



FYI-94-000923

INIT 07/21/94

CHEMICAL MANUFACTURERS ASSOCIATION

*FYI 1087-000923*

October 21, 1987

REC'D  
OCT 29 1987  
*At Brink*

GERALDINE V. COX, Ph.D.  
Vice President  
Technical Director



8494000023

(A)

Robert H. Brink  
Executive Secretary  
TSCA Interagency Testing Committee (TS-792)  
Environmental Protection Agency  
401 M Street, SW  
Washington, D.C. 20460

Dear Mr. Brink:

The Chemical Manufacturers Association Lubricant Additives Program Panel submits the enclosed information in response to a Federal Register Notice (Fed. Reg. 52: 10409, April 1, 1987) announcing the 1987 list of chemicals selected for review by the TSCA Interagency Testing Committee (ITC). Specifically, information is submitted on three phosphorodithioic acid esters: phosphorodithioic acid, 0,0-dipropyl ester (CAS No. 2253-43-2); phosphorodithioic acid, 0,0-bis (2-methylpropyl) ester (CAS No. 2253-52-3); and phosphorodithioic acid, 0,0-bis (2-ethylhexyl) ester (CAS No. 5810-88-8). Information was provided to CMA by four manufacturers; Lubrizol Corporation, Elco Corporation, Ethyl Corporation, and Chevron Chemical Company. General information on the manufacture and use of phosphorodithioic acids was provided by the Exxon Chemical Company.

The Program Panel would be willing to discuss this information with the ITC or its contractor. If you have immediate questions\* regarding this submission, please contact Dr. Carol Stack of my staff at 887-1196.

Sincerely yours,

*Geraldine V. Cox*

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ATTACHMENT A

# MATERIAL SAFETY DATA SHEET

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## PRODUCT IDENTIFICATION

TRADE NAME: HiTEC<sup>®</sup> 678 Dithioacid (Intermediate)  
Performance Additive

CHEMICAL NAME: Phosphorodithioic acid, 0,0-bis (2-ethylhexyl) ester

CHEMICAL FAMILY: Dialkyl phosphorodithioic acid

CHEMICAL FORMULA:  $(C_8H_{17}O)_2PS_2H$

CAS NO.: 5810-88-8

THIS MATERIAL IS IN COMPLIANCE WITH THE TOXIC SUBSTANCE CONTROL ACT (15 USC 2601-2629)

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## SUMMARY OF HAZARDS

Causes burns to the skin and eyes.

VAPORS FROM HEATED PRODUCT ARE EXPECTED TO BE HIGHLY TOXIC ( $H_2S$ ).

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## CHEMICAL & PHYSICAL PROPERTIES

APPEARANCE/ODOR: Green, thin, watery liquid.

VAPOR PRESSURE (mm Hg @ 20°C): 9

SOLUBILITY IN WATER: Nil.

SPECIFIC GRAVITY (@ 15.6°/15.6°C): 0.99

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## FIRE & EXPLOSION HAZARDS

FLASH POINT (METHOD): 110°C (Pensky-Martens).

FLAMMABLE LIMITS: Not determined.

EXTINGUISHING MEDIA: Dry chemical, water spray (fog), foam or carbon dioxide.

HAZARDOUS THERMAL DECOMPOSITION PRODUCTS: Oxides of carbon, sulfur and phosphorus.  
Hydrogen sulfide.

SPECIAL FIRE FIGHTING PROCEDURES: As for petroleum products. Use self-contained breathing apparatus.

UNUSUAL FIRE AND EXPLOSION HAZARDS: None.

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# MATERIAL SAFETY DATA SHEET

Required under USDL Safety and Health Regulations for Ship Repairing,  
Shipbuilding, and Shipbreaking (29 CFR 1915, 1916, 1917)

## SECTION I

MANUFACTURER'S NAME		EMERGENCY TELEPHONE NO.
ADDRESS (Number, Street, City, State, and ZIP Code)		
CHEMICAL NAME AND SYNONYMS <b>Di-n-propylphosphorodithioic Acid</b>		TRADE NAME AND SYNONYMS
CHEMICAL FAMILY <b>Dialkyldithiophosphoric Acid</b>	FORMULA	<b>Trade Secret</b>

## SECTION II - HAZARDOUS INGREDIENTS

PAINTS, PRESERVATIVES, & SOLVENTS	%	TLV (Units)	ALLOYS AND METALLIC COATINGS	%	TLV (Units)
PIGMENTS			BASE METAL		
CATALYST			ALLOYS		
VEHICLE			METALLIC COATINGS		
SOLVENTS			FILLER METAL PLUS COATING OR CORE FLUX		
ADDITIVES			OTHERS		
OTHERS					
HAZARDOUS MIXTURES OF OTHER LIQUIDS, SOLIDS, OR GASES				%	TLV (Units)
Hydrogen sulfide					ND
Dialkyldithiophosphoric acid					90

## SECTION III - PHYSICAL DATA

BOILING POINT (°F.)	Decomposes	SPECIFIC GRAVITY (H <sub>2</sub> O=1)	1.11
VAPOR PRESSURE (mm Hg.)	Unknown	PERCENT VOLATILE BY VOLUME (%)	Unknown
VAPOR DENSITY (AIR=1)	Unknown	EVAPORATION RATE (_____ =1)	Unknown
SOLUBILITY IN WATER	Negligible	Ph	1-2
APPEARANCE AND ODOR	Liquid with faint hydrogen sulfide odor.		

## SECTION IV - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (Method used)	100°C., C.O.C.	FLAMMABLE LIMITS	LeI	Uel
		Unknown		
EXTINGUISHING MEDIA	CO <sub>2</sub> , dry chemical, foam.			
SPECIAL FIRE FIGHTING PROCEDURES	Areas downwind from fire should be evacuated. Firefighters should use self-contained breathing apparatus.			
UNUSUAL FIRE AND EXPLOSION HAZARDS	None			

**SECTION V - HEALTH HAZARD DATA**

THRESHOLD LIMIT VALUE None established

EFFECTS OF OVEREXPOSURE Causes skin and eye burns, slight trace of H<sub>2</sub>S

can cause dizziness or unconsciousness.

EMERGENCY AND FIRST AID PROCEDURES  
Eyes - flush eyes with plenty of water for at least 15 min., get medical attention.

Skin - wash with soap and water, rinse well, get medical attention. In case of

dizziness or unconsciousness remove to uncontaminated area, assist breathing if necessary by artificial respiration or mechanical means.

**SECTION VI - REACTIVITY DATA**

STABILITY	UNSTABLE		CONDITIONS TO AVOID
	STABLE	X	Strong oxidizing agents, heat, sparks, water, open flame.

INCOMPATIBILITY (Materials to avoid)  
Bromine, chlorine, hydrogen peroxide, chromic acid, etc.

HAZARDOUS DECOMPOSITION PRODUCTS  
Oxides of phosphorus, CO, CO<sub>2</sub> and H<sub>2</sub>S.

HAZARDOUS POLYMERIZATION	MAY OCCUR		CONDITIONS TO AVOID
	WILL NOT OCCUR	X	

**SECTION VII - SPILL OR LEAK PROCEDURES**

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED  
Remove source of ignition and soak up with absorbent.

WASTE DISPOSAL METHOD  
Dilute with solvent, incinerate under controlled conditions.

**SECTION VIII - SPECIAL PROTECTION INFORMATION**

RESPIRATORY PROTECTION (Specify type)  
Not necessary if storage area is well ventilated; Scott air packs in closed in areas.

VENTILATION	LOCAL EXHAUST		SPECIAL
	MECHANICAL (General)	X	OTHER

PROTECTIVE GLOVES Rubber gloves EYE PROTECTION Safety goggles

OTHER PROTECTIVE EQUIPMENT None

**SECTION IX - SPECIAL PRECAUTIONS**

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING  
Product can cause skin and eye burns, avoid all personal contact.

OTHER PRECAUTIONS  
This material is heat and water-sensitive; do not store above 100°F. and keep dry.

**ATTACHMENT B**

TRADE NAME: HITEC<sup>®</sup> 678 Dithioacid (Intermediate)

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REACTIVITY DATA

STABILITY: Stable.  
MATERIALS TO AVOID: Strong mineral acids and oxidizers.  
HAZARDOUS POLYMERIZATION: Will not occur.

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HEALTH HAZARDS

INHALATION: Vapors from heated product are expected to be highly toxic.  
EYE CONTACT: Expected to cause burns.  
SKIN CONTACT: Expected to cause burns.  
INGESTION: Expected to be an irritant.  
CHRONIC EFFECTS OF OVEREXPOSURE: None known.

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EMERGENCY FIRST AID PROCEDURES

INHALATION: Remove to fresh air. If not breathing, give artificial respiration, preferably mouth-to-mouth. If breathing is difficult, give oxygen. Get medical attention.  
EYE CONTACT: Immediately flush eyes with plenty of water for at least 15 minutes. Get medical attention.  
SKIN CONTACT: Immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Get medical attention. Wash clothing before reuse.  
INGESTION: If symptoms occur, give two glasses of water. Do not induce vomiting.

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TRADE NAME: HITEC<sup>®</sup> 678 Dithioacid (Intermediate)

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EXPOSURE CONTROL INFORMATION

EXPOSURE LIMITS: None established by OSHA or ACGIH.  
EYE PROTECTION: Chemical goggles or face shield.  
PROTECTIVE GLOVES: Resistant to chemical penetration.  
OTHER: If skin contact or contamination of clothing is likely, protective clothing should be worn.  
RESPIRATORY PROTECTION: NIOSH approved supplied-air respirator when exposure to vapor is likely.  
VENTILATION: LOCAL - At source of vapors.  
MECHANICAL - Recommended.

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ENVIRONMENTAL PROTECTION

SPILLS OR LEAKS: Contain any spills with dikes or absorbents to prevent migration and entry into sewers or streams. Take up small spills with dry chemical absorbent. Large spills may be taken up with pump or vacuum and finished off with dry chemical absorbent. May require excavation of contaminated soil.

DISPOSAL METHODS: Under the CERCLA/RCRA regulations in effect July 3, 1985, this material is regulated as a hazardous waste or material. Therefore, it must be disposed of in a "permitted" hazardous waste facility in compliance with EPA and/or other applicable local, state, and federal regulations and should be handled in a manner acceptable to good waste management practice.

STORAGE REQUIREMENT: The dithioacid intermediate is not stored. It is pumped from the reactors at 60°C to a stainless steel degasser which is unheated and vented to the H<sub>2</sub>S handling system.

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REVISED: 11-18-86

SUPERSEDES: New

T&IH FILE CODE: TX-01096-EC-6

EPAD FILE CODE: H-678 Dithioacid (Intermediate)(0) DMC

# EXPLANATION OF MATERIAL SAFETY DATA SHEET TERMINOLOGY

## PRODUCT IDENTIFICATION

### TRADE NAME AND SYNONYMS

The name under which the product is sold and common synonyms.

### CHEMICAL NAME AND FORMULA

Chemical descriptive name and the chemical formula.

### CAS NO.

Chemical Abstract Service registry number which identifies the product.

## SUMMARY OF HAZARDS

Emphasizes major hazard(s) associated with the chemical. Further details are provided in subsequent sections.

## COMPONENTS

### COMPONENT NAME

Chemical, generic, or proprietary name that identifies the product or components of a mixture. Inclusion of a component is not necessarily based on hazard criteria.

### % (PERCENT)

Percentage by weight or volume of the component in the total product.

### EXPOSURE LIMIT

The airborne concentration at which most workers can be exposed without any expected adverse effects. Source may be Ethyl guidelines, ACGIH, TLV, or OSHA PEL.

## CHEMICAL AND PHYSICAL PROPERTIES

### APPEARANCE/ODOR

Description of material at normal temperature and pressure that may be useful in identifying the presence of the product.

### BOILING POINT

Temperature at which a liquid changes to a vapor at 760 mm Hg or some specified pressure.

### MELTING POINT

Temperature at which a solid changes to a liquid at 760 mm Hg or some specified pressure.

### VAPOR PRESSURE

Pressure exerted by a saturated vapor above its liquid.

### SOLUBILITY IN WATER

Solubility of the product, by weight in water at ambient or specified temperature.

### SPECIFIC GRAVITY

Ratio of the weight of a volume of the product to the weight of an equal volume of water (liquids/solids) or air (gases).

### EVAPORATION RATE

Ratio of the rate of vaporization of the product to the rate of a known material.

### PERCENT VOLATILES

The percentage of the product (liquid or solid) that will evaporate at ambient temperature.

## FIRE AND EXPLOSION HAZARDS

### FLASH POINT(CLOSED CUP METHOD)

Lowest temperature at which the chemical will give off enough vapor to ignite.

### FLAMMABLE LIMITS

Range of vapor concentration (percent by volume in air) which will burn or explode in the presence of spark or flame. LEL is the lower explosive limit and UEL is the upper explosive limit.

### EXTINGUISHING MEDIA

The fire fighting agents which should be used.

### HAZARDOUS THERMAL DECOMPOSITION PRODUCTS

Known hazardous products resulting from heating or burning the compound.

### SPECIAL FIREFIGHTING PROCEDURES

General firefighting procedures of chemical fires are not described, but special procedure are given.

### UNUSUAL FIRE AND EXPLOSION HAZARDS

Hazards not covered by other sections of the MSDS pertaining to chemical reactions in the presence of heat and/or fire.

## REACTIVITY DATA

### STABILITY

Indicates the susceptibility of dangerous decomposition by the chemical.

### CONDITIONS AND MATERIALS TO AVOID

Gives the conditions and materials that may cause unstable situations.

### HAZARDOUS DECOMPOSITION PRODUCTS

Describes the hazardous materials produced from a chemical reactions.

### HAZARDOUS POLYMERIZATION

Indicates the tendency of the chemical's molecules to combine in a violent reaction.

## HEALTH HAZARDS

Gives the effects of overexposure to the chemical by skin or eye contact, breathing vapors or dust, and ingestion. Common symptoms which may occur from exposure to the chemical are given.

### CHRONIC EFFECTS

Refers to the effects most likely to occur after repeated or prolonged overexposure to the chemical.

### OTHER HEALTH EFFECTS

May include medical conditions which have been known to be aggravated by exposure to the chemical.

### TOXICITY

Gives numerical results from animal tests on the compounds. LD50 or LC50 is the dose level that kills half of the animals tested.

## EMERGENCY FIRST AID

Gives emergency and first aid instructions for treating overexposure by inhalation, ingestion, and skin and eye contact.

### NOTE TO PHYSICIAN

May give any contraindicated treatment or recommended treatment for a licensed health care professional to conduct.

## EXPOSURE CONTROL INFORMATION

### EYE PROTECTION

Specification of eyes or face protection beyond normal use of safety glasses.

### PROTECTIVE GLOVES

Specification of gloves required, based on type and degree of hazard from skin contact.

### RESPIRATORY PROTECTION

Specification of the type of respirator recommended for use during routine or emergency situations.

### VENTILATION

Specification of the type (local/general) of ventilation recommended to capture contaminants or prevent the build-up of hazardous atmospheres.

### OTHER

Specification of other recommended personal protective equipment based on type and degree of hazard.

## ENVIRONMENTAL PROTECTION

### SPILLS AND LEAKS

Indicates special precautions for clean-up of spills and leaks and preparation of chemical for disposal.

### DISPOSAL METHOD

Tells the EPA classification of the chemical as well as the proper disposal procedure.

### STORAGE REQUIREMENTS

Any unusual requirements are given as well as precautions for storage.

### ADDITIONAL PRECAUTIONS OR COMMENTS

States or reemphasizes any special precautions or handling requirements.

Although the information and recommendations set forth herein (hereinafter "Information") are presented in good faith and believed to be correct as the date hereof. Corporation makes no representations as to the completeness or accuracy thereof. Information is supplied upon the condition that the persons receiving same will make their own determination as to its safety and suitability for their purposes prior to use. In no event will Corporation be responsible for damages of any nature whatsoever resulting from the use or reliance upon 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 INFORMATION OR THE PRODUCT TO WHICH THE INFORMATION REFERS.

# MATERIAL SAFETY DATA SHEET

Required under USDL Safety and Health Regulations for Ship Repairing,  
Shipbuilding, and Shipbreaking (29 CFR 1915, 1916, 1917)

## SECTION I

MANUFACTURER'S NAME	EMERGENCY TELEPHONE NO.
ADDRESS (Number, Street, City, State, and ZIP Code)	
CHEMICAL NAME AND SYNONYMS <b>Di-2-Ethylhexylphosphorodithioic Acid</b>	TRADE NAME AND SYNONYMS
CHEMICAL FAMILY <b>Dialkyldithiophosphoric Acid</b>	FORMULA <b>Trade Secret</b>

## SECTION II - HAZARDOUS INGREDIENTS

PAINTS, PRESERVATIVES, & SOLVENTS	%	TLV (Units)	ALLOYS AND METALLIC COATINGS	%	TLV (Units)
PIGMENTS			BASE METAL		
CATALYST			ALLOYS		
VEHICLE			METALLIC COATINGS		
SOLVENTS			FILLER METAL PLUS COATING OR CORE FLUX		
ADDITIVES			OTHERS		
OTHERS					
HAZARDOUS MIXTURES OF OTHER LIQUIDS, SOLIDS, OR GASES				%	TLV (Units)
Hydrogen sulfide				ND	
Dialkyldithiophosphoric acid				90	

## SECTION III - PHYSICAL DATA

BOILING POINT (°F.)	Decomposes	SPECIFIC GRAVITY (H <sub>2</sub> O=1)	0.99
VAPOR PRESSURE (mm Hg.)	Unknown	PERCENT VOLATILE BY VOLUME (%)	Unknown
VAPOR DENSITY (AIR=1)	Unknown	EVAPORATION RATE (_____ =1)	Unknown
SOLUBILITY IN WATER	Negligible	Ph	1-2
APPEARANCE AND ODOR	Liquid with faint hydrogen sulfide odor.		

## SECTION IV - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (Method used)	180°C (C.O.C.)	FLAMMABLE LIMITS	Lel Uel
EXTINGUISHING MEDIA	CO <sub>2</sub> , dry chemical, foam.		
SPECIAL FIRE FIGHTING PROCEDURES	Areas downwind from fire should be evacuated. Fire fighters should use self-contained breathing apparatus.		
UNUSUAL FIRE AND EXPLOSION HAZARDS	None		

**SECTION V - HEALTH HAZARD DATA**

THRESHOLD LIMIT VALUE

None established.

EFFECTS OF OVEREXPOSURE

Causes skin and eye burns, slight trace of H<sub>2</sub>S, can cause dizziness or unconsciousness.

EMERGENCY AND FIRST AID PROCEDURES

Eyes - flush eyes with plenty of water for at least 15 minutes, get medical attention. Skin - wash with soap and water, rinse well, get medical attention. In case of dizziness or unconsciousness remove to uncontaminated area, assist breathing if necessary by artificial respiration or mechanical means.

**SECTION VI - REACTIVITY DATA**

STABILITY

UNSTABLE

CONDITIONS TO AVOID

STABLE

X

Strong oxidizing agents, heat, sparks, water.

INCOMPATIBILITY (Materials to avoid)

Bromine, chlorine, hydrogen peroxide, chromic acid, etc.

HAZARDOUS DECOMPOSITION PRODUCTS

Oxides of phosphorus, CO, CO<sub>2</sub> and H<sub>2</sub>S.

HAZARDOUS POLYMERIZATION

MAY OCCUR

CONDITIONS TO AVOID

WILL NOT OCCUR

X

**SECTION VII - SPILL OR LEAK PROCEDURES**

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED

Remove source of ignition and soak up with absorbent.

WASTE DISPOSAL METHOD

Dilute with solvent, incinerate under controlled conditions.

**SECTION VIII - SPECIAL PROTECTION INFORMATION**

RESPIRATORY PROTECTION (Specify type)

Not necessary if storage area is well-ventilated; Scott air packs in closed in areas.

VENTILATION

LOCAL EXHAUST

X

SPECIAL

MECHANICAL (General)

OTHER

PROTECTIVE GLOVES

Rubber gloves

EYE PROTECTION

Safety goggles

OTHER PROTECTIVE EQUIPMENT

**SECTION IX - SPECIAL PRECAUTIONS**

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING

Product can cause skin and eye burns, avoid all personal contact.

OTHER PRECAUTIONS

This material is heat and water-sensitive; do not store above 100°F. and keep dry.

PAGE (2) While the information and recommendations sent forth herein are believed to be accurate as of the date thereof

Form OSHA-20  
Rev. May 72

MAKES NO WARRANTY WITH RESPECT THERETO AND DISCLAIMS ALL LIABILITY FROM RELIANCE THEREON.

11/85

# Material Safety Data Sheet

Prepared According to the OSHA Hazard Communication Standard (29 CFR 1910.1200).  
(Formerly Called MATERIAL INFORMATION BULLETIN)

## DITHIOPHOSPHORIC ACIDS

**DANGER!**            **CORROSIVE. CAUSES EYE AND SKIN DAMAGE**  
**HARMFUL OR FATAL IF SWALLOWED OR INHALED**  
**HEATING MAY RELEASE TOXIC HYDROGEN SULFIDE GAS (H<sub>2</sub>S)**  
**COMBUSTIBLE**  
**KEEP OUT OF REACH OF CHILDREN**

## TYPICAL COMPOSITION

Alkyl dithiophosphoric acid (CAS 68187-41-7)

100%

## EXPOSURE STANDARD

No Federal OSHA exposure standard or ACGIH TLV has been established for this material. The Federal OSHA exposure standard for hydrogen sulfide (H<sub>2</sub>S) is 20 ppm (a ceiling value). It may be exceeded (up to 50 ppm) for 10 minutes in any 8-hour period in which no other measurable exposure occurs. The ACGIH (1986-87) TLV is 10 ppm (8-hour time weighted average).

## PHYSIOLOGICAL & HEALTH EFFECTS

Causes severe eye irritation and injury. Application of a similar material into the eyes of rabbits produced severe membrane irritation with corneal injury persisting beyond 14 days.

Corrosive to skin and causes skin damage. Application of a similar material onto the skin of rabbits produced severe erythema and edema with damage persisting beyond 14 days.

Expected to have moderate acute toxicity by inhalation. The inhalation LC<sub>50</sub> (rat) of a similar material for a one-hour exposure was less than 2.4 mg/liter.

Expected to have moderate acute toxicity by ingestion. The acute oral LD<sub>50</sub> (rat) of a similar material was 480 mg/kg (male) and 270 mg/kg (female). Ingestion may cause severe irritation or ulceration of the digestive tract which may result in nausea, vomiting, diarrhea, and in severe cases, collapse, shock and death.

## EMERGENCY & FIRST AID PROCEDURES

### Eyes

Flush eyes immediately with fresh water for at least 15 minutes while holding the eyelids open. See a doctor.

### Skin

Remove contaminated clothing. Wash skin thoroughly with water. See a doctor immediately. Launder contaminated clothing.

### Inhalation

Move exposed person to fresh air. If breathing has stopped, apply artificial respiration. Call a doctor immediately. See Respiratory Protection, Page 2.

### Ingestion

If swallowed, give water or milk to drink and telephone for medical advice. DO NOT make person vomit unless directed to do so by medical personnel. If medical advice cannot be obtained, then take the person and product container to the nearest medical emergency treatment center or hospital.

## ADDITIONAL HEALTH DATA

See following pages

## SPECIAL PROTECTIVE INFORMATION

**Eye Protection:** Chemical safety goggles must be worn if there is any chance of contact with eyes.

**Skin Protection:** Do not get on skin or on clothing. Wear impervious protective clothing including gloves when handling.

**Respiratory Protection:** Wear approved respiratory protection such as an organic vapor and acid gas cartridge respirator with a with toxic dust/mist/fume prefilter, or an air-supplying respirator unless ventilation is adequate.

**Ventilation:** Use this material only in well ventilated areas.

## FIRE PROTECTION

Considered noncombustible. However, under fire conditions decomposes to form extremely flammable and highly toxic hydrogen sulfide gas (H<sub>2</sub>S). Exposure to flames or elevated temperatures may cause an explosion if the material is confined.

**Flash Point:** (COC)160°F(71°C) Min.

**Autoignition Temp.:** NDA

**Flammability Limits:** n/a

**Extinguishing Media:** CO<sub>2</sub>, Dry Chemical, Foam, Water Fog

**Special Fire Fighting Procedures:** For fires involving this material, do not enter any enclosed or confined fire space without proper protective equipment, including self-contained breathing apparatus. See Hazardous Decomposition Products. Read the entire MSDS.

## SPECIAL PRECAUTIONS

See following pages

## ENVIRONMENTAL PROTECTION

31 (04-85)

**Environmental Impact:** This material may be toxic to aquatic organisms and should be kept out of sewage and drainage systems and all bodies of water.

**Precautions if Material is Released or Spilled:** Eliminate all open flame in vicinity of spill or released vapor. If this material is released into a work area, evacuate the area immediately. Persons entering the contaminated area to correct the problem and determine whether it is safe to resume normal activities must comply with all instructions in Special Protective Information. Contain liquid to prevent further contamination of soil, surface water or groundwater. Clean up small spills using appropriate techniques such as sorbent materials or pumping. Where feasible and appropriate, remove contaminated soil. Follow prescribed procedures for reporting and responding to larger releases.

**Waste Disposal Methods:** Place contaminated materials in disposable containers and dispose of in a manner consistent with applicable regulations. Contact local environmental or health authorities for approved disposal of this material.

## REACTIVITY DATA

**Stability (Thermal, Light, etc.):** Stable at temperatures below 150°F (66°C). Some hydrogen sulfide gas may be evolved at room temperature.

**Incompatibility (Materials to Avoid):** May form thio esters and thio amides with alcohols and amines, is easily oxidized by peroxide or iodine to form disulfides, and reacts rapidly with chlorine to form phosphorochlorodithionates.

**Hazardous Decomposition Products:** Normal combustion forms carbon dioxide and water vapor and may produce oxides of sulfur; incomplete combustion can produce carbon monoxide. Thermal decomposition may produce H<sub>2</sub>S at temperatures greater than 150°F (66°C).

**Hazardous Polymerization:** Will not occur.

## PHYSICAL PROPERTIES

See following pages

n/a = Not Applicable

NDA = No Data Available

The above information is based on data of which we are aware and is believed to be correct as of the date hereof. Since the information contained herein may be applied under conditions beyond our control and with which we may be unfamiliar and since data made available subsequent to the date hereof may suggest modifications of the information, we do not assume any responsibility for the results of its use. This information is furnished upon the condition that the person receiving it shall make his own determination of the suitability of the material for his particular purpose.

No. 3110

# Material Safety Data Sheet

## DITHIOPHOSPHORIC ACIDS

### ADDITIONAL HEALTH DATA

Principle routes of exposure are by skin and eye contact which may result in severe damage, and by inhalation which may be fatal.

This material may release hydrogen sulfide gas ( $H_2S$ ) when heated. The main hazard from hydrogen sulfide is from inhalation overexposure. Because of the rapid occurrence of olfactory fatigue, odor is an unreliable indicator of concentration. Inhalation of  $H_2S$  at airborne levels of approximately 50-70 ppm may result in irritation of the eyes and respiratory tract. Exposure to higher concentrations may produce signs and symptoms of headache, dizziness, nausea, vomiting, coughing, and a sensation of dryness and pain in the nose, throat and chest. At 1000 - 2000 ppm,  $H_2S$  may be immediately hazardous to life. Prolonged or frequently repeated exposure to  $H_2S$  may result in chronic health effects characterized by local irritation of the eyes, respiratory tract and skin.

### SPECIAL PRECAUTIONS

READ AND OBSERVE ALL PRECAUTIONS ON PRODUCT LABEL.

DO NOT USE OR STORE near flame, sparks or hot surfaces. USE ONLY IN WELL VENTILATED AREA. Keep container closed.

DO NOT weld, heat or drill container. Replace cap or bung. Emptied container still contains hazardous material which may ignite with explosive violence if heated sufficiently.

CAUTION! Do not use pressure to empty drum or explosion may result.

Maximum safe temperature for handling is 150°F (66°C). Maximum long-term storage temperature is 100°F (38°C).

This product is corrosive to many common metals including carbon and low-alloy steels and deteriorates slowly in contact with stainless steel. Store only in glassed steel, polyethylene, polypropylene or TEFLON containers.

**PHYSICAL PROPERTIES**

Solubility: NDA  
Appearance (Color, Odor, etc.): Greenish-black liquid with rotten-egg odor.  
Boiling Point: n/a  
Melting Point: n/a  
Specific Gravity: 0.98-1.04  
Vapor Pressure: n/a  
Vapor Density (Air=1): n/a  
Percent Volatile (Volume %): n/a  
Evaporation: n/a

n/a = Not Applicable  
NDA = No Data Available

ATTACHMENT C

# MATERIAL SAFETY DATA SHEET

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## PRODUCT IDENTIFICATION

TRADE NAME: X-5130  
CHEMICAL FAMILY: Dithio acid  
CHEMICAL FORMULA:  $(RO)_2\overset{S}{\parallel}P-SH$  where R = isopropyl, isobutyl, and/or 2-ethylhexyl  
FOR R&D USE ONLY

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## SUMMARY OF HAZARDS

FLAMMABLE.  
Causes burns to the skin and eyes.  
Vapors from heated product are expected to be highly toxic. ( $H_2S$ .)

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## CHEMICAL & PHYSICAL PROPERTIES

APPEARANCE/ODOR: Dark green to brown liquid.  
VAPOR PRESSURE (mm Hg. @ 20°C): 13  
SOLUBILITY IN WATER: Not determined.  
SPECIFIC GRAVITY (@ 15.6°/15.6°C): 1.05, typical.  
PERCENT VOLATILES: Not determined.

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## FIRE & EXPLOSION HAZARDS

FLASH POINT (METHOD): Less than or equal to 28°C (Pensky-Martens).  
FLAMMABLE LIMITS: Not Determined.  
EXTINGUISHING MEDIA: Foam, dry chemical, or carbon dioxide.  
HAZARDOUS THERMAL DECOMPOSITION PRODUCTS:  $H_2S$ , oxides of carbon and sulfur.

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FIRE & EXPLOSION HAZARDS - Continued

SPECIAL FIRE FIGHTING PROCEDURES: As for petroleum products. Use self-contained breathing apparatus.

UNUSUAL FIRE AND EXPLOSION HAZARDS: None.

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REACTIVITY DATA

STABILITY: Stable.

MATERIALS TO AVOID: Contact with reactive metals (carbon steel).

HAZARDOUS POLYMERIZATION: Will not occur.

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HEALTH HAZARDS

INHALATION: Vapors from heated product are expected to be highly toxic.

EYE CONTACT: Expected to cause burns.

SKIN CONTACT: Expected to cause burns.

INGESTION: Expected to be an irritant.

CHRONIC EFFECTS OF OVEREXPOSURE: None known.

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EMERGENCY FIRST AID PROCEDURES

INHALATION: Remove to fresh air. If not breathing, give artificial respiration, preferably mouth-to-mouth. If breathing is difficult, give oxygen. Get medical attention.

EYE CONTACT: Immediately flush eyes with plenty of water for at least 15 minutes. Get medical attention.

SKIN CONTACT: Immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Get medical attention. Wash clothing before reuse.

INGESTION: If symptoms occur, give two glasses of water. Do not induce vomiting.

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EXPOSURE CONTROL INFORMATION

EXPOSURE LIMITS: None established by OSHA or ACGIH.

PROTECTIVE EQUIPMENT:

EYE Chemical goggles.

CLOVES Resistant to chemical penetration.

OTHER If skin contact or contamination of clothing is likely, protective clothing should be worn.

RESPIRATORY PROTECTION: None under normal conditions. NIOSH approved supplied-air respirator when exposed to vapors from heated material.

LOCAL VENTILATION: At source of vapors.

MECHANICAL VENTILATION: Recommended.

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ENVIRONMENTAL PROTECTION

SPILLS OR LEAKS: Eliminate sources of ignition. Ventilate area. Contain any spills with dikes or absorbents to prevent migration and entry into sewers or streams. Clean up small spills with neutralization agent such as lime, caustic, or soda ash. Large spills may be taken up with pump or vacuum and finished off with neutralization agent. May require excavation of contaminated soil.

DISPOSAL METHODS: Under the CERCLA/RCRA regulations in effect December 29, 1986, this material is regulated as a hazardous waste or material. Therefore, it must be disposed of in a "permitted" hazardous waste facility in compliance with EPA and/or other applicable local, state, and federal regulations and should be handled in a manner acceptable to good waste management practice (RQ = 100 lbs for ignitable substances).

STORAGE REQUIREMENT: Store in glass or stainless steel. Do not heat over 90°C. Caution: product may release H<sub>2</sub>S.

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REVISED: 05-15-87-

SUPERSEDES: 11-11-86

EPAD FILE CODE: X-5130(2)DMC

CHEMICAL MANUFACTURERS ASSOCIATION

Lubricant Additives Program Panel

Response to Request for Information on  
Phosphorodithioic Acid Esters

Phosphorodithioic acid, 0,0-dipropyl ester (CAS No. 2253-43-2)

Information on this chemical was provided by the single manufacturer. The company produces this ester and the 0,0-bis (2-ethylhexyl) ester for another company that uses the materials in the manufacture of lubricant additives. The end product is a metal salt.

The plant where this product is produced employs 11 people. Annual production volume ranges from 200,000 to 500,000 lbs. Since this product is manufactured in a sealed vessel and shipped as a liquid in bulk quantities, the only potential exposure to plant personnel is during the loading of the tank truck. There are two employees assigned to loading and their exposure is less than 0.5 of an hour per man.

The manufacturer has no storage capacity dedicated to this product; the material is loaded directly into tank trucks from the reaction vessel. The customer stores the product at his plant site in a single tank. Over a 7-10 day period, two tank truck deliveries are normally made. The customer converts the entire amount delivered as quickly as possible to the finished salt.

There is no impact on the environment from the manufacture of this product. Vapors emitted in the sealed vessel during production go to a caustic scrubber (mainly to capture the hydrogen sulfide generated during production). The finished acid is filtered through a sealed bag filter to remove the inorganic starting material. This is returned to the kettle for further reaction.

The manufacturer has not performed toxicity tests on this product, since it is known to be a strong acid and is tightly controlled. Precautionary measures are noted in the attached Material Safety Data Sheet (Attachment A).

Phosphorodithioic acid, 0,0-bis (2-ethylhexyl) ester (CAS No. 5810-88-8)

Information on this ester was provided by four manufacturers.

Total 1986 annual production volume is estimated to be 22,300,000 pounds. The material is manufactured in a batch process in totally enclosed systems; the largest producer reported a total of 750

batches/year. Except for the one minor producer that sells the material to a single customer, all the dithioic acid produced is converted on site to a metal salt. (One company reported some limited inter-plant transfer.)

The total number of workers potentially exposed at a given time in the four plants is about 100. Opportunity for worker exposure occurs during: 1) batch sampling of the dithio acid reactors (4 to 5 times/day, approximately 10 minutes per batch); 2) analysis of batch samples (20 minutes per batch); 3) cleaning cartridge filters; and 4) maintenance activity. Since the primary concern is with skin and eye contact, workers involved in these operations wear chemical goggles and impervious gloves.

One company noted that when equipment cleaning is necessary, the equipment is flushed first with lubricating oil that is added to the product. The thoroughly-drained, acid-free equipment is then water washed and the wash sent to the plant water treatment facility. About twice a year, the contents of a small filter used for removing trace sediment from the product are incinerated.

Environmental release of the material is essentially non-existent. All companies reported that the acid is produced in a closed system which vents to a scrubber or flare tower. Material Safety Data Sheets are attached (Attachment B).

Phosphorodithioic acid, 0,0 - bis (2-methylpropyl) ester (CAS No. 2253-52-3)

Two companies reported production of mixed esters containing these groups. Annual production exceeds 2.0 million pounds. Use and exposure patterns paralleled that of the other phosphorodithioic acids. A sample Material Safety Data Sheet is attached (Attachment C).

General Comments

The phosphorodithioic acid esters noted above are produced and used exclusively as intermediates in the manufacture of metal salts. The diester acids are corrosive, relatively strong acids, exhibiting moderate toxicity. They are also known skin irritants. Because of their corrosive and irritant properties, strict measures are taken to provide potentially exposed workers with personnel protective equipment to prevent eye and skin contact and any inhalation of vapor (in particular, hydrogen sulfide or alkyl mercaptans produced as by-products).

During manufacture of the diester acids, relatively large amounts of hydrogen sulfide are produced as a by-product. The acids may contain residual H<sub>2</sub>S or mercaptans. The toxicity and hazard of the H<sub>2</sub>S requires that the process operation be tightly contained in a closed system with minimum fugitive emissions. All process emissions are vented to a scrubber or flared.

## Conclusion

Dithioic acid esters produced as intermediates in the manufacturer of metal salts are corrosive, irritant, moderately toxic materials. Their hazardous properties require that they be produced in enclosed systems and precautionary measures be taken to prevent eye and skin contact.

The number of workers potentially exposed during the manufacture of these materials is relatively small and opportunity for exposure is limited. There are no applications of these products outside the workplace.

We conclude that, given present workplace practices, these chemicals pose little or no risk to the small number of potentially exposed workers and the environmental impact is negligible. Therefore, it would not seem appropriate to expend resources on extensive health and environmental effects testing.