidebook (ERG), NIOSH Pocket Guide and MSDS on pages 7 to 14 to answer the next three questions.

18. What is the Guide number in the 2008 Emergency Response Guidebook (ERG) for propane?

    a. 111
    b. 113
    c. 115
    d. 119

19. What is the physical description for propane found in the NIOSH Pocket Guide?

    a. Colorless, odorless gas which may have a foul-smelling odorant added
    b. Greenish-yellow gas with a pungent, irritating odor
    c. Colorless gas with a suffocating odor like musty hay
    d. Colorless gas or liquid (below 7ºF) with a pleasant odor at high concentrations

20. What are the products of combustion listed on Valero's MSDS for propane on pages 9 to 16?

    a. Carbon monoxide, carbon dioxide and reactive hydrocarbons
    b. Carbon monoxide and hydrogen cyanide
    c. Carbon dioxide and water vapor
    d. Nitrogen oxide

MATERIAL SAFETY DATA SHEET

Propane

VALERO MARKETING & SUPPLY COMPANY
and Affiliates
P.O. Box 696000
San Antonio, TX 78269-6000

Emergency Phone Numbers
24 Hour Emergency: 866-565-5220
Chemtrec Emergency: 800-424-9300

General Assistance
General Assistance: 210-345-4593

BRAND NAMES: Valero, Diamond Shamrock, Shamrock, Ultramar, Beacon, Total

Section 1. Chemical Product and Company Identification

Common / Trade name : Propane

Synonym : dimethylmethane; propane (dot); propyl hydride; dimethyl methane

SYNONYMS/COMMON NAMES: This Material Safety Data Sheet applies to the listed products and synonym descriptions for Hazard Communication purposes only. Technical specifications vary greatly depending on the product and are not reflected in this document. Consult specification sheets for technical information. This product contains ingredients that are considered to be hazardous as defined by the OSHA Hazard Communication Standard (29 CFR 1910.1200).

Material uses : ORGANIC SYNTHESIS; HOUSEHOLD AND INDUSTRIAL FUEL; MANUFACTURE OF ETHYLENE; EXTRACTANT; SOLVENT; REFRIGERANT; GAS ENRICHER; AEROSOL PROPELLANT; MIXTURE FOR BUBBLE CHAMBERS.

MSDS# : 309

CAS # : 74-98-6

Section 2. Composition, Information on Ingredients

Name	CAS number	Concentration (%)
Propane	74-98-6	90 - 100
Propylene	115-07-1	0 - 10
Ethylene	74-85-1	0 - 1

Section 3. Hazards Identification

Extremely Flammable. Compressed Gas. Narcotic and asphyxiant in high concentrations. Gas or vapor reduces oxygen available for breathing and may cause suffocation. Contact with liquid causes burns similar to frostbite. Wear insulated gloves if contact with liquid cooled equipment is expected. Avoid liquid, mist and vapor contact. Vapors may explode.

Physical state : Gas. (COLORLESS LIQUEFIED COMPRESSED GAS; ODORLESS BUT MAY HAVE SKUNK ODOR ADDED.)

Emergency overview : Danger!
CONTENTS UNDER PRESSURE.
CAUSES DAMAGE TO THE FOLLOWING ORGANS: NERVOUS SYSTEM.
POSSIBLE CANCER HAZARD
CONTAINS MATERIAL WHICH MAY CAUSE CANCER BASED ON ANIMAL DATA.

Continued on next page

Do not ingest. Avoid shock and friction. Extremely hazardous liquid and vapor under pressure. Do not puncture or incinerate container. Wash thoroughly after handling. Risk of cancer depends on duration and level of exposure.

Routes of entry : Dermal contact. Eye contact. Inhalation. Ingestion.

Potential acute health effects

Eyes : May cause severe irritation, redness, tearing, blurred vision and conjunctivitis. Contact with compressed liquid may cause permanent damage and frost burns.

Skin : Extreme overexposure to very high concentrations may cause mild skin irritation. Contact with compressed liquid may cause skin to freeze or frost burns.

Inhalation : Simple asphyxiant. Nasal and respiratory tract irritation, central nervous system effects including excitation, euphoria, contracted eye pupils, dizziness, drowsiness, blurred vision, fatigue, nausea, headache, loss of reflexes, tremors, convulsions, seizures, loss of consciousness, coma, respiratory arrest and sudden death could occur as a result of long term and/or high concentration exposure to vapors. May also cause anemia and irregular heart rhythm.

Ingestion : This product may cause freeze burns to the mucous membranes. May cause harmful central nervous system effects, similar to those listed under "inhalation".

Medical conditions aggravated by overexposure: : Preexisting eye, skin, heart, central nervous system and respiratory system disorders may be aggravated by exposure to this product. Components have been shown to be weak cardiac sensitizers which can result in cardiac arrhythmia and ventricular fibrillation.

Over-exposure signs/symptoms : Simple asphyxiant. Nasal and respiratory tract irritation, central nervous system effects including excitation, euphoria, contracted eye pupils, dizziness, drowsiness, blurred vision, fatigue, nausea, headache, loss of reflexes, tremors, convulsions, seizures, loss of consciousness, coma, respiratory arrest and sudden death could occur as a result of long term and/or high concentration exposure to vapors. May also cause anemia and irregular heart rhythm.

See toxicological Information (section 11)

Section 4. First Aid Measures

Eye contact : Remove the victim from the source of contamination. Open eyelids to let the product evaporate, then flush immediately with large amounts of water for at least 15 minutes. Eyelids should be held away from the eyeball to ensure thorough rinsing. Seek medical advice if pain or redness continues. If the victim cannot tolerate light, protect his eyes with a bandage or handkerchief.

Skin contact : For exposure to liquid, slowly rewarm frostbitten part with lukewarm water. In case of massive exposure, remove clothing while showering with lukewarm water. Call a physician. Remove contaminated clothing promptly and launder before reuse.

Inhalation : If inhaled, remove to fresh air. If breathing is difficult, give oxygen. If not breathing, give artificial respiration. Get medical attention.

Ingestion : This product is a gas at normal temperatures and pressures. Never give anything by mouth to an unconscious person. DO NOT induce vomiting. Keep person warm and quiet. SEEK IMMEDIATE MEDICAL ATTENTION.

Notes to physician : Treat Symptomatically.

Section 5. Fire Fighting Measures

Flammability of the product : Flammable.

Auto-ignition temperature : 449.85°C (841.7°F)

Flash point : Closed cup: -104.45°C (-156°F).

Flammable limits : Lower: 2.3% Upper: 9.5%

Products of combustion : Combustion may produce carbon monoxide, carbon dioxide and reactive hydrocarbons (aldehydes, aromatics, etc.).

Continued on next page

Fire fighting media and instructions : Use an extinguishing agent suitable for surrounding fires.

Extremely Flammable. Do not extinguish fire due to probable explosive reignition. Shut off source of flow, if possible. Use appropriate extinguishing media for any secondary fires. Small fires can be extinguished with dry chemical or carbon dioxide. Water can be used to cool fire-exposed containers, structures and to protect personnel. If a leak or spill has not ignited, ventilate area and use water spray to disperse gas or vapor and to protect personnel attempting to stop a leak.

Risk of explosion by shock, friction, fire or other sources of ignition.

Special protective equipment for fire-fighters : Fire fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full facepiece operated in positive pressure mode. Fire-fighters' protective clothing will provide limited protection. Dangerous when exposed to heat or flame. Vapors form flammable or explosive mixtures with air at room temperature. Vapor or gas may spread to distant ignition sources (pilot lights, welding equipment, electrical equipment, etc.) and flash back. Vapors may accumulate in low areas. Vapors may concentrate in confined areas. Flowing product can be ignited by self generated static electricity. Use adequate bonding and grounding to prevent static buildup. Runoff to sewer may cause fire or explosion hazard. Containers may explode in heat of fire. Irritating or toxic substances may be emitted upon thermal decomposition. For fires involving this material, do not enter any enclosed or confined space without proper protective equipment, which may include NIOSH approved self-contained breathing apparatus with full face mask. Clothing, rags or similar organic material contaminated with this product and stored in a closed space may undergo spontaneous combustion. Transfer to and from commonly bonded and grounded containers.

Special remarks on fire hazards : FLAMMABLE.

Special remarks on explosion hazards : No additional remark.

Section 6. Accidental Release Measures

Personal precautions : Immediately contact emergency personnel. Eliminate all ignition sources. Keep unnecessary personnel away. Use suitable protective equipment (Section 8). Do not touch or walk through spilled material.

Environmental precautions : If facility or operation has an "oil or hazardous substance contingency plan", activate its procedures. Stay upwind and away from spill. Wear appropriate protective equipment including respiratory protection as conditions warrant. Do not enter or stay in area unless monitoring indicates that it is safe to do so. Isolate hazard area and restrict entry to emergency crew. Extremely flammable. Review Fire and Explosion Hazard Data before proceeding with clean up. Keep all sources of ignition (flames, smoking, flares, etc.) and hot surfaces away from release. Contain spill in smallest possible area. Recover as much product as possible (e.g., by vacuuming). Stop leak if it can be done without risk. Use water spray to disperse vapors. Spilled material may be absorbed by an appropriate absorbent, and then handled in accordance with environmental regulations. Prevent spilled material from entering sewers, storm drains, other unauthorized treatment or drainage systems and natural waterways. Contact fire authorities and appropriate federal, state and local agencies. If spill of any amount is made into or upon navigable waters, the contiguous zone, or adjoining shorelines, contact the National Response Center at 800-424- 8802. For highway or railway spills, contact Chemtrec at 800-424-9300.

Continued on next page

Section 7. Handling and Storage

Handling : Do not ingest. Avoid shock and friction. To avoid fire or explosion, dissipate static electricity during transfer by grounding and bonding containers and equipment before transferring material. Use explosion-proof electrical (ventilating, lighting and material handling) equipment. Extremely hazardous liquid and vapor under pressure. Do not puncture or incinerate container. Wash thoroughly after handling. Use good personal hygiene practices. After handling this product, wash hands before eating, drinking, or using toilet facilities.

Storage : Store in a segregated and approved area. Keep container in a cool, well-ventilated area. Keep container tightly closed and sealed until ready for use. Avoid all possible sources of ignition (spark or flame).

Section 8. Exposure Controls, Personal Protection

Engineering controls : Ventilation is normally required when handling or using this product.

Personal protection

Eyes : Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists or dusts.

Skin : Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product. Flame Retardant Clothing is recommended.

Respiratory : Use a properly fitted, air-purifying or air-fed respirator complying with an approved standard if a risk assessment indicates this is necessary.Respirator selection must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected respirator.

Hands : Chemical-resistant, impervious gloves or gauntlets complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary.

Personal protective equipment (Pictograms) : Consult your Supervisor or S.O.P. for special handling directions.

Personal protection in case of a large spill : Splash goggles. Full suit. Vapor respirator. Boots. Gloves. A self-contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Component	Exposure limits
Propane	**ACGIH TLV (United States, 1/2004). Notes: ACGIH 2004 Adoption** TWA: 1000 ppm 8 hour(s). Form: All forms **NIOSH REL (United States, 6/2001).** TWA: 1000 ppm 10 hour(s). Form: All forms Simple asphyxiant.
Propylene	**ACGIH TLV (United States, 1/2004).** TWA: 500 ppm 8 hour(s). Simple asphyxiant.
Ethylene	Simple asphyxiant.

Consult local authorities for acceptable exposure limits.

Continued on next page

Section 9. Physical and Chemical Properties

Physical state	:	Gas. (COLORLESS LIQUEFIED COMPRESSED GAS; ODORLESS BUT MAY HAVE SKUNK ODOR ADDED.)
Color	:	Colorless.
Odor	:	FAINT GASSY
Molecular formula	:	C3-H8
Boiling point	:	-41.79°C (-43.2°F)
Melting/freezing point	:	-185.89°C (-302.6°F)
Specific gravity	:	0.59 (Water = 1)
Vapor density	:	1.6 (Air = 1)
Volatility	:	Essentially 100%
VOC	:	100 (%)
Solubility	:	Insoluble in cold water.

Section 10. Stability and Reactivity Data

Stability and reactivity	:	The product is stable.
Conditions of instability	:	Stable under normal conditions of use. (Ethane)
Incompatibility with various substances	:	Extremely reactive or incompatible with oxidizing agents, reducing agents, acids, alkalis.
Hazardous decomposition products	:	Combustion may produce carbon monoxide, carbon dioxide and reactive hydrocarbons (aldehydes, aromatics, etc.).
Hazardous polymerization	:	Will not occur.

Section 11. Toxicological Information

Toxicity data

LIQUIFIED PETROLEUM GAS acts as a simple asphyxiant, but may also cause central nervous system depression. Concentrations of 100,000 ppm may be tolerated, but cause dizziness within a few minutes. No chronic systemic effect has been reported from occupational exposure to LPG.

IDLH	:	2100 ppm
Chronic effects on humans	:	**CARCINOGENIC EFFECTS**: Classified A4 (Not classifiable for human or animal.) by ACGIH, 3 (Not classifiable for human.) by IARC [Propylene]. Classified A4 (Not classifiable for human or animal.) by ACGIH, 3 (Not classifiable for human.) by IARC [Ethylene]. Causes damage to the following organs: the nervous system.
Other toxic effects on humans	:	Hazardous in case of skin contact (irritant), of eye contact (irritant), of ingestion, of inhalation.
Specific effects		
Carcinogenic effects	:	Contains material which may cause cancer based on animal data. Risk of cancer depends on duration and level of exposure.
Target organs	:	Causes damage to the following organs: the nervous system.

Continued on next page

Section 12. Ecological Information

Ecotoxicity data

Products of degradation : carbon oxides (CO, CO_2) and water

Toxicity of the products of biodegradation : The products of degradation are less toxic than the product itself.

Section 13. Disposal Considerations

Waste disposal : Do not puncture or incinerate container. Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements.

Consult your local or regional authorities.

Section 14. Transport Information

Regulatory information	UN number	Proper shipping name	Class	Packing group	Label	Additional information
DOT Classification	UN1075	PETROLEUM GASES, LIQUEFIED	2.1	Not available.		Limited quantity Yes. Packaging instruction Passenger Aircraft Quantity limitation: Forbidden. Cargo Aircraft Quantity limitation: 150 kg Special provisions T50
TDG Classification	UN1075	PETROLEUM GASES, LIQUEFIED	2.1	Not available.		Special provisions 29, 42

Section 15. Regulatory Information

United States

U.S. Federal regulations : TSCA 8(b) inventory: Propane; Propylene; Ethylene

SARA 302/304/311/312 extremely hazardous substances: No products were found.
SARA 302/304 emergency planning and notification: No products were found.
SARA 302/304/311/312 hazardous chemicals: Propane
SARA 311/312 MSDS distribution - chemical inventory - hazard identification: Propane: Fire hazard, Sudden Release of Pressure; Propylene: Fire hazard, Sudden Release of Pressure

Continued on next page

Clean Water Act (CWA) 307: No products were found.

Clean Water Act (CWA) 311: No products were found.

Clean air act (CAA) 112 accidental release prevention: Propane; Propylene; Ethylene

Clean air act (CAA) 112 regulated flammable substances: Propane; Propylene; Ethylene

Clean air act (CAA) 112 regulated toxic substances: No products were found.

SARA 313

	Product name	CAS number	Concentration
Form R - Reporting requirements :	Propylene	115-07-1	0 - 10
Supplier notification :	Propylene	115-07-1	0 - 10

SARA 313 notifications must not be detached from the MSDS and any copying and redistribution of the MSDS shall include copying and redistribution of the notice attached to copies of the MSDS subsequently redistributed.

State regulations : Pennsylvania RTK: Propane: (generic environmental hazard); Propylene: (environmental hazard, generic environmental hazard); Ethylene: (environmental hazard, generic environmental hazard)
Massachusetts RTK: Propane; Propylene; Ethylene
New Jersey: Propane; Propylene; Ethylene
California prop. 65: No products were found.

Canada

WHMIS (Canada) : Class A: Compressed gas.
Class B-1: Flammable gas.
CEPA DSL: Propane; Propylene; Ethylene

Section 16. Other Information

Label Requirements : CONTENTS UNDER PRESSURE.
CAUSES DAMAGE TO THE FOLLOWING ORGANS: NERVOUS SYSTEM.
POSSIBLE CANCER HAZARD
CONTAINS MATERIAL WHICH MAY CAUSE CANCER BASED ON ANIMAL DATA.

Hazardous Material Information System (U.S.A.) :

Health	1
Fire hazard	4
Physical Hazard	0
Personal protection	

National Fire Protection Association (U.S.A.) :

Date of printing : 11/28/2005.

Date of issue : 11/28/2005.

Date of previous issue : No Previous Validation.

Version : 1

Disclaimer

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Definitions of Material Safety Data Sheet Terminology

GOVERNMENT AGENCIES AND PRIVATE ASSOCIATIONS

ACGIH - American Conference of Governmental Industrial Hygienists, (private association)
DOT - United States Department of Transportation
EPA - United States Environmental Protection Agency
IARC - International Agency for Research on Cancer, (private association)
NFPA - National Fire Protection Association, (private association)
MSHA - Mine Safety and Health Administration, U.S. Department of Labor
NIOSH - National Institute of Occupational Safety and Health, U.S. Department of Health and Human Services
NTP - National Toxicology Program, (private association)
OSHA - Occupational Safety and Health Administration, U.S. Department of Labor
WHMIS- Workplace Hazardous Material Information System
CSA- Canadian Standards Association

HAZARD AND EXPOSURE INFORMATION

Acute Hazard - An adverse health effect which occurs rapidly as a result of short term exposure.
CAS # - American Chemical Society's Chemical Abstract service registry number which identifies the product and/or ingredients.
Ceiling - The concentration that should not be exceeded during any part of the working exposure
Chronic Hazard - An adverse health effect which generally occurs as a result of long term exposure or short term exposure with delayed health effects and is of long duration
Fire Hazard - A material that poses a physical hazard by being flammable, combustible, phyrophoric or an oxidizer as defined by 29 CFR 1910.1200
Hazard Class - DOT hazard classification
Hazardous Ingredients - Names of ingredients which have been identified as health hazards
IDLH- Immediately Dangerous to Life and Health, the airborne concentration below which a person can escape without respiratory protection and exposure up to 30 minutes, and not suffer debilitating or irreversible health effects. Established by NIOSH.
mg/m3 - Milligrams of contaminant per cubic meter of air, a mass to volume ratio
N/A - Not available or no relevant information found
NA - Not applicable
PEL - OSHA permissible exposure limit; an action level of one half this value may be applicable
ppm - Part per million (one volume of vapor or gas in one million volumes of air)
Pressure Hazard - A material that poses a physical hazard due to the potential of a sudden release of pressure such as explosive or a compressed gas as defined by 29 CFR 1910.1200
Reactive Hazard - A material that poses a physical hazard due to the potential to become unstable reactive, water reactive or that is an organic peroxide as defined by 29 CFR 1910.1200.
STEL - The ACGIH Short-Term Exposure Limit, a 15-minute Time-Weighted Average exposure which should not be exceeded at any time during a workday, even if the 8-hour TWA is less than the TLV.
TLV - ACGIH Threshold Limit Value, represented herein as an 8-hour TWA concentration.
8-hour TWA - The time weighted average concentration for a normal 8-hour workday and a 40-hour workweek, to which nearly all workers may be repeatedly exposed, day after day, without adverse effect.
LD50 – Single dose of a substance that, when administered by a defined route in an animal assay, is expected to the cause the death of 50% of the defined animal population.
LC50 - The concentration of a substance in air that, when administered by means of inhalation over a specified length of time in an animal assay, is expected to cause the death of 50% of a defined animal population.