



**DEPARTMENT OF DEFENSE
HAZARDOUS CHEMICAL
WARNING LABELING SYSTEM**

**OFFICE OF THE
ASSISTANT SECRETARY OF DEFENSE
(FORCE MANAGEMENT AND PERSONNEL)**

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FORCE MANAGEMENT
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FOREWORD

This Handbook is issued under the authority of, and in accordance with, DoD Instruction 6050.5, 'Hazardous Material Information System, " January 25, 1978. This Handbook, the "Department of Defense Hazardous **Chemical Warning** Labeling System, " establishes a standard label format and uniform labeling system throughout DoD for identifying hazardous materials used by DoD personnel. In addition, this publication provides an additional training resource to help DoD comply with the training and worker information requirements of the Occupational Safety and Health Administration's Hazard Communication Standard (29 C. F. II. 1910.1200) .

This publication applies to the Office of the Secretary of Defense, the Military Departments, the Joint Staff, the unified and Specified Commands, and the Defense Agencies. It is effective immediately.

Forward recommended changes to this Handbook through appropriate channels to:

Director, Safety and Occupational Health Policy
OASD (FM&P), ODASD (FSE&S)
Room 3A272, The Pentagon
Washington, D.C. 20301-4000

DoD Components may obtain copies of this Handbook through their own publications channels. Other Federal Agencies and the public may obtain copies from the U.S. Department of Commerce, National Technical Information Service, 5285 Port Royal Road, Springfield, Virginia 22161.


DAVID J. BERTEAU
Deputy Assistant Secretary
(Resource Management & Support)

DEPARTMENT OF DEFENSE
HAZARDOUS CHEMICAL
WARNING LABELING SYSTEM
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DEPARTMENT OF DEFENSE
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On August 29, 1987, the Occupational Safety and Health Administration (**OSHA**) issued a final rule titled, "Hazard Communication Standard" (29 CFR 1910.1200). The purpose of this standard is to create a uniform, comprehensive program to reduce chemically related occupational illness and injury by evaluating chemical hazards and by communicating the hazard information to persons who might be exposed.

In addition to other requirements, the standard requires that chemical manufacturers, importers, or distributors ensure that each container of hazardous chemicals leaving the workplace is labeled, tagged, or marked with the following information:

- o Identity of hazardous chemical (s);
- o Appropriate hazard warning; and
- o Name and address of the chemical manufacturer, importer, or other responsible party.

Employers must also ensure that each container of hazardous chemicals in the workplace is labeled appropriately.

For the purpose of the OSHA Hazard Communication Standard, a hazardous chemical may be defined as any discrete chemical or chemical compound or mixture for which a hazard determination has been made, resulting in the **classification** of the material as a health hazard **or** a physical hazard. The chemicals listed in either of the following sources are hazardous by definition and serve as a baseline of hazardous chemicals:

- o 29 CFR Part 1910, Subpart Z, "Toxic and Hazardous Substances," Occupational Safety and Health Administration (**OSHA**); or
- o "**Threshold** Limit Values for Chemical Substances and Physical Agents in the Work Environment," American Conference of Governmental Industrial Hygienists (**ACGIH**), latest edition.

Additionally, chemicals are considered hazardous and must be included on the Hazardous Chemical Inventory if they have been reported to be suspected or confirmed carcinogens in one positive, valid study, or any of the following sources:

- o International Agency for Research on Cancer (IARC), Monographs;
- o National Toxicology Program (NTP), Annual Report on Carcinogens; or
- o 29 CFR 1910, Subpart Z, "Toxic and Hazardous Substances," Occupational Safety and Health Administration (OSHA).

Frequently, the label on a hazardous chemical container is the initial source of information a worker has concerning the identity and hazards of the material inside. The label on a hazardous chemical container should identify the material and potential hazards of the material with respect to the health and physical hazards as defined in Appendix A of the Hazard Communication Standard. It also should identify the manufacturer, importer, or distributor of the material. Using these guidelines, as well as the labeling requirements of the OSHA Hazard Communication Standard, the DoD hazardous chemical warning label was developed.

The **DoD** hazardous chemical warning label and data element descriptors are to be used to meet the labeling requirements within **DoD** for:

- o Unlabeled hazardous materials, when appropriate Material Safety Data Sheets (MSDSs) are available;
- o Hazardous chemicals manufactured within **DoD** (specific ingredients, composition, or properties may be protected for national security reasons);
- o Repackaged containers of hazardous chemicals; and
- o Marking tanks, vats, or similar vessels of hazardous chemicals in lieu of placards, stencils, or other methods.

DoD installations are not required to relabel with the DoD label hazardous chemicals received from commercial suppliers when those materials are labeled by the supplier in accordance with the Hazard Communication Standard (HCS). Commercial suppliers shall be requested to provide HCS compliant labels for

hazardous chemicals which are unlabeled or improperly labeled when received. The manufacturer and/or supplier should be held accountable for providing proper labels.

The DoD labeling system provides the following advantages:

- o Reduces the training burden on workers to **understand** many types of hazard warning labels
- o Can be understood by all levels of workers, either by the visible hazard indicators (**and Pictograms**) or the written American National Standard Institute (ANSI) statements of hazard
- o Can be computer generated, prepared by hand or printed
- o Can be produced on black and white or colored labeling stock
- o Can be printed in various sizes
- o Uses ANSI standard language, including signal words, statements of hazard, and precautionary measures

Samples of the hazard warning label are attached for two chemicals in two sizes, to demonstrate the flexibility of this labeling system for use with various label sizes. Sample labels are presented in color and black and white for the two chemicals. In Appendix A, a large label (8-1/2" X 11") has been prepared for the mixture, **Alkanex**, 9637. In Appendix 8, a smaller label (4-1/2" x 6") has been prepared for a pure chemical, benzene. Each chemical is listed or has components that are listed in 29 CFR, Part 1910, Subpart Z, as a hazardous material. All elements pertinent to the hazards of these chemicals may be verified by information contained in copies of the corresponding **MSDS** and DoD Hazardous Material Information System (**HMIS**) sheets in Attachment 1. Procedures for determination of labeling information, using Benzene as a model, are also presented in Attachment 1.

a. Data Elements of the DoD Label. The data elements of the DoD hazardous chemical label are presented in Figure 1 below and described in the section that follows:

Figure 1. DoD Hazardous Chemical Label

HAZARDOUS CHEMICAL WARNING LABEL						
(1)	1. CHEMICAL/COMMON NAME				2. HAZARD CODE	
	3. NSN/LSN		4. PART NUMBER			
	5. ITEM NAME					
(2)	6. HAZARDS (X all that apply)	(1) Acute (Immediate)				(2) Chronic (Delayed)
		NONE	SLIGHT	MODERATE	SEVERE	
		a. HEALTH 				
		b. CONTACT 				*****
		c. FIRE 				
	d. REACTIVITY 					
(3)	7. SPECIFIC HAZARDS AND PRECAUTIONS (Including Target Organ Effects)					
	<i>(See MSDS for further information)</i>					
(4)	3. PROTECT (X all that apply)	a. EYES	b. SKIN	c. RESPIRATORY		
	8. CONTACT a. COMPANY NAME					
(5)	. ADDRESS (Street, P.O. Box, City, State, Zip Code, and Country)					
	EMERGENCY TELEPHONE NUMBER (Include Area Code)					
	O. PROCUREMENT YEAR FOR HAZARDOUS CHEMICAL					

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b. Hazardous Material Label Sections. The hazard warning label consists of five sections, identified as follows (see Figure 1) .

- (1) Hazardous Material Identification
 - (a) Chemical /Common Name
 - (b) National Stock Number **(NSN)**/Local Stock Number **(LSN)**
 - (c) Part Number
 - (d) Item Name
 - (e) Hazard Code **(HCC)**
- (2) Hazards
 - (a) Acute (immediate)
 - o **Health**
 - o Contact
 - o Fire
 - o Reactivity
 - (b) Chronic (delayed)
- (3) Health Hazards (Including target organ effects)
 - o **Signal** Word
 - o Statements of Hazard
 - o Precautionary Measures
- (4) Protect
 - o Eye, Skin, Respiratory
- (5) Manufacturer's Identification
 - (a) Name
 - (b) Address
 - (c) Emergency Telephone Number

In addition, two pieces of clerical labeling information are placed at the bottom of the label.

- o **DD** Form -- Department of Defense number
- o Year -- Procurement year for hazardous material identified by the affixed label

The data elements of each section of the label are discussed in the following paragraphs. These data elements **will** be available in the Hazard Warning Labeling section of the DoD **HMIS**, when appropriate data have been entered by the Defense Logistics Agency (**DLA**).

(1) Hazardous Material Identification

(a) Chemical /Common Name. This is the product name as it appears on the **MSDS**. It may be (1) the chemical name; i.e., the scientific designation of a chemical in accordance with the nomenclature system developed by the International Union of Pure and Applied Chemistry (**IUPAC**) or the Chemical Abstracts Service (**CAS**) rules of nomenclature; or (2) a common name or trade name that will clearly identify the chemical for the purpose of conducting a hazard evaluation.

(b) National Stock Number/Local Stock Number. The National Stock Number (**NSN**) or Local Stock Number (**LSN**) for an item of supply consists of the applicable four-digit class code number from the Federal Supply Classification, plus the applicable nine-digit National Item Identification Number as assigned by the Federal Catalog System or a nine-digit LSN used by an individual activity.

(c) Part Number. The part number (P/N) is a number or name that the manufacturer uses to identify his product and to provide the specificity necessary to distinguish between different sizes, concentrations, etc. This mandatory identification may be a part number, a trade name, or a synonym and may be used interchangeably in the **HMIS** data system. It appears on the manufacturer's label and on the **MSDS**. Changes in the manufacturer's product composition may be indicated by an addendum to the P/N indicator of the **HMIS**.

(d) Item Name. The item name is a **nonmandatory** entry, defined in the **HMIS** Procedures Manual as the cataloging item name as recorded in the Federal Catalog System's Total Item Record.

(e) Hazard Code (Hazard Characteristic Code). The hazard code box, at the top right of the label, is reserved for the DoD-designated Hazard Characteristic Code - an alpha numeric code that will alert the worker to the types of chemical hazards associated with the labeled item. Use of the HCC assures uniformity in the identification and management of hazardous materials and assists DoD personnel in the safe handling, storage, and use of packaged chemicals. HCCS **will** be assigned by the technical safety and health, transportation, and environmental protection personnel representing the service agency focal points to **HMIS**.

(2) Hazards

(a) Acute (immediate). An acute or immediate hazard, as defined by the ANSI Standard, is the potential [of a chemical] to cause an adverse effect which manifests itself within a short period of time. **Corrosivity** to eye and skin, flammability and highly toxic chemicals are examples of acute hazards. The HAZARDS area of the label visually conveys the type and degree of hazards that may be encountered when using the chemical. While quantification of hazards in this manner is not required under the OSHA Standard, it has significant value on a DoD label that must convey the hazards to personnel, nationally and internationally. It is important to remember that the label must be interpreted by all levels of DoD personnel. The use of **pictograms** with a four-tiered hazard rating system provides a fundamental understanding of the type and severity of the hazard associated with the product.

The HAZARDS area of the **label** uses pictograms and will appear in black and white or color bars, to provide immediate visual warnings about the immediate or acute hazard(s) of the chemical in the container.

Quantification of the degree of hazard is accomplished in two ways:

- (1) an inclined slope pictogram indicating increasing severity of the hazard,
- and (2) an "X" in the indicator box under the appropriate degree of hazard.

In developing hazard warning labeling statements, efforts should be made to obtain appropriate hazard information; however, if a specific hazard cannot

be determined (e.g., a chemical in DoD inventory lacking adequate **HMIS, MSDS,** or manufacturer's information), there will be no "X" to quantify that hazard and the following statement will be provided in the Health Hazards section of the label: "Hazard Not Determined." For example, inadequate reactivity data will result in no quantification of the reactivity hazard, and the following statement **will** be shown in the Health Hazards area, "Reactivity Hazard Not Determined."

Hazard ratings (none, slight, moderate, or severe) will be assigned to all hazardous chemicals by the manufacturer (commercial or military) or by DoD, and will correlate with the appropriate ANSI Signal Word as assigned by the manufacturer or determined by the properties of the chemical or mixture.

Several sources are available and will be used for acute (immediate) hazard data. The primary sources for information are the HMIS and the manufacturer's **MSDS**. These sources are supplemented, when necessary, by information from the following sources:

- o Registry of Toxic Effects of Chemical Substances (**RTECS**), **NIOSH**;
- o Threshold Limit Values and Their Documentation, **ACGIH**;
- o The American National Standard for the Precautionary Labeling of Hazardous Industrial Chemicals, ANSI **Z129.1-1987**;
- o An Identification System for Occupational Hazardous Materials, National Institute for Occupational Safety and Health (**NIOSH**);
- o NFPA 704 System, National Fire Protection Association (**NFPA**); and
- o Appendix A to 49 CFR Part 173, U.S. Department of Transportation.

Reactivity and fire hazards may be readily quantified using the sources listed above. Reactivity and fire hazard data are also available on the **HMIS** or **MSDS** under (1) Physical / Chemical Characteristics, (2) Fire and Explosion Hazard Data, or (3) Reactivity Data.

MSDSs do not always contain acute toxicity data since this information is not required by the HCS. Therefore, acute toxicity data often are not available in the HMIS data system for use in quantifying the health or contact

hazards for many of the items currently **in** the DoD supply. When available, acute toxicity data (e.g., **LD₅₀** or **LC₅₀**) may be used to quantify the immediate hazards for health and contact. When acute toxicity data are not available, the general descriptive criteria, listed below, will be used for quantifying the health and contact hazards as none, slight, moderate, or severe. When using appropriate sources for hazard information, there is usually adequate data to determine specific health and/or physical hazards. However, when there is insufficient data to determine whether a health or contact hazard exists, there will be no "X" to quantify the acute hazard and the following statement will be provided in the Health Hazards area of the label: "Health/Contact Hazard Not Determined."

o None

- No significant health hazard.
- Materials **which** produce toxic effects only under the most unusual conditions or by overwhelming dosage.

o Slight Hazard (Signal Word -- **CAUTION!**)

- No severe or permanent damage to affected person.
- No reduction of affected person's physical or mental ability to respond appropriately to an emergency.

Examples: nausea; headache; skin defatting; mild irritation of skin, eyes, and respiratory tract; coughing.

o Moderate Hazard (Signal Word -- **WARNING!**)

- No severe or permanent damage to affected person.
- Possible reduction of affected person's physical or mental ability to respond appropriately to an emergency.

Examples: dizziness, temporary loss of sight, mental confusion, severe abdominal pain, first-degree skin burns, temporary cardiac arrhythmia, loss of coordination, central nervous system depression.

o Severe Hazard (Signal Word -- **DANGER!**)

- **Severe** or permanent damage, or **fatal** to affected person.

Examples: loss of consciousness; cardiac arrest; convulsions; severe (second or third degree) burns to skin; severe irritation to eyes and respiratory tract; coma; damage to organs; death.

In determining the health and contact hazards related to hazardous material exposure and use, consideration also must be given to the following:

- o The immediate psychological and neurological effects (e.g., dizziness, irritation to eyes), and
- o The reduced ability of the affected person to respond appropriately to the emergency, due to physical or mental impairment (e.g., inability to evacuate the building because of dizziness or inability to operate the emergency eyewash because of temporary blindness).

There are four immediate hazard indicators: Health, Contact, Fire and Reactivity. Appropriate hazard warnings, identified on the manufacturer's **MSDS**, should always be the primary source of labeling data. However, when **MSDS** or **HMIS** data are not complete or current, the following guidelines can be used to determine appropriate hazard warning label text:

- o Health - Skull and Crossbones Pictogram - Blue bar, when Color Coded

The immediate health hazard rating is based upon quantification by the manufacturer as indicated by an appropriate signal word. When precise data are available, the NPCA Acute Toxicity Rating Criteria for oral and inhalation exposure (Appendix D) should be used. When precise data are unavailable, the General Descriptive Criteria for Health and Contact Hazards (Appendix C) should be used.

- o Contact - Corrosive/Hand Pictogram - White bar, when Color Coded

The contact or **corrosivity** health hazard is based upon **dermal** toxicity, skin irritation, and/or eye irritation. It is quantified by either: (1) Acute Toxicity Ratings for contact (Appendix E); or (2) the General Descriptive Criteria for Health and Contact (Appendix C).

- o Fire - Flame Pictogram - Red bar, when Color Coded

The criteria for designating the flammability rating are taken from the latest definitions developed by the NFPA 704 System. These are straight forward physical constants used by most manufacturers. The specific criteria used for these ratings are presented in Appendix F.

- o Reactivity - Explosion Pictogram - Yellow bar, when Color Coded

The reactivity hazard is a measure of the hazards caused by the changes a chemical may undergo either spontaneously or in the presence of water or air. The criteria for assigning the reactivity rating (Appendix G) are taken from the National Fire Protection Association (NFPA) 704 System.

(b) Chronic (delayed). A delayed hazard, as defined by the ANSI Standard, is the potential (of a chemical) to cause an adverse effect which manifests itself after a **long** period of time. **Carcinogenicity**, teratogenicity and certain target organ/system effects are examples of delayed hazards. The presence of a chronic (delayed) hazard associated with use or exposure to the labeled hazardous material is indicated by an "X" in the box under the word CHRONIC. The delayed or chronic hazard indicator signals the user to refer to the MSOS for additional information.

While the chronic hazard symbols will appear in the health hazards area where acute hazards are quantified, there is no quantification of the delayed or chronic health hazards. The complex issues involved in developing delayed effects and the lack of standardized classifications and tests prevent consideration of quantification of delayed hazards. When a chronic hazard is indicated in the upper portion of the label, a descriptive hazard warning **will**, however, appear **in** the SPECIFIC HAZARDS and PRECAUTIONS area, along with target organ effects.

When there are no chronic hazards associated with use of, or exposure to, the labeled product, the delayed box **will** contain the word "no." If the delayed hazard is unknown, the box **will** contain the letters "UNK" for the word "unknown." When the chronic hazard is unknown, a statement will appear in the Specific Hazards area stating "**Delayed** Hazards Not Determined."

(3) Specific Hazards and Precautions (Including Target Organ Effects).

The Specific Hazards and Precautions area of the **label** conveys specific information regarding the hazards of the chemical in the container. This is accomplished using American National Standards Institute (ANSI) Signal Words, Statements of Hazards, Precautionary Measures, and any other pertinent hazard information supplied by the manufacturer, importer, or distributor.

The written hazard warning is the portion of the label that must be emphasized for compliance with the OSHA Hazard Communication Standard. In

order to fully understand the hazards that may be encountered, the label must convey specific hazard warnings. While the pictorial warnings indicate the type and degree of hazard, they are meant only to supplement the written hazard warning. This portion of the label will also indicate any target organs **that** may be affected.

The Signal Word indicates the relative degree, or severity of the immediate hazards in increasing order: **CAUTION!**, **WARNING!**, and **DANGER!**. When a product has more than one hazard, only one Signal Word, corresponding to the class of greatest hazard, will be used.

The Statements of Hazards **will** follow the Signal Word in the Specific Hazards and Precautions area of the label and will include appropriate warnings for specific acute and chronic hazards that may be encountered in the workplace, in such a manner that employees may be exposed under normal conditions of use or in a foreseeable emergency. These may be statements such as "EXTREMELY FLAMMABLE" or "HARMFUL IF ABSORBED THROUGH SKIN." With products possessing more than one such hazard, an appropriate statement for each significant hazard should be included. In general, the most serious of the immediate hazards should be placed first.

When the hazardous chemical is a compound or mixture for which more than one physical hazard exists, the hazard of greatest severity will be noted. When the hazardous chemical is a compound or mixture for which more than one health hazard exists, each hazard quantified as moderate or severe will be noted with appropriate ANSI statements of hazards, including identification of target organ effects, when known.

The Signal Words and Statements of Hazards used in the Health Hazards and Precautions area of the ~~label~~ will be developed using the guidelines provided in the American National Standard for Hazardous Industrial Chemicals - Precautionary Labeling, ANSI Z129.1-1987. The 1987 revision of the ANSI standard also contains appropriate warning statements for chronic (delayed) hazards. The proper ANSI Signal Words, Statements of Hazard Precautionary Measures will be determined from information provided by the manufacturer or

may **be** obtained from the **HMIS, MSDS**, or other suitable data source. Appropriate pages from the **ANSI Z129.1-1987** are included in Attachment 2.

(4) Protect (Eye, Skin, Respiratory)

This section of the label indicates the routes of entry (eye, skin, or respiratory) that should be protected from the hazards of chemical exposure. The method of protection may be personal protective equipment (**PPE**), engineering controls (**ECs**), or a combination of items used to guard the worker against the normal hazards of the chemical. ECS are physical systems which provide protection from chemical exposure. The necessity for PPE or ECS is shown by an "X" in a box beside the word EYE, SKIN, or RESPIRATORY, indicating the route of entry that should be protected. The worker should consult the supervisor for the proper PPE to use. In training sessions, PPE use should be explained and reinforced. Workers should be taught the importance of consulting the supervisor for the proper PPE or EC to use, since various types of equipment and levels of protection are suitable and available throughout 000. The supervisor should seek technical assistance from supporting safety and/or industrial hygiene personnel.

The conditions under which personal protective equipment is required **should** be determined for each work environment. For example, the following guidelines, identified by the National Paint and Coatings Association, suggest communicating the maximum protective equipment under the following assumed conditions:

- o Direct worker contact with the material is possible;
- o The material is used routinely, equipment is not for emergency or misuse situation; and
- o The material **will** be used without engineering controls.

All of these conditions assume the material is not being used in a confined space.

(5) Responsible Party's Identification

This area of the label identifies the manufacturer, importer, or distributor of the hazardous material. The area includes the name, address, and emergency telephone number of the manufacturer of the product, or other responsible party, such as the importer or distributor.

When a distributor is identified in addition to the manufacturer, the distributor's name should be listed after the manufacturer's name, but only the manufacturer's address and emergency telephone number should be given. When the distributor is identified and no manufacturer is named, the listed name, address, and emergency telephone number should be that of the **distributor or** other responsible party who can provide additional information on the hazardous chemical and appropriate emergency procedures.

APPENDIX A

SAMPLE DoD HAZARDOUS MATERIAL LABEL
(Size 8-1/2" x 11")

HAZARDOUS CHEMICAL WARNING LABEL

1. CHEMICAL/ COMMON NAME 9637, Alkanex					2. HAZARD CODE		
3. NSN / LSN 5970-00-161-7232		4. PART NUMBER 9637 Alkanex					
5. ITEM NAME Insulating Varnish							
5. HAZARDS (X all that apply)		(1) Acute (Immediate)				(2) Chronic (Delayed)	
		NONE	SLIGHT	MODERATE	SEVERE		
a. HEALTH				X		X	
b. CONTACT					X		
c. FIRE					X		
d. REACTIVITY			X				
<p>7. SPECIFIC HAZARDS AND PRECAUTIONS (Including Target Organ Effects)</p> <p style="margin-left: 40px;">WARNING !</p> <p><u>Acute:</u> Irritation of skin, eyes, mucous membranes. Drying, defatting of skin. Ingestion may cause severe damage to gastrointestinal tract. Avoid breathing vapors. Keep away from heat, sparks, and flame.</p> <p><u>Chronic:</u> Contains a suspected mutagen. Contains a suspected teratogen. Bleed and reproductive disorders may occur; eye, liver, kidney, and central nervous system damage may occur.</p> <p style="text-align: center; margin-top: 20px;">(See MSDS for further information)</p>							
8. PROTECT (X all that apply)		X	a. EYES	X	b. SKIN	X	c. RESPIRATORY
9. CONTACT a. COMPANY NAME ABC Chemical Company							
b. ADDRESS (Street, P. O. Box, City, State, Zip Code, and Country) 10 Elm Street, Anytown, NY 55515							
c. EMERGENCY TELEPHONE NUMBER (Include Area Code) (555) 810-1010							
10. PROCUREMENT YEAR FOR HAZARDOUS CHEMICAL							

APPENDIX B

SAMPLE DOD HAZARDOUS MATERIAL LABEL
(Size 4-1/2" x 6")

HAZARDOUS CHEMICAL WARNING LABEL

1. CHEMICAL COMMON NAME Benzene, Benzol, Carbon Oil					2. HAZARD CODE
3. NSN/LSN 6810-00-281-5266		4. PART NUMBER Benzene AR			
5. ITEM NAME Benzene, Technical					
6. HAZARDS (X all that apply)	(1) Acute (Immediate)				(2) chronic (Delayed)
	NONE	SLIGHT	MODERATE	SEVERE	
a. HEALTH 				X	X
b. CONTACT 				X	
c. FIRE 				X	
d. REACTIVITY 		X			
7. SPECIFIC HAZARDS AND PRECAUTIONS (Including Target Organ Effects)					
DANGER!					
Acute: Absorbs through skin. Severe irritant to eyes, skin. Acute poisoning causes headache, dizziness, liver and kidney damage. Extremely flammable. Keep away from heat, sparks, flame. Use with adequate ventilation.					
Chronic: carcinogen. Benzene is a leukemogen.					
(See MSDS for further information)					
8. PROTECT (X all that apply)		X	a. EYES	X	b. SKIN
				X	c. RESPIRATORY
9. CONTACT a. COMPANY NAME XYZ Chemical Company					
b. ADDRESS (Street, P. O. Box, City, State, Zip Code, and Country) 345 Flower Street, Anytown, MD 00055					
c. EMERGENCY TELEPHONE NUMBER (Include Area Code) (101) 555-1010					
10. PROCUREMENT YEAR FOR HAZARDOUS CHEMICAL					

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APPEND 1x c

GENERAL DESCRIPTIVE CRITERIA FOR HEALTH AND CONTACT HAZARDS

GENERAL DESCRIPTIVE CRITERIA FOR HEALTH AND CONTACT HAZARDS

NONE

- No significant health hazard.
- Materials which produce toxic effects only under the most unusual conditions or by overwhelming dosage.

SLIGHT

- No severe or permanent damage to affected person.
- No reduction of affected person's physical or mental ability to respond appropriately to an emergency.

Examples: nausea; headache; skin **defatting**; mild irritation of skin, eyes, and respiratory tract; and coughing.

MODERATE

- No severe or permanent damage to affected person.
- Possible reduction of affected person's physical or mental ability to respond appropriately to an emergency.

Examples: dizziness, temporary loss of sight, mental confusion, severe abdominal pain, first-degree skin burns, temporary cardiac arrhythmia, loss of coordination, and central nervous system depression.

SEVERE

- Severe, permanent, or fatal damage to affected person.

Examples: loss of consciousness; cardiac arrest; convulsions; severe burns to skin, eyes, **and** respiratory tract; coma; damage to organs; death.

APPENDIX D
HEALTH HAZARD RATING CRITERIA
BASED UPON
NPCA ACUTE TOXICITY RATING CRITERIA*

* **HMIS=** is a registered trademark of the National Paint and Coatings Association (NPCA). All **HMIS=** materials are copyrighted by NPCA and can be only obtained from **Labelmaster** (American **Labelmark, Inc.**) of Chicago, IL.

HEALTH HAZARD **RATING** CRITERIA

	ORAL**	INHALATION
ACUTE TOXICITY RATING	Li qui ds, Sol i ds LD₅₀ Rat (mg/kg)	Ousts, Fumes, Mi sts (mg/l) Gases, Vapors (ppm) LC₅₀ 1-hour exposure
NONE	>5,000 (mg/kg)	200 mg/l >10,000 ppm
SLI GHT	500 - 5,000 (mg/kg)	>20 - 200 mg/l >2,000 - 10,000 ppm
MODERATE	50 - 500 (mg/kg)	>2 - 20 mg/l >200 - 2,000 ppm
SEVERE	0 - 50 (mg/kg)	0 - 2 mg/l 0 - 200 ppm

The **oral route of exposure is highly unlikely in a workplace setting. If situations are encountered where the oral **LD₅₀** value would indicate a significantly different rating, toxicity values for the other routes of entry may be considered more appropriate when assigning the rating.

APPENDIX E
CONTACT HAZARD RATING CRITERIA
BASED UPON
NPCA ACUTE TOXICITY RATING CRITERIA*

* **HMIS=** is a registered trademark of the National Paint and Coatings Association (**NPCA**). All **HMIS=** materials are copyrighted by NPCA and can be only obtained from **Labelmaster** (American Labelmark, Inc.) of Chicago, IL.

CONTACT HAZARD RATING CRITERIA

ACUTE TOXICITY RATING	DERMAL Liqui ds, Sol i ds LD₅₀ Rabbi t (mg/kg)	- SKIN IRRI TATI ON Liqui ds, Sol i ds 4-hour Exposure	EYE IRRI TATI ON Liqui ds, Sol i ds
NONE	>5,000 (mg/kg)	Essenti al l y noni rri tati ng	Essenti al l y noni rri tati ng
SLI GHT	>1,000 - 5,000 (mg/kg)	Slightl y irri tati ng	Slightl y irri tati ng but reversi bl e wi thi n 7 days
MODERATE	>200 - 1,000 (mg/kg)	Primar y irri tant sensi ti zer	Irri tati ng or moderatel y persi sti ng more than 7 days wi th reversi bl e cornea l opaci ty
SEVERE	0 - 200 (mg/kg)	Severel y irri tati ng and/or corrosi ve	Corrosi ve, irreversi bl e cornea l opaci ty

APPENDIX F
FIRE **HAZARD** RATING CRITERIA
BASED UPON
NFPA 704 SYSTEM FLAMMABILITY CRITERIA*

* Identification of the Fire Hazards of Materials. NFPA. **Quincy,**
Massachusetts, 1985. National Fire Protection Association, Standard
Number 704.

FIRE HAZARD **RATING** CRITERIA
BASED UPON
NFPA 704 SYSTEM FLAMMABILITY CRITERIA

NONE

Materials that will not burn. This degree should include any material which will not burn in air when exposed to a temperature of **1500°F** for a period of 5 minutes.

SLIGHT

Materials that must be preheated before ignition can occur. Materials in this degree require considerable preheating, under all ambient temperature conditions, before ignition and combustion can occur. This degree **should** include: (1) materials that will burn in air when exposed to a temperature of **1500°F** for a period of 5 minutes or less; and (2) liquids, solids, and semi solids having a flash point above **200°F**. This degree **includes** most ordinary combustible materials.

MODERATE

Materials that must be moderately heated or exposed to relatively high ambient temperatures before ignition can occur. Materials in this degree would not, under normal conditions, form hazardous atmospheres with air but, under high ambient temperatures or under moderate heating, may release vapor in sufficient quantities to produce hazardous atmospheres with air. This degree should include: (1) liquids having a flash point above 100°F but not exceeding **200°F** and (2) solids and semi solids that readily give off flammable vapors.

SEVERE

Materials that will rapidly or completely vaporize at atmospheric pressure and normal ambient temperature, or that are readily dispersed in air, or that burn readily. Liquids and solids that can be ignited under all ambient temperature conditions. Materials in this degree produce hazardous atmospheres with air under almost all ambient temperatures or, though unaffected by ambient temperatures, are readily ignited under almost all conditions. This degree should include: (1) liquids having a flash point **below** 73°F and having a boiling point at or above **100°F** and those liquids having a flash point at or above 73°F and below 100°F (Class **1B** and Class **1C** flammable liquids); (2) gases; (3) cryogenic materials; and (4) any **liquid or** gaseous material that is a liquid **while** under pressure and having a flash point below 73°F and having a boiling point below 100°F (Class 1A flammable liquids). Materials that, because of their physical form or environmental conditions, can form explosive mixtures with air that are readily dispersed in air, such as dust of combustible solids and mists of flammable or combustible liquid droplets.

APPENDIX G
REACTIVITY HAZARD RATING CRITERIA
BASED UPON
NFPA 704 SYSTEM REACTIVITY CRITERIA*

* Identification of the Fire Hazards of Materials. NFPA. Quincy, Massachusetts, 1985. National Fire Protection Association, Standard Number 704.

REACTIVITY HAZARD RATING CRITERIA
BASED UPON
NFPA 704 SYSTEM REACTIVITY CRITERIA

NONE

Materials that are normally stable, even under fire exposure conditions and which are not reactive with water.

SLIGHT

Materials that are normally stable but which can become unstable at elevated temperatures and pressures or which may react with water with some, but not violent, release of energy.

MODERATE

Materials that are normally unstable and readily undergo violent chemical change but do not detonate. This degree should include materials which can undergo chemical change with rapid release of energy at normal temperatures and pressures or which can undergo violent chemical change at elevated temperatures and pressures. It also should include those materials which may react violently with water or which may form potentially explosive mixtures with water.

SEVERE

Materials that, in themselves, are readily capable of detonation or of explosive decomposition or explosive reaction at normal temperatures and pressures. This degree should include materials which are sensitive to mechanical or localized thermal shock and react explosively with water at normal temperatures and pressures.

ATTACHMENT 1

MATERIAL SAFETY DATA SHEETS (MSDSs),
HAZARDOUS MATERIAL INFORMATION SYSTEM (HMIS),
and
PROCEDURES FOR DETERMINATION OF LABEL INFORMATION

Data Sheets for:
Alkanex, 9637
Benzene

MATERIAL SAFETY DATA SHEET
ABC PAINT COMPANY

Page: 1
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MANUFACTURED BY:
ABC PAINT COMPANY
10 ELM STREET
ANYTOWN , NY 55515

EMERGENCY TELEPHONE :
DAILY : (555) 810-1010
24 HRS
REVISED: 5/08/86

**** I PRODUCT IDENTIFICATION ****

PRODUCT IDENTIFICATION: 963- / CHEMICAL FAMILY: **POLYESTER PHENOLIC RESIN**
CHEMICAL NAME: POLYESTER PHENOLIC RESIN FORMULA : MIXTURE

**** II PRODUCT COMPONENTS ****

PRODUCT COMPOSITION	APPROX . %	ACGIH TLV	OSHA PEL	UNITS	CAS REG NO.
A. HAZARDOUS					
XYLENE	<30%	100	100	PPM	4330-20- 7*
PETROLEUM NAPHTHA 100	<30%	30	NF	PPM	64742-95- 6*
PETROLEUM NAPHTHA 150	< 5%	100	NF	PPM	64742-94- 5*
2-BUTOXYETHANOL	< 5%	25	50	PPM	111-76- 2*
B. NON-HAZARDOUS					

**** III PHYSICAL DATA ****

****PRODUCT INFORMATION**

BOILING POINT	: NF	(F)	NF	(c)	% VOLATILE BY VOLUME: 52
VAPOR PRESSURE (20 C)	: NF	MM	HG		EVAPORATION RATE : >1
VAPOR DENSITY (AIR=1)	: NF				(BUTYL ACETATE=1)
FREEZING POINT	: NA	(F)	NA	(c)	SPECIFIC GRAVITY : 0.97
MELTING POINT	: NA	(F)	NA	(c)	(WATER =1)
PHYSICAL STATE	LIQUID				DENSITY : NF KG/M3
ODOR	AROMATIC				ACIDITY/ALKALINITY : NA MEG/G
COLOR	: AMBER				PH : NA
SOLUBILITY IN WATER (20 c)	: MODERATE				
SOLUBILITY IN ORGANIC SOLVENT	: NF				
	(STATE SOLVENT):				

XYLENE

BOILING POINT: 280 (F) 138 (C)
VAPOR PRESSURE : (20 C) 6 MM HG
VAPOR DENSITY : (AIR=1) 3.7

MATERIAL SAFETY DATA SHEET
ABC PAINT COMPANY

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PETROLEUM NAPHTHA 100
BOILING POINT: 311 (F) 155 (C)
VAPOR PRESSURE: (20 C) <10 MM HG
VAPOR DENSITY: (AIR=1) 4.1

PETROLEUM NAPHTHA 150
BOILING POINT: **350 (F) 177 (C)**
VAPOR PRESSURE: (20 C) <10 MM HG
VAPOR DENSITY: (AIR=1) 4.0

2-BUTOXYETHANOL
BOILING POINT: 340 (F) 171 (C)
VAPOR PRESSURE: (20 C) <1 MMHG
VAPOR DENSITY: (AIR=1) 4.1

**** IV FIRE AND EXPLOSION DATA ****
FLASH POINT: 85 (F) **29 (C)** BY PMCC IGNITION TEMP: (F) **NE** (C)
FLAMMABLE LIMITS IN AIR (%) LOWER: **0.9** UPPER: 10.6

EXTINGUISHING MEDIA:

CARBON DIOXIDE
DRY CHEMICAL
FOAM
WATER MIST

SPECIAL FIREFIGHTING PROCEDURES:

VAPORS MAY FORM EXPLOSIVE MIXTURE WITH AIR.
Flammable.
POSITIVE PRESSURE. SELF-CONTAINED BREATHING APPARATUS .
EVACUATE AREA AND FIGHT FIRE FROM A SAFE DISTANCE.

**** V REACTIVITY DATA ****

STABILITY: X STABLE UNSTABLE HAZARDOUS:
POI, YMKRIZA'L'ION WILL NOT OCCUR

HAZARDOUS DECOMPOSITION PRODUCTS:

CARBON MONOXIDE.
CARBON DIOXIDE.
TOXIC FUMES.
TOXIC METAL FUMES.
FUMES OF AROMATIC HYDROCARBONS.
XYLENE FUMES.

INCOMPATIBILITY (MATERIALS TO AVOID):

AVOID CONTACT WITH ACIDIC, BASIC OR OXIDIZING AGENTS.
METAL SALTS SUCH AS ALUMINUM CHLORIDE.

CONDITIONS TO AVOID:

KEEP AWAY FROM HEAT, SPARKS AND OPEN FLAME.

MATERIAL SAFETY DATA SHEET
ABC PAINT COMPANY

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**** VI HEALTH HAZARD DATA ****

ACUTE SIGNS /EFFECTS OF EXPOSURE:

INGESTION :

CAUSES **VOMITTING** , **NAUSEA** , AND **DIARRHEA** .
MAY CAUSE SEVERE **DAMAGE** OF **GASTROINTESTINAL** TRACT.
ASP **IRAT 10N** CAN BE A HAZARD IF THIS MATERIAL IS SWALLOWED.
MAY **CAUSE** **PULMONARY EDEMA** .

SKIN CONTACT :

CAUSES **MODERATE SKIN T. IRRITAT 10N** .
MAY **CAUSE** **SKIN DEFATTING** WITH **PROLONGED EXPOSURE**.
CAN **DRY SKIN** .

INHALATION :

EXCESSIVE INHALATION CAUSES **HEADACHE** , **DIZZINESS** , **NAUSEA** AND
INCOORDINATION.
CAUSES IRRITATION OF **THE MOUTH** , **NOSE** , AND **THROAT** .
CAN CAUSE **UNCONSCIOUSNESS** IF **INHALED**.

EYE CONTACT :

CAUSES EYE IRRITATION .
CAUSES REDNESS AND **TEARING** .
CAUSES BLURRED VISION.

MEDICAL CONDITIONS AGGRAVATED :

RESPIRATORY .
PULMONARY DISORDERS .
LIVER , **KIDNEY**
DERMATITIS .
CENTRAL NERVOUS SYSTEM DISORDERS.
GASTROINTESTINAL DISORDERS .
BLOOD DISORDERS .
EYE ILLMENTS .

OTHER :

NONE KNOWN .

CHRONIC EFFECTS OF EXPOSURE:

DERMATITIS.
RESPIRATORY ILLMENTS .
CENTRAL NERVOUS SYSTEM DAMAGE .
LIVER AND KIDNEY DAMAGE.
CORNEAL DAMAGE.
BLOOD DISORDERS.
REPRODUCTIVE DISORDERS.
THIS PRODUCT CONTAINS A COMPONENT THAT IS A SUSPECTED MUTAGEN.
THIS PRODUCT CONTAINS A COMPONENT THAT IS A SUSPECTED TERATOGEN .
EYE DAMAGE .

EMERGENCY AND FIRST AID PROCEDUREs:

INGESTION :

IF SWALLOWED DO NOT INDUCE VOMITTING . **GIVE LARGE QUANTITIES**

MATERIAL SAFETY DATA SHEET
ABC PAINT COMPANY

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OF WATER TO DRINK AND GET MEDICAL ATTENTION. NEVER
GIVE ANYTHING BY MOUTH TO AN UNCONSCIOUS PERSON.

SKIN :

REMOVE CONTAMINATED CLOTHING AND LAUNDER BEFORE REUSE.
WASH WITH SOAP AND WATER.
GET MEDICAL ATTENTION IF IRRITATION PERSISTS.

INHALATION:

IF INHALED, REMOVE TO FRESH AIR. IF NOT BREATHING GIVE ARTIFICIAL RESPIRATION, PREFERABLY MOUTH-TO-MOUTH. IF BREATHING IS DIFFICULT GIVE OXYGEN. GET MEDICAL ATTENTION.

EYES :

IN CASE OF CONTACT, IMMEDIATELY FLUSH EYES WITH PLENTY OF WATER FOR AT LEAST 15 MINUTES AND GET MEDICAL ATTENTION.

NOTE TO PHYSICIAN:

MONITOR FOR 24 HRS. OBSERVE AND SUPPORT LIVER FUNCTION.
ASPIRATION MAY CAUSE SEVERE LUNG DAMAGE. EVACUATE STOMACH IN A WAY WHICH AVOIDS ASPIRATION.

TOXICITY:

XYLENE

ACUTE ORAL LD50: 4,300 MG/KG (RAT) MG/KG
ACUTE DERMAL LD50: >3950(RBT) MG/KG
ACUTE INHALATION LD50: 5,000 PPM/4H(RAT)
OTHER : EYE AND SKIN IRRITANT.
AMES TEST: UNKNOWN

TOXICITY:

PETROLEUM NAPHTHA 100

ACUTE ORAL LD50: 4,700 MG/KG (RAT) MG/KG
ACUTE DERMAL LD50: >4 ML/KG(RAT) MG/KG
ACUTE INHALATION LD50: 3,670 PPM/8H(RAT)
OTHER : EYE AND SKIN IRRITANT.
AMES TEST: UNKNOWN

TOXICITY:

PETROLEUM NAPHTHA 150

ACUTE ORAL LD50: NE MG/KG
ACUTE DERMAL LD50: NE MG/KG
ACUTE INHALATION LD50: NE
OTHER : EYE AND SKIN IRRITANT.
AMES TEST: UNKNOWN

TOXICITY:

2-BUTOXYETHANOL

ACUTE ORAL LD50: 470(RAT) MG/KG
ACUTE DERMAL LD50: 220(RBT) MG/KG
ACUTE T.NHAL,A'L'ION LD50: LCL0500 PPM/4H (RAT)
OTHER : EYE AND SKIN IRRITANT.
AMES TEST: UNKNOWN
PRINCIPAL ROUTES OF EXPOSURE:
ORAL .

MATERIAL SAFETY DATA SHEET
ABC PAINT COMPANY

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DERMAL - SKIN.

EYES .

INHALATION .

ABSORPTION THROUGH SKIN.

THIS PRODUCT OR ONE OF ITS INGREDIENTS PRESENT 0.1% OR MORE IS NOT LISTED AS A CARCINOGEN OR SUSPECTED CARCINOGEN BY NTP, IARC, OR OSHA.

PRODUCTS/ INGREDIENTS :

THIS SPACE RESERVED FOR SPECIAL USE.

**** VI SPECIAL PROTECTIVE EQUIPMENT ****

RESPIRATORY PROTECTION :

USE IN A WELL VENTILATED AREA .

USE APPROVED NIOSH RESPIRATORY PROTECTION IF TLV EXCEEDED

OR OVER EXPOSURE IS LIKELY .

CARTRIDGE RESPIRATOR .

PROTECTIVE GLOVES :

NEOPRENE .

EYE AND FACE PROTECTION :

SAFETY GLASSES .

MONOGOGGLES .

OTHER PROTECTIVE EQUIPMENT:

RUBBER APRON .

VENTILATION :

USE ONLY IN WELL VENTILATED AREA .

MECHANICAL VENTILATION .

**** VII SPILL, LEAK AND DISPOSAL PROCEDURES ****

ACTION TO BE TAKEN IF MATERIAL IS RELEASED OR SPILLED :

WIPE. SCRAPE OR SOAK UP IN AN INERT MATERIAL AND PUT IN A CONTAINER FOR DISPOSAL.

WASH WALKING SURFACES WITH DETERGENT AND WATER TO REDUCE SLIPPING HAZARD .

WEAR PROPER PROTECTIVE EQUIPMENT AS SPECIFIED IN THE PROTECTIVE EQUIPMENT SECTION .

REMOVE SOURCES OF IGNITION .

WARN OTHER WORKERS OF SPILL .

INCREASE AREA VENTILATION .

PERSON NOT TRAINED SHOULD EVACUATE AREA .

DISPOSAL METHOD:

DISPOSAL SHOULD BE MADE IN ACCORDANCE WITH FEDERAL, STATE AND LOCAL REGULATIONS .

**** IX SPECIAL PRECAUTIONS ****

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORAGE:

USE GROUND STRAP .

STORE UPRIGHT IN A COOL PLACE BELOW 30°C (85° F) .

MATERIAL SAFETY DATA SHEET
ABC PAINT COMPANY

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KEEP CONTAINER CLOSED WHEN NOT IN USE.
AVOID BREATHING VAPORS . IF EXPOSED TO HIGH VAPOR CONCRNTRATION,
LEAVE AREA AT ONCE.
AVOID CONTACT WITH SKIN ANDEYES.
OPEN CONTAINER CAUTIOUSLY.
USE ONLY IN A WELL VENTILATED AREA.
WARNING! FLAMMABLE.
DO NOT **INHALE** VAPORS.
KEEP AWAY **FROM** FOOD AND SMOKING **MATERIALS.**
WASH **HANDS** BEFORE EATING AND **SMOKING.**
AVOID CONTACT **WITH EYES.**

ENGINEERING CONTROLS:

EXHAUST VRNTILATION.
SHOWERS.
EYEWASH STATIONS.
USE IN A **WELL VENTILATED AREA.**

**** X SHIPPING AND REGULATORY CLASSIFICATION DATA ****

DOT SHIPPING NAME: RESIN SOLUTION
DOT HAZARD CLASS: **FLAMMABLE LIQUID**
DOT LABEL(S): **FLAMMABLE**
UN/NA NUMBER: **UN1866**
PLACARDS:
-

EXPORT :

EPA HAZARD WASTE: **D001**
OSHA HAZARD CLASS: IRRITANT
CPSC CLASSIFICATION: -
'L'RANSPOR'L'ATION CLASS: **IMO 3.3 PG 3153**
RID (OCT1)
ADR (ECE)
RAR (TATA) 3,III

NFPA/HMIS CLASSIFICATION: FLAMMABILITY 3 , REACTIVITY 0 , HEALTH 2

ADDITIONAL INFORMATION:

THIS PRODUCT OR ITS COMPONENTS ARE ON THE EUROPEAN INVENTORY OF
EXISTING COMMERCIAL CHEMICALS (EINECS)
THESE DATA ARE OFFERED IN GOOD FAITH AS TYPICAL VALUES AND NOT
AS A PRODUCT SPECIFICATION. NO WARRANTY, EITHER EXPRESSED OR
IMPLIED, IS MADE. THE RECOMMENDED HANDLINGPROCEDURES ARE
BELIEVED 'TO BE GENERALLY APPLICABLE. HOWEVER, EACH USER SHOULD
REVIEW THESE RECOMMENDATIONS IN THE SPECIFIC CONTENT OF THE
INTENDED USE

STOCK NUMBER	MFR CAGE	PN	INO	FPIND	STATUS	NO ENTRIES	STOCK NUMBER	MFR CAGE	PN	IND	FP	IND	STATUS	NO ENTRIES
6810-00-281-s 1-5266	62910	A	K			002 OF 003	6810-00-281-5266	62910	A	K				002 OF 003

PART NO/TRADE NAME BENZENE AR
 DATE TECH REVIEW-SAFE. . . 03JUN86
 SUPPLY ITEM MANAGER CX

GENERAL INFORMATION

PROPRIETARY OATA. NO
 ITEM NAME. BENZENE, TECHNICAL
 MANUFACTURER. MALLINCKRODT INC., SCIENCE PRODUCTS DIVIS
 ION
 EMERGENCY TELEPHONE NO. 314-982-8000
 SPECIFICATION NO. VV-B-221
 HAZ CHARACTERISTIC CODE. F2
 UNIT OF ISSUE. CN
 U/I CONTAINER QUANTITY. 5 GAL
 TYPE CONTAINER. CAN, METAL
 NET UNIT WEIGHT. N/K

INGREDIENTS/IDENTITY INFORMATION

NIOSH RTECS NO. 1 CY1400000
 INGREDIENT NO. 1 BENZENE; BENZOL; COAL NAPHTHA; CARBON OIL;
 CAS #71-43-2; OSHA PEL: TWA 10PPM; 25PPM (CE
 ILING)
 PERCENT NO. 1 >99
 ACGIH TLV NO. 1 10PPM

PHYSICAL/CHEMICAL CHARACTERISTICS

APPEARANCE AND ODOR. CLEAR COLORLESS LIQ; SWEET AROMATIC ODOR
 BOILING POINT. 80C (176F)
 VAP PRESS/MM HG/70 F/. . . 100
 VAP DENSITY (AIR =1). . . . 2.7
 SPECIFIC GRAVITY. 0.88
 EVAP RATE & REFERENCE. . . 2.8 (ETHER=1)
 SOLUBILITY IN WATER. NEGLIGIBLE
 PCT VOLATILES BY VOL. . . . 100

FIRE AND EXPLOSION HAZARD DATA

FLASH POINT. -11C (12F) - C.C
 LOWER EXPLOSIVE LIMIT. . . 1.0
 UPPER EXPLOSIVE LIMIT. . . 8.0
 EXTINGUISHING MEDIA. . . . DRY POWDER, FOAM, CARBON DIOXIDE
 SPEC FIRE FIGHT PROC. . . . WEAR SELF-CNTD BRTHG, APP H+20 SPRAY TO C
 DOL CONTR.
 UNUS FIRE & EXPLOS HAZ. . . EXPLOSIVE VAPOR/AIR MIXTURES MAY FORM AB
 OVE FLASH POINT. CONTAINER MAY EXPLODE IN
 HEAT OR FLAME.

REACTIVITY DATA

CONTINUED ON TOP RIGHT HAND SIDE OF THIS FRAME/PAGE
 N/K = NOT KNOWN N/R = NOT RELEVANT N/A = NOT APPLICABLE

* STABILITY. YES
 * COND TO AVOID (STABIL). IGNITION SOURCES
 * MATERIALS TO AVOID. . . . OXIDIZERS, CORROSIVE MATL (CLF+3, H+2SO+4, K
 CHROMIC ANHYDRIDE)
 * HAZ DECOMPOSITION PROD. TOXIC GASES & VAPOR SUCH AS CARBON MONOX
 IDE
 * HAZ POLYMERIZATN OCCUR. NO
 * COND TO AVOID (POLYMR). N/K

HEALTH HAZARD DATA

* SIGNS AND SYMPTONS OF
 * EXPOSURE. INH: MAY BE FATAL. MAY CAUSE DIZZ, HEAD, LVR
 /KDNV DAMG; ING: SAME AS INH; SKIN/EYES: IRR
 ITANT. MAY CAUSE PAIN
 * EMERGENCY AND FIRST AID
 * PROCEDURES. INHAL: RMV TO FRESH AIR. IF NEEDED, GIVE C
 PR/OXYGEN. GET MD; INGEST: GIVE SEVRL GL OF
 WATER. DO NOT INDUCE VOMITG. IMMED GET MD
 ; SKIN: FLUSH W/LG QTY OF H+20 FOR 15 MIN.
 REMV CONTMNTD CLOTHES. GET MD; EYES: IMMED
 FLUSH W/PLENTY OF H+20 FOR AT LEAST 15 M
 IN. GET MD.

PRECAUTIONS FOR SAFE HANDLING AND USE

* STEPS TO BE TAKEN IF
 * MATL IS RELEASED/SPILL. . . VENTILATE & EVAC AREA. USE PROTCTV CLOTHG
 & RESP PROTCTN FM VAP. CONTAIN & RECOV
 R LIQ WHEN POSS. SPILLS MAY BE ABSORBD W/
 SAND, VERMICULITE OR OTHER INERT MATL & C
 ONTAINERIZE FOR DISPOSAL. USE H+20 SPRAY
 TO DISPRS VAPS, TO FLUSH AWAY/DILUTE SPIL
 LS. RMV IGN
 * WASTE DISPOSAL METHOD. . . WASTE CAN BE ATOMIZED IN A CHEMICAL INCI
 NERATOR SUITABLE FOR BURNING HAZARDOUS W
 ASTE & EQUIPPED W/AN AFTERBURNER & SCRUB
 BER SYSTEM. ENSURE COMPLIANCE W/LOCAL, STA
 TE & FED REGS. CWA/CERCLA RQ: 1000LBS.
 * HANDLING/STORAGE PREC. . . KEEP IN TIGHTLY CLOSED CONTNRS AT COOL, D
 RY, VENTILATED PLACE. PROTECT AGAINST PHY
 DAMAGE. OUTSIDE OR DETACHED STORAGE IS PR
 EFERRED. KEEP AWAY FM OXIDIZERS
 * OTHER PRECAUTIONS. AVOID BREATHING DUST. USE W/ADEQUATE VENT
 ILATION. KEEP CONTAINRS CLOSED. WASH THORO
 UGHLY AFTER HANDLING. AVOID SKIN, EYES & C
 LOTHING CONTACT; CANCER HAZRD; OVEREXPOSU
 RE MAY CREATE CANCER RISK.

CONTROL MEASURES

* RESPIRATORY PROTECTION. SUPPLIED AIR RESPIR/SCBA; ESCAPE; GAS MA

CONTINUED ON NEXT FRAME/PAGE BELOW SEQ NO: 51 " N - s - N
 * N/K = NOT KNOWN N/R = NOT RELEVANT N/A = NOT APPLICABLE

HAZARDOUS MATERIALS INFORMATION SYSTEM INTERROGATION REPLIES

GOHR74
 STOCK NUMBER MFR CAGE PN IND FP IND STATUS NO ENTRIES NO ENTRIES
 6810-00-281-5266 62910 A K 6810-00-281-5266 62910 A K 002 OF 003 002 OF 003

VENTILATION..... LOCAL EXHAUST TO MAINTN BELOW TLV.
 PROTECTIVE GLOVES..... IMPERVIOUS
 EYE PROTECTION..... GOGGLES/FACE SHIELD
 OTHER PROTECTIVE EQUIP. FULL PROTECTIVE CLOTHING, SAFETY SHOWER, E
 YE WASH STATION

SUPPLEMENTAL SAFETY &
 HEALTH DATA..... MSDS FM MFR DATED JAN 85 CONFORMS TO OSH
 A HAZ COMM STD; BENZENE IS CARCINOGEN DI
 FINED BY IARC, MAK, NIOSH, NTP & ACGIH-S
 EF ACGIH 1985, VOL 13, TABLE A3;

*** TRANSPORTATION DATA ***

DATE TECH REVIEW-TRANS. 03JUN86
 DOT PSN CODE..... BRZ
 DOT SHIPPING NAME..... BENZENE
 DOT HAZARD CLASS..... FLAMMABLE LIQUID
 DOT LABEL..... FLAMMABLE LIQUID
 DOT MODE INDICATOR..... E
 DOT ID NUMBER..... UN114
 REPORTABLE QUANTITY..... NO
 LIMITED QUANTITY..... NO

IMO PSN CODE..... BXB
 IMO SHIPPING NAME..... BENZENE
 IMDG PAGE NUMBER..... 3058
 UN NUMBER..... 1114
 UN CLASS..... 3.2
 SUBSIDIARY RISK LABEL..

IATA PSN CODE..... DBA
 IATA SHIPPING NAME..... BENZENE
 IATA CLASS OR DIVISION. 3
 IATA LABEL..... FLAMMABLE LIQUID
 UN OR ID NUMBER..... 1114
 AFR 71-4 SHIPPING NAME. BENZENE
 AFR 71-4 CLASS..... FLAMMABLE LIQUID
 AFR 71-4 LABEL..... FLAMMABLE LIQUID
 ADDITIONAL TRANSP DATA. DOT RQ: 1000LBS.

STOCK NUMBER MFR CAGE P N IND FP IND STATUS NO ENTRIES
5970-00-1617232 01139 B D 002 OF 009

PART NO/TRADE NAME 9637 ALKANEX
DATE/TECH REVIEW-SAFE. . . 25MAR85
SUPPLY ITEM MANAGER. . . . CX

*** GENERAL INFORMATION ***

PROPRIETARY DATA. NO
ITEM NAME. INSULATING VARNISH
MANUFACTURER. GENERAL ELECTRIC CO. INSULATING MATERIAL
EMERGENCY TELEPHONE NO. (518) 385-0172
SPECIFICATION NO. MIL-I-24092
HAZ CHARACTERISTIC CODE. F2
UNIT OF ISSUE. CN
U/I CONTAINER QUANTITY. 1 GAL

*** INGREDIENTS/IDENTITY INFORMATION ***

NIOSH RTECS NO. 1 1000268VE
INGREDIENT NO. 1 VEHICLE
PERCENT NO. 1 48
NIOSH RTECS NO. 2 1000099PH
INGREDIENT NO. 2 PETROLEUM HYDROCARBON
PERCENT NO. 2 52
ACGIH TLV NO. 2 100 PPM

*** PHYSICAL/CHEMICAL CHARACTERISTICS ***

APPEARANCE AND ODOR. STRONG AROMATIC ODOR
BOILING POINT. 286F
VAP PRESS/MM HG/70 F/. . . 20
VAP DENSITY (AIR =1) . . . 3.9
SPECIFIC GRAVITY. 0.9
SOLUBILITY IN WATER. INSOLUBLE
PCT VOLATILES BY VOL. . . . 50

*** FIRE AND EXPLOSION HAZARD DATA ***

FLASH POINT. 73F (PMCC)
LOWER EXPLOSIVE LIMIT. . . 1
UPPER EXPLOSIVE LIMIT. . . 7
EXTINGUISHING MEDIA. . . . CARBON DIOXIDE, FOAM, DRY CHEMICAL, WATER SPRAY OR FOG
SPEC FIRE FIGHT PROC. . . . USE AIR-SUPPLIED RESCUE EQUIPMENT. COOL EXPOSED CONTAINERS.

*** REACTIVITY DATA ***

STABILITY. YES
COND TO AVOID (STABIL). HIGH TEMP OR HEAT
MATERIALS TO AVOID. OXYGEN & STRONG OXIDANTS MAY DISSOLVE SO

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N/K = NOT KNOWN N/R = NOT RELEVANT N/A = NOT APPLICABLE

STOCK NUMBER MFR CAGE P N IND FP IND STATUS NO ENTRIES
5970-00-161-7232 01139 B D 002 OF 009

ME PLASTIC & RUBBER
HAZ OECC)MPOSITION PROD. CARBON MONOXIDE
HAZ POLYMERIZATN OCCUR. NO

*** HEALTH HAZARD DATA ***

SIGNS AND SYMPTOMS OF
EXPOSURE. INHAL OF HIGH CONC MAY RESULT IN MILD DEPRESSION TO CONVULSIONS & LOSS OF CONSCIOUSNESS.
EMERGENCY AND FIRST AID PROCEDURES. INHAL: REMOVE FROM EXPOSURE IMMED & CALL PHYSICIAN. IF BREATHING IRREG OR STOPPED, START RESUSCITATION. EYES: FLUSH WITH WATER UNTIL IRRITATION SUBSIDES. WASH SKIN. REMOVE CONTAMINATED CLOTHING.

*** PRECAUTIONS FOR SAFE HANDLING AND USE ***

STEPS TO BE TAKEN IF
MATERIAL IS RELEASED/SPILL. REMOVE ALL IGNITION SOURCES. KEEP PEOPLE AWAY. RECOVER FREE LIQUID. ADD ABSORBENT TO SPILL AREA. AVOID BREATHING VAPORS. VENTILATE ENCLOSED SPACES. OPEN ALL WINDOWS & DOORS. USE PERSONAL PROTECTIVE EQUIPMENT.
WASTE DISPOSAL METHOD. ABSORB WITH DRY SOLIDS & INCINERATE. RUN OFF TO WATERWAY CREATES FIRE HAZARD. NOTIFY FIRE & HEALTH AGENCIES.
HANDLING/STORAGE PREC. KEEP CONTAINERS CLOSED. KEEP AWAY FROM HEAT OR OPEN FLAME. USE ONLY WITH ADEQUATE VENTILATION. AVOID PROLONGED OR REPEATED BREATHING OF VAPORS.
OTHER PRECAUTIONS. AVOID SKIN CONTACT.

*** CONTROL MEASURES ***

RESPIRATORY PROTECTION. HYDROCARBON VAPOR CANISTER. SUPPLIED AIR OR HOSE MASK
VENTILATION. FACE VELOCITY > 60 FPM; EXPLOSION-PROOF VENTILATION EQUIP.
PROTECTIVE GLOVES. PLASTIC
EYE PROTECTION. CHEM GOGGLES
OTHER PROTECTIVE EQUIP. HYDROCARBON-INSOLUBLE APRON
SUPPLEMENTAL SAFETY & HEALTH DATA. CONFORMS TO MIL-I-24092, GRADE CB, COMPOSITION I, CLASS 155. PRODUCT SUPERSEDED BY NEW FORMULATION PN I D AS OF MAR83. NOTE NEW EMER PHONE NO. AS PER 24MAR83 MSDS

*** TRANSPORTATION DATA ***

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N/K = NOT KNOWN N/R = NOT RELEVANT N/A = NOT APPLICABLE

1-10

HAZARDOUS MATERIALS INFORMATION SYSTEM INTERROGATION REPLIES

STOCK NUMBER	MFR CAGE	PN IND	FP IND	STATUS	NO ENTRIES	STOCK NUMBER	MFR CAGE	PN IND	FP IND	STATUS	NO ENTRIES
5970-00-161-7232	01139	B	D		002 OF 009	5970-00-161-7232	01139	B	D		002 OF 009

DATE TECH REVIEW-TRANS. 11AUG82

DOT PSN CODE..... KFJ
 DOT SHIPPING NAME..... PAINT
 DOT HAZARD CLASS..... FLAMMABLE LIQUID
 DOT LABEL..... FLAMMABLE LIQUID
 DOT ID NUMBER..... UN1263
 LIMITED QUANTITY..... NO

IMO PSN CODE..... PHM
 IMO SHIPPING NAME..... VARNISH
 IMDG PAGE NUMBER..... 3149
 UN NUMBER..... 1263
 UN CLASS..... 3.3
 SUBSIDIARY RISK LABEL.. -

IATA PSN CODE..... SXN
 IATA SHIPPING NAME..... PAINT
 IATA CLASS OR DIVISION. 3
 IATA LABEL..... FLAMMABLE LIQUID
 UN OR ID NUMBER..... 1263

AFR 71-4 PSN CODE..... HHJ
 AFR 71-4 SHIPPING NAME. PAINT
 AFR 71-4 CLASS..... FLAMMABLE LIQUID
 AFR 71-4 LABEL..... FLAMMABLE LIQUID
 ID NUMBER..... UN1263

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 N/K = NOT KNOWN N/R = NOT RELEVANT N/A = NOT APPLICABLE

BENZENE

Material Safety Data Sheet

Emergency Telephone Number

xyz Chemical company
345 Flower Street
Anytown, MD 00055

(101) 555-1010

Effective Date: 11-06-85 Supersedes 01-01-85

PRODUCT IDENTIFICATION :

Synonyms: **Benzol**; carbon oil; coal naphtha

Formula CAS No. : **71-43-2**

Molecular Weight: 78.11

Hazardous Ingredients:
Not applicable.

Chemical Formula: C6H6

PRECAUTIONARY MEASURES

DANGER ! EXTREMELY FLAMMABLE . CANCER HAZARD. OVEREXPOSURE MAY CREATE CANCER RISK . HARMFUL IF SWALLOWED, INHALED OR ABSORBED THROUGH SKIN. MAY AFFECT BLOOD SYSTEM .

Keep away from heat, sparks and flame.
Do **not** get in eyes, on skin, or on clothing.
Avoid breathing vapor.
Keep **container** closed.
Use with adequate ventilation.
Wash thoroughly after handling.

EMERGENCY/FIRST AID

If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen.
Aspiration hazard.
If swallowed, DO NOT INDUCE VOMITING! Give large quantities of water or milk if available. Never give anything by **mouth** to an unconscious person.
In case of contact, immediately flush skin or eyes with plenty of water for **at least 15 minutes**.
In all cases call a physician.
SEE SECTION 5.

DOT Hazard **Class:** Flammable Liquid

Physical Data

SECTION 1

Appearance: Clear, colorless liquid.

Odor: Sweet, aromatic odor.

Solubility: 0.1 g/100 g water @ 20°C (68°F).

Boiling Point: 80°C (176°F).

Vapor Density (Air-1) :2.7

Melting Point: 5.5°C (41.9°F).

Vapor Pressure (mmHg): 100
@ 26°C (79°F)

Specific Gravity: 0.88

Evaporation Rate: (ether-1) 2.8

Fire and Explosion
Information

SECTION 2

Fire: Extremely flammable liquid.
Flashpoint: **-11°C (12°F)** (CC).
Flammable limits, in air, % by volume:
 l_{el}: 1.3; u_{el}: 7.1
Autoignition temperature **562°C (1044°F)**.

Explosion: Above flash point, vapor-air mixtures are explosive within flammable limits noted above.

Fire Extinguishing Media: Dry chemical, foam or carbon dioxide. Water spray may be used to keep fire exposed containers cool.

Special Information: In the event of a fire, wear full protective clothing and **NIOSH-approved** self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode. This highly flammable liquid must be kept from sparks, open flame, hot surfaces, and all sources of heat and ignition. Vapors can flow along surfaces to distant ignition source and flash back.

Reactivity Data

SECTION 3

Stability: Stable under ordinary conditions of use and storage.

Hazardous Decomposition Products: Toxic gases and vapors may be released if involved in a fire.

Hazardous Polymerization: This substance does not polymerize.

Incompatibilities: Strong oxidizers such as permanganate, ozone, sulfuric acid, potassium, chromic anhydride, and nitric acid.

Leak/Spill Disposal Information

SECTION 4

Persons not wearing protective equipment or clothing should be restricted from area of spill until clean-up has been completed. Ventilate and dike area of leak or spill. Remove all sources of ignition. Clean-up personnel require protective clothing and respiratory protection from vapors. Contain and recover liquid when possible. Collect as hazardous waste and atomize in a suitable RCRA approved combustion chamber, or absorb with vermiculite, dry sand, earth or similar material for disposal as hazardous waste in a RCRA approved facility. Do not flush to sewer !

Reportable Quantity (RQ)(CWA/CERCLA) : 1000 lbs.

Ensure compliance with local, state and federal regulations.

Health Hazard Information

SECTION 5

A. Exposure/Health Effects

Inhalation: Acute poisoning may cause dizziness, weakness, headache, nausea, visual blurring, abnormal respiration, collapse. May also cause liver and kidney damage.

Ingestion: May cause headache, abdominal pain, dizziness, nausea, dullness, unconsciousness.

Skin Contact: Irritant. Can be absorbed through the skin. Contact effects may include redness, irritation, scaling, cracking, edema and blistering.

Eye Contact: Severe irritant. Effects may include irritation, redness and eye damage.

Chronic Exposure: Benzene is a recognized **leukemogen**. Other chronic effects may include headache, loss of appetite, drowsiness, nervousness, **blood cell** changes, pallor, abnormal bleeding, bone marrow **aplasia**.

Aggravation of Pre-existing Conditions: Persons with pre-existing skin disorders or eye problems, or impaired liver; kidney or respiratory function may be more susceptible to the effects of the substance.

B. FIRST AID

Inhalation: Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Call a physician.

Ingestion: Aspiration hazard. If swallowed, DO NOT induce vomiting. Give large quantities of water or milk if available. Call a physician immediately. Never give anything by mouth to an unconscious person.

Skin Exposure: **In case of contact, immediately** flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. Call a physician immediately.

Eye Exposure: Wash eyes with plenty of water for at least 15 minutes, lifting **lower** and upper eyelids occasionally. Get medical attention immediately.

C. TOXICITY DATA (RTECS, 1982)

Inhalation rat LC50: 10000 ppm/7H.
Oral rat LD50: 4894 mg/kg.
Irritation data: skin rabbit: 15 mg/24H open mild.
Eye rabbit: 2 mg/24H severe.
Mutation references cited.
Reproductive effects cited.
Tumorigenic references cited.
Carcinogenic determination: Human positive IARC 29, 93, 82.
Listed as a carcinogen by the National Toxicology Program (NTP).

Occupational Control Measures

SECTION 6

Airborne Exposure Limits:

-OSHA Permissible Exposure Limit (PEL):
1 ppm (TWA); 25 ppm (ceiling)
50 ppm/10M (peak).

-ACGIH Threshold Limit Value (TLV):
10 ppm (TWA); 25 ppm (STEL).

Ventilation System:

A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, "Industrial Ventilation, A Manual of Recommended Practices", most recent edition, for details.

Personal Respirators
(NIOSH Approved)

If the TLV is exceeded, wear a supplied air full-facepiece respirator, airlined hood, or self-contained breathing apparatus.

Skin Protection:

Wear impervious protective clothing, including boots, gloves, lab coat, apron or coveralls to prevent skin contact.

Eye Protection:

Use chemical safety goggles and/or a full face shield where splashing is possible. Contact lenses should not be worn when working with this material.

Maintain eye wash fountain and quick-drench facilities in work area.

Storage and Special Information

SECTION 7

Protect against physical damage. Store in a cool, dry well-ventilated location, away from direct sunlight and any area where the fire hazard may be acute. Store in tightly closed containers (preferably under nitrogen atmosphere). Outside or detached storage is preferred. Inside storage should be in a standard flammable liquids storage room or cabinet. Separate from oxidizing materials. Containers should be bonded and grounded for transfers to avoid static sparks. Storage and use areas should be No Smoking areas. Use non-sparking type tools and equipment. Wear special protective equipment (Sec. 6) for maintenance break-in or where exposures may exceed established exposure levels. Wash hands, face, forearms and neck when exiting restricted areas. Shower, dispose of outer clothing, change to clean garments at the end of the day. Avoid cross-contamination of street clothes. Wash hands before eating and do not eat, drink, or smoke in workplace.

The information contained herein is provided in good faith and is believed to be correct as of the date hereof. However, **Mallinckrodt**, Inc. makes no representation as to the comprehensiveness or accuracy of the information. It is expected that individuals receiving the information will exercise their independent judgment in determining its appropriateness for a particular purpose. Accordingly, **Mallinckrodt**, Inc. will not be responsible for damages of any kind resulting from the use of or reliance upon such information. NO REPRESENTATIONS, OR WARRANTIES, EITHER EXPRESS OR IMPLIED, OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE OR OF ANY OTHER NATURE ARE MADE HEREUNDER WITH RESPECT TO THE INFORMATION SET FORTH HEREIN OR TO THE PRODUCT TO WHICH THE INFORMATION REFERS.

Determination of Label Information

For BENZENE:

Chemical /Common Name

- o taken directly from the manufacturer's original **MSDS**.

NSN/Part Number

- o identified through **DLA's** Defense Integrated Data System (010S).

Item Name

- o identified through **DLA's** 010S.

Hazards

- o Delayed
 - identified from manufacturer's original **MSDS** under Exposure/Health Effects, Chronic Exposure. Listed on IARC and NTP documents as carcinogen.
- o Health - moderate
 - identified from manufacturer's original MSDS information compared to General Descriptive Criteria for Health and Contact Hazards.
- o Contact - moderate
 - identified from manufacturer's original MSDS information on skin and eye contact which as then compared to the Contact Hazard Rating Criteria.
- o Fire - severe
 - identified from manufacturer's original **MSDS. Flashpoint** then compared with Fire Hazard Rating Criteria.
- o Reactivity - moderate
 - identified from manufacturer's original MSDS information under Fire and Explosion Information, in that, above the flashpoint which is very low, vapor-air mixtures may explode.

Health Hazards

- o identified from manufacturer's original information on Precautionary Measures; also data from Fire and Explosion Information.

Protect

- o Eye - affirmative response from section on Occupational Control Measures under Eye Protection.
- o Skin - affirmative response from section on Skin Protection under Occupational Control Measures.
- o Respiratory - affirmative response based on information on Personal Respirators under Occupational Control Measures.

Name, Address & Telephone

- o identified from manufacturer's original **MSDS**.

ATTACHMENT 2

AMERICAN NATIONAL STANDARD FOR HAZARDOUS INDUSTRIAL CHEMICALS --
PRECAUTIONARY LABELING
ANSI **Z129.1-1987**

3. General Requirements

3.1 A hazardous chemical shall be labeled for its immediate and delayed hazards. These hazards are its reasonably foreseeable physical hazards and its reasonably foreseeable health hazards as determined by a health hazard evaluation. (See Section 4).

3.2 The following subject matter shall be considered for inclusion on precautionary labels: (1) Identification of the chemical product or its hazardous component(s), (2) signal word, (3) statement of hazard(s), (4) precautionary measures, (5) instructions in case of contact or exposure, (6) antidotes, (7) notes to physician, (8) instructions in case of fire and spill or leak, and (9) instructions for container handling and storage.

3.2.1 Identification of the chemical product or its hazardous component(s) shall be adequate to permit selection of proper action in case of exposure. Identification shall not be limited to a nondescriptive code designation or trade name. For a single chemical substance, the chemical name shall be used. For mixtures, the chemical names of the components contributing substantially to the hazards of the mixture shall be included as part of the label. In some instances, this information may be a trade secret or proprietary. In such instances, this information need not be included on the label; however, a procedure shall be available to provide information in emergency situations. In all cases, the appropriate precautionary labeling must be shown.

3.2.2 The Signal Word shall indicate the relative degree of severity of an immediate hazard in the diminishing order of DANGER!, WARNING!, and CAUTION! When a chemical has more than one hazard, only the signal word corresponding to the class of greatest immediate hazard shall be used. When differentiating immediate from delayed hazards by the optional use of a signal word for delayed hazards, it is recommended that a signal word(s) other than that used for immediate hazards be selected.

3.2.3 For highly toxic chemicals, additional attention will be directed to the potentially severe harm that can come from exposure to these chemicals by the use of the word POISON and the skull and crossbones symbol placed above the Instructions in Case of Contact or Exposure. When used, this legend shall not replace the signal word.

3.2.4 The Statement of Hazard shall give notice of the hazard or hazards (such as EXTREMELY FLAMMABLE and HARMFUL IF ABSORBED THROUGH SKIN) that are present in connection with the customary or reasonably foreseeable handling, use or misuse of the chemical. For chemicals possessing more than one immediate hazard, an appropriate statement for each significant hazard shall be included. Because immediate hazards are more likely to be the result of single exposure, they should usually precede the statements of hazard for delayed hazards. In general, the most serious immediate hazard shall be placed first, followed by all other immediate hazards. It is also desirable to group delayed hazards. Hazards listed as immediate need not be repeated in the delayed hazards group.

3.2.5 The Precautionary Measures (such as "Keep away from heat, sparks, and flame" and "Avoid breathing dust") shall supplement the statement of hazards by briefly providing measures to be taken to avoid injury from the hazard of hazards.

3.2.6 Instructions in Case of Contact or Exposure shall be included where the results of contact or exposure warrant immediate treatment (first aid), and where simple remedial measures may be taken before Professional medical assistance is available. Procedures recommended for providing assistance shall be limited to those that may be expected of individuals with special training. Simple remedial measures (such as washing or removal of clothing) shall be included where they will serve to lessen or avoid serious injury following contact or exposure. This section shall be captioned First Aid (see 4.7). When specific antidotes are known and are of such a type that may be administered by a person without training, they shall be included on the label with the caption: Antidote (see 4.8). Antidotes or recommended medical practices that should be administered by a physician shall be included on the label with the caption: Notes to Physicians (see 4.9).

3.2.7 Instructions in Case of Fire and Spill or Leak shall be included when applicable to provide persons who handle containers during shipment and storage with appropriate instructions for confining and extinguishing fires and for cleaning up spills or leaks. The instructions shall be as simple and brief as possible and advise the use of suitable material for control. In some cases, to minimize contamination and when personnel and property are not at risk, it may be preferable to provide instructions to allow the chemical to burn rather than extinguish the fire.

3.2.8 Instructions for Container Handling and Storage shall be included to provide additional information for those chemicals requiring special or unusual handling and storage procedures.

3.3 For many chemicals and components of mixtures of chemicals there will be information based on data of questionable relevance to humans which may lead to the misapplication of this standard. If during the health hazard evaluation, such information is judged to fall outside the requirements of Section 3.1, these precautionary labeling standards do not apply. Such information may be conveyed in a factually accurate way, such as in a statement of information, in a Material Safety Data Sheet (MSDS), or in other supplemental information.

3.4 A sample of an experimental chemical for which the hazards have not been fully investigated shall be labeled based on the current knowledge of the chemical, professional appraisal of its potential hazards and the principles of labeling set forth in this standard. (See 4.11.7 for examples).

3.5 The intended conditions of use of a chemical as recommended by the manufacturer (e.g., elevated temperature or pressure) may result in the release of a hazardous chemical(s). The principles expressed in this standard for labeling should be applied for these hazards as well as any encountered at ambient conditions .

3.6 The management (disposal) of unused chemicals and their containers may be subject to complex and varied federal, state and local regulations. This precludes the use of a few labeling statements to cover all cases. A reference to these regulations, however, may be an appropriate part of a label or other supplemental information. (See 4.6.8 and 4.11.6 for examples).

4. Selection of Precautionary Label Text

Precautionary texts should be selected and placed on the label according to the category of the hazard (immediate or delayed). Specific texts will be found in Table 1 or Table 2 for many relevant hazards. It is not intended for Table 1 and Table 2 to cover all possible hazard labeling needs; however, the general approach illustrated should be followed in developing additional label statements. Each chemical must be considered individually based on its inherent properties and customary or reasonably foreseeable handling, use or misuse. Suitable statements should be selected or developed as appropriate. When a chemical is capable of producing multiple harmful effects, the precautionary label texts may be grouped. The intent of such grouping is to minimize repeated wording consistent with concise communication of hazard. Examples of some other useful statements of hazard can be found in 4.10.

4.1 Immediate Hazards Precautionary Labeling. Table 1 classifies chemicals on the basis of the immediate hazards that are most frequently encountered. For each hazard, a Signal Word, Statement of Hazard, Precautionary Measures, and, in most cases, Instructions in Case of Contact or Exposure are given. Applicable precautionary label text should be selected from 4.2, 4.4 to 4.11 and Tables 1, 3 and 4.

4.2 Target Organ/System Hazards Precautionary Labeling. Contact with certain chemicals may present immediate or delayed hazards to human organs or systems. The organ(s) or system(s) where major toxicity is observed is generally referred to as the target organ(s) or system(s). As defined by Casarett and Doull⁷, "Most chemicals that produce systemic toxicity do not cause a similar degree of toxicity in all organs but usually produce the major toxicity to one or two organs. These are referred to as target organs of toxicity for that chemical." The site of toxicity may be distant from the location of initial entry of the chemical. Chemicals may produce observable toxic effects in more than one organ/system, but for labeling purposes, only target organs/systems as defined above need be addressed if the precautionary measures suggested will also provide protection for these lesser effects.

There may be chemicals which cause effects at inordinately high doses, under unused conditions, or other unique circumstances. The relative weight of such information should be considered when making a health hazard evaluation.

⁷Klaasen, C. D.; Amdur, M. O.; Doull, J. (eds.) Casarett and Doull's TOXICOLOGY. The Basic Science of Poisons, 3rd edition. Macmillan Publishing Co., Inc., New York, page 16, 1986.

4.2.1 Tested Chemicals and Tested Mixtures

For tested chemicals and tested mixtures, if the health hazard evaluation results in a determination that there is generally accepted, well established evidence that a chemical causes serious damage to human organs or systems, the chemical shall be labeled with the following statement of hazard:

CAN CAUSE (specify the organ or system) DAMAGE^{8,9}

If a health hazard evaluation of the tested chemical or mixture results in a determination that there is significant probability based only on laboratory animal data that serious damage to human organs or systems may be possible, the chemical or mixture shall be labeled with the following statement of hazard:

MAY CAUSE (specify the organ or system) DAMAGE^{8,9}
BASED ON ANIMAL DATA

If a health hazard evaluation results in a determination that the tested chemical or mixture does not present a hazard, this precautionary labeling standard need not apply.

4.2.2 Tested Components in Untested Mixtures

Guidance for labeling the health hazards to human organs or systems of an untested mixture with a tested component(s) is as follows:

- (a) If a health hazard evaluation results in a determination that the tested component(s) in an untested mixture, under conditions of normal use and reasonably foreseeable misuse, does present a hazard based on generally accepted, well established evidence or professional judgment, the untested mixture should be labeled as would the tested component(s) (see 4.2.1), except that a modification of the label text should be used:

CONTAINS MATERIAL WHICH
CAN CAUSE (specify the organ or system) DAMAGE^{8,9}

CONTAINS MATERIAL WHICH
MAY CAUSE (specify the organ or system) DAMAGE^{8,9}
BASED ON ANIMAL DATA

If a health hazard evaluation results in a determination that the untested mixture does not present a hazard, this precautionary labeling standard need not apply.

⁸ Whenever appropriate, the term "DAMAGE" may be replaced by more specific terms such as "BLOOD DISORDERS," "NERVOUS SYSTEM EFFECTS," etc.

⁹ It may be a useful option to convey that the risk of damage or effects depends on duration and level of exposure.

(b) In the absence of a health hazard evaluation as described above, mixtures containing 1% or more of a tested component(s) causing target organ/system effects shall be labeled for the hazard of the tested component(s) with the modification indicated for mixtures ("Contains material which. .").

4.3 Carcinogenicity and Teratogenicity Precautionary Labeling. Table 2 provides precautionary label text for two delayed hazards. The table was developed using the "Criteria for Identifying and Classifying Carcinogens, Mutagens, and Teratogens"¹⁰ for purposes of determining whether the hazard is evident and to what degree. Precautionary label text is provided for the noted delayed hazards, and the category of hazard is defined in terms of the classification categories as provided in the referenced document.

Since existing animal and epidemiological evidence does not support the hypothesis that chemical exposures cause heritable genetic damage in humans, no precautionary labeling recommendations will be made for mutagens in this standard. If supporting evidence demonstrates a causal relationship between such data and human effects, labeling for mutagens will then become appropriate.¹¹

4.3.1 Tested Chemicals and Tested Mixtures

The label text in Table 2 is for tested chemicals and mixtures.

4.3.2 Tested Components in Untested Mixtures

Guidance for labeling these delayed hazards of an untested mixture for a tested component(s) is as follows:

¹⁰CEFIC, CMA/SOCMA, CCPA. Criteria for Identifying and Classifying Carcinogens, Mutagens, and Teratogens. Regulatory Toxicology and Pharmacology. 7:1-20, 1987.

¹¹Although the potential for human DNA and chromosomal changes as a result of chemical exposures may exist, no precedent has been set at the time this standard was published for presuming animal mutagens to be human mutagens.

In "Criteria for Identifying and Classifying Carcinogens, Mutagens, and Teratogens,"¹⁰ a discussion is presented on the difficulty in making causal associations between heritable genetic effects in humans and chemical exposures:

"...It should be noted that direct evidence for the occurrence of a causal relationship linking chemical exposure and increase in the frequency of occurrence of a heritable effect in a human population has never been shown. . ."

- (a) If a health hazard evaluation results in a determination that the tested component(s) in an untested mixture, under conditions of normal use and reasonably foreseeable misuse, does present a hazard based on generally accepted, well established evidence or professional judgment, the untested mixture should be labeled as would the tested component(s), except that a modification ("Contains material which...") of the label text should be used as indicated in Table 2.

If a health hazard evaluation results in a determination that the untested mixture does not present a hazard, this precautionary labeling standard need not apply.

- (b) In the absence of a health hazard evaluation as described above, mixtures containing carcinogens at or above 0.1% and teratogens at or above 1% shall be labeled for the hazard of the tested component(s) with the modification indicated for mixtures in Table 2 ("Contains material which. ..").

4.4 Fire Action. For additional statements to be used in case of a fire hazard, see 3.2.7 and Table 3.

4.5 Spill or Leak Action. For additional statements to be used in case of a hazard from spilling or leaking, see 3.2.7 and Table 4.

Table 1

Selection of Precautionary Label Text:
immediate Hazards

Hazard	Signal Word	Statement of Hazard	Precautionary Measures	Instructions in Case of, Contact or Exposure
Highly Toxic (by ingestion)	DANGER !	MAY BE FATAL IF SWALLOWED	Wash thoroughly after handling.	<p align="center">☠ POISON ☠</p> <p align="center"><u>(Get medical attention (immediately) *)</u> <u>(Call a physician (Contact a poison control center) *)0</u></p> <p>FIRST AID: @ If swallowed, induce vomiting immediately as directed by medical personnel. Never give anything by mouth to an unconscious person.</p>
2-7 Toxic (by ingestion)	WARNING !	HARMFUL IF SWALLOWED	Wash thoroughly after handling.	<p>FIRST AID: @ If swallowed, induce vomiting immediately as directed by medical personnel. Never give anything by mouth to an unconscious person. (Get medical attention (immediately)*) (Call a physician (Contact a poison control center) *)0</p>
Highly Toxic (by absorption)	DANGER !	MAY BE FATAL IF ABSORBED THROUGH SKIN	<p>Do not get in eyes, on skin, or on clothing.</p> <p>Wash thoroughly after handling.</p>	<p align="center">☠ POISON ☠</p> <p align="center"><u>(Get medical attention (immediately*))</u> <u>(Call a physician (Contact a poison control center) *)0</u></p> <p>FIRST AID: In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. (Destroy cent aminated shoes.)+ (Thoroughly clean shoes before reuse.)+</p>

TABLE 1 - Continued

Hazard	Signal Word	Statement of Hazard	Precautionary Measures	Instructions in Case of Contact or Exposure
Toxic (by absorption)	WARNING!	HARMFUL IF ABSORBED THROUGH SKIN	Avoid contact with eyes, skin, and clothing. Wash thoroughly after handling .	FIRST AID: In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. (Get medical attention (immediately)*) (Call a physician (Contact a poison control center)*) ^o Wash clothing before reuse. (Destroy contaminated shoes.)+ (Thoroughly clean shoes before reuse.)+
Highly Toxic (by inhalation)	DANGER !	MAY BE FATAL IF INHALED	Do not breathe (dust, vapor, mist, gas)*. Keep container closed. Use only with adequate ventilation.	 POISON  <u>(Get medical attention (immediately) *)</u> <u>(Call a physician (Contact a poison control center) *)^o</u> FIRST AID: If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. (Get medical attention (immediately) *) (Call a physician) ^o
Toxic (by inhalation)	WARNING!	HARMFUL IF INHALED	Avoid breathing (dust, vapor, mist, gas)*, Keep container closed. Use with adequate ventilation.	FIRST AID: If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. (Get medical attention immediately*) (Call a physician (Contact a poison control center) *) ^o
Strong Sensitizer, Lungs	(WARNING!) (DANGER!) ^o	MAY CAUSE (SEVERE)+ ALLERGIC RESPIRATORY REACTION	Do not breathe, (dust, vapor, mist, gas)*. Keep container closed. Use only with adequate ventilation.	FIRST AID: If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. (Get medical attention (immediately)*) (Call a physician) ^o

TABLE 1 - Continued

Hazard	Signal Word	Statement of Hazard	Precautionary Measures	Instructions in Case of Contact or Exposure
Irritant, Severe Respiratory	WARNING !	CAUSES RESPIRATORY TRACT IRRITATION (or specific site, if appropriate)	Avoid breathing (dust, vapor, mist, gas)*. Keep container closed. Use with adequate ventilation.	FIRST AID: If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. (Get medical attention (immediately)*) (Call a physician) ^o
Irritant, Moderate Respiratory	CAUTION!	MAY CAUSE RESPIRATORY TRACT IRRITATION (or specific site, if appropriate)	Avoid breathing (dust, vapor, mist, gas)*. Keep container closed. Use with adequate ventilation.	FIRST AID : If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. (Get medical attention (immediately)*) (Call a physician) ^o
Physio- logically Inert Vapor or Gas	CAUTION!	(VAPOR) (GAS)* REDUCES OXYGEN AVAILABLE FOR BREATHING	Keep container closed. Use with adequate ventilation. Do not enter (storage areas, confined spaces)* unless ade- quately ventilated.	FIRST AID: If inhaled, remove to fresh air. If not breathing, give artificial res- piration. If breathing is difficult, give oxygen. (Get medical attention (im- mediately) *) (Call a physician) ^o
Irritant, Severe Eye	WARNING!	CAUSES EYE IRRITATION	Avoid contact with eyes. Wash thoroughly after handling.	FIRST AID : In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. (Get medical attention (immediately)*) (Call a physician) ^o Remove material from skin and clothing.

'TABLE 1 - Continued

Hazard	Signal Word	Statement of Hazard	Precautionary Measures	Instructions in Case of Contact or Exposure
Irritant, Moderate Eye	CAUTION!	MAY CAUSE EYE IRRITATION	Avoid contact with eyes. Wash thoroughly after handling .	FIRST AID: In case of contact, immediately flush eyes with plenty of water. (Get medical attention (immediately)*) (Call a physician) ^o if irritation persists.
Irritant, Severe Skin	WARNING!	CAUSES SKIN IRRITATION	Avoid contact with skin and clothing. Wash thoroughly after handling.	FIRST AID: In case of contact, immediately flush skin with plenty of water. Remove contaminated clothing. (Get medical attention (immediately) *) (Call a physician) ^o Wash clothing before reuse.
Irritant, Moderate Skin	CAUTION !	MAY CAUSE SKIN IRRITATION	Avoid contact with skin and clothing. Wash thoroughly after handling.	FIRST AID: In case of contact, flush skin with plenty of water. Remove contaminated clothing. (Get medical attention (immediately)*) (Call a physician) ^o if irritation persists. Wash clothing before reuse.
Strong Sensitizer, Skin	WARNING!	MAY CAUSE ALLERGIC SKIN REACTION	Avoid prolonged or repeated contact with skin. Wash thoroughly after handling.	FIRST AID: In case of contact, immediately wash skin with soap and plenty of water. Remove contaminated clothing. (Get medical attention (immediately) *) (Call a physician) ^o if symptoms occur. Wash clothing before reuse.
Corrosive, Eye	DANGER!	CAUSES (SEVERE)+ EYE BURNS	Do not get in eyes. Avoid breathing (dust, vapor, mist, gas)*. Keep container closed. Use with adequate ventilation. Wash thoroughly after handling.	FIRST AID: In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. (Get medical attention (immediately)*) (Call a physician) ^o

TABLE 1 - Continued

Hazard	Signal Word	Statement of Hazard	Precautionary Measure	Instructions in Case of Contact or Exposure
Corrosive, Skin	DANGER !	CAUSES (SEVERE)+ SKIN BURNS	Do not get on skin or clothing. Avoid breathing (dust, vapor, mist, gas)*. Keep container closed. Use with adequate ventilation. Wash thoroughly after handling.	FIRST AID: In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes., (Get medical attention (immediately)*) (Call a physician) ^o Wash clothing before reuse. (Destroy contaminated shoes.)+ (Thoroughly clean shoes before reuse.)+
Corrosive, Other Target Organs	DANGER !	CAUSES (SEVERE)+ BURNS	Do not get in eyes, on skin or on clothing. Do not breathe (dust, vapor, mist, gas)*. Keep container closed. Use with adequate ventilation. Wash thoroughly after handling .	FIRST AID: In case of contact, immediately flush eyes and skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. (Get medical attention (immediately) *) (Call a physician) ^o Wash clothing before reuse. (Destroy contaminated shoes.)+ (Thoroughly clean shoes before reuse.)+
Extremely Flammable Liquid	DANGER!	EXTREMELY FLAMMABLE LIQUID AND VAPOR VAPOR MAY CAUSE FLASH FIRE	Keep away from heat, sparks, and flame. Keep container closed. Use with adequate ventilation.	
Flammable Gas	DANGER !	FLAMMABLE GAS MAY CAUSE FLASH FIRE	Keep away from heat, sparks, and flame. Keep container closed. Use with adequate ventilation.	(See Table 3 for selection of appropriate fire-extinguishing statement.)
Flammable Liquid	WARNING !	FLAMMABLE LIQUID AND VAPOR	Keep away from heat, sparks, and flame. Keep container closed. Use with adequate ventilation.	

TABLE 1 - Continued

Hazard	Signal Word	Statement of Hazard	Precautionary Measures	Instructions in Case of Contact or Exposure
Flammable Solid	WARNING !	FLAMMABLE SOLID	Keep away from heat, sparks, and flame.	
Combustible Liquid	CAUTION !	COMBUSTIBLE LIQUID AND VAPOR	Keep away from heat and flame.	
Pyrophoric Chemical	DANGER !	EXTREMELY FLAMMABLE CATCHES FIRE IF EXPOSED TO AIR	Keep away from heat, sparks, and flame. Keep container tightly closed.	
Strong Oxidizer	DANGER!	STRONG OXIDIZER CONTACT WITH OTHER MATERIAL MAY CAUSE FIRE	Keep from contact with clothing and other combustible materials. Do not store near combustible materials. Store in tightly closed container.	Remove and wash contaminated clothing promptly.

NOTE : Additional useful statements may be found in 4.2, 4.4 through 4.11 and Tables 3 and 4.

*Select applicable word or words.

+Use word or phrase when appropriate.

@Do not use when vomiting is not recommended. For recommended statements, see 4.7 through 4.9.

'Select one.

Table 2

Selection of Precautionary Label Text:
Delayed Hazards

Hazard	Label Statement
CARCINOGENICITY	
Category I[*] (Proven human carcinogenic substance.)	CANCER HAZARD (CONTAINS MATERIAL WHICH)⁺ CAN CAUSE CANCER Risk of cancer depends on duration and level of exposure. @
Category II* (Suspected human carcinogenic substance.)	SUSPECT CANCER HAZARD⁺ (CONTAINS MATERIAL WHICH)⁺ MAY CAUSE CANCER Risk of cancer depends on duration and level of exposure. @
Category III* (Proven animal carcinogenic substance of potential relevance to humans.)	POSSIBLE CANCER HAZARD⁺ (CONTAINS MATERIAL WHICH)⁺ MAY CAUSE CANCER BASED ON ANIMAL DATA Risk of cancer depends on duration and level of exposure. @

Table 2 - Continued

Hazard	Label Statement
TERATOGENICITY	
<p data-bbox="421 639 661 703">Category I[*]</p> <p data-bbox="322 747 1340 783">(Substances known to be teratogenic to humans.)</p>	<p data-bbox="1606 663 2270 783">BIRTH DEFECT HAZARD (CONTAINS MATERIAL WHICH)[†] CAN CAUSE BIRTH DEFECTS</p>
<p data-bbox="421 849 675 913">Category II[*]</p> <p data-bbox="322 960 1227 1041">(Substances which should be regarded as if they are teratogenic to humans.)</p>	<p data-bbox="1578 873 2350 1037">POSSIBLE BIRTH DEFECT HAZARD (CONTAINS MATERIAL WHICH)[†] MAY CAUSE BIRTH DEFECTS BASED ON ANIMAL DATA</p>

* Categories correspond respectively to those categories described in the paper: CEFIC, CMA/SOCMA, CCPA. Criteria for Identifying and Classifying Carcinogens, Mutagens, and Teratogens. Regulatory Toxicology and Pharmacology. 7:1-20, 1987. (See Appendix C.)

[†] Phrase to be used for mixtures. Specific chemical component may be identified.

@Use phrase when appropriate,

Table 3
Fire Action Statements

Type of Chemical	Fire Extinguishing Stat ements*
For water-soluble or dilut able liquids	In case of fire, use water (flood with water) , dry chemical, CO₂ , or " alcohol" foam.
For water-immiscible liquids	In case of fire, use water spray (fog) , foam, dry chemical, or CO ₂ .
For solids such as oxidizing agents where water is appropriate and not dangerous	In case of fire, soak (flood) with water.
For solids where water is not appropriate	In case of fire, smother with dry sand, dry ground limestone, or dry powder-type agents specially designed for metal powder fires. Do not use CO ₂ extinguishers or water.
For flammable gases	In case of fire, allow gas to burn if flow cannot be shut off immediately. Apply water from a safe distance to cool container and protect surrounding area.

* Substitute or add appropriate words in parentheses.