

CODING FORMS FOR SRC INDEXING

Microfiche No.		OTS0001116	
New Doc ID	FYI-OTS-0794-1116	Old Doc ID	
Date Produced	10/05/88	Date Received	07/26/94
		TSCA Section	FYI
Submitting Organization	AIR PRODUCTS & CHEMICALS INC		
Contractor			
Document Title	INITIAL SUBMISSION: MSDS ON CYCLOHEXYLAMINE, MORPHOLINE, DIISOPROPYLAMINE, DICYCLOHEXYLAMINE, DABCO R-8020, DABCO 33-LV, & DABCO S-25 CATALYST W/COVER LETTER DATED 10/05/88		
Chemical Category	CYCLOHEXYLAMINE		

CODING FORM FOR GLOBAL INDEXING

Microfiche No. (7) *		i		No. of Pages		2	
Doc. I.D. FYI-07-4-1116		3		Old Doc I.D.		4	
Case No. (8)						5	
Date Produced (6)		Date Rec'd (6)		7		Conf. Code *	
						A	
Check One: <input type="checkbox"/> Publication		<input type="checkbox"/> Internally Generated		<input type="checkbox"/> Externally Generated		9	
Pub/Journal Name						9	
Author(s)						10	
Organ. Name						11	
Dept/Div						12	
P.O. Box		13		Street No./Name		14	
City		15		State		16	
				Zip		17	
Country						18	
MID No. (7)		19		D & B NO. (11)		20	
Contractor						21	
Doc Type						22	
						FYI	
Doc Title						23	
Chemical Name (30 per name)		25		CAS No. (10)		24	

Chemicals Group
Air Products and Chemicals, Inc.
Allentown, PA 18195
Telephone (215) 481-4911
Telecopy (215) 481-8051



FYI-94-001116
INIT 07/26/94



84940000198

AIR PRODUCTS

74-0794-001116

5 October 1988

Ms. Roberta Wedge
Dynamac Corporation
11140 Rockville Pike
Rockville, MD 20852

Dear Ms. Wedge:

Due to manpower and resource restraints within Air Products, enclosed is the extent of my response to your letter of 19 September 1988. Production volume data should be available through the EPA TSCA Inventory office.

Very truly yours,

Eugene I. Handwerk

Eugene I. Handwerk
Manager, Product Safety

EIH:mcs
8721L

Enclosures

RECEIVED
JUL 26 1988
9:52

Chemicals Group
Air Products and Chemicals, Inc.
Allentown, PA 18195
Telephone (215) 481-4911
Telecopy (215) 481-8051



MATERIAL SAFETY DATA SHEET

SECTION 1: PRODUCT IDENTIFICATION

MATERIAL NAME (TRADE NAME): Cyclohexylamine

MANUFACTURER : Air Products and Chemicals, Inc. Allentown, PA 18195

CHEMICAL NAME : Cyclohexylamine; CHA

CHEMICAL FAMILY: Alicyclic Amine

EMERGENCY TELEPHONE NUMBERS

1-800-523-9374

1-215-481-4911 (outside U.S.A.)

SALES & PRODUCT INFO PHONE

1-800-345-3148

MSDS NUMBER: 6400-01 EFFECTIVE DATE: August 1987 REVISION: 1

SECTION 2: HAZARDOUS INGREDIENTS

The product is a single component liquid. The liquid and its vapors are severely irritating to the skin, eyes and mucous membranes of the respiratory tract. The material will absorb through the skin, with skin contact being toxic.

The product is a flammable liquid and presents a fire hazard.

The Chemical Abstract Registry Number for Cyclohexylamine is 108-91-8.

A strong ammonia-like or fishy odor gives warning of its presence.

SECTION 3: PHYSICAL DATA

BOILING POINT : 134.5 C (274 F)
MELTING POINT : -17.7 C
SOLUBILITY IN WATER : Miscible
VAPOR PRESSURE (mm Hg) : 23 mmHg at 100 F; 9.6 mmHg at 75 F
VAPOR DENSITY (Air=1) : 3.4
% VOLATILE BY VOLUME : 100
PH : 10.5 (0.1% Aqueous Solution)
SPECIFIC GRAVITY (H2O=1) : .8683
APPEARANCE/ODOR : Colorless liquid with characteristic amine odor
EVAPORATION RATE : No Data

SECTION 4: FIRE AND EXPLOSION DATA

FLASH POINT (Tag Closed Cup) : 83 F
AUTOIGNITION TEMPERATURE : 560 F
FLAMMABLE LIMITS IN AIR : Lower 1.5%; Upper 9.4%

Cyclohexylamine is classified as flammable liquid, class IC. At temperatures greater than 83 F its vapors form flammable mixtures with air (See flammable limits above). Vapors are heavier than air and can travel a considerable distance to an ignition source and flash back.

EXTINGUISHING MEDIA:

Upon ignition, the product generates a class B fire. Recommended extinguishers are carbon dioxide (CO₂), dry chemical, alcohol foam or water spray. Water spray is also useful in cooling fire exposed tanks and in dispersing vapors. The product is completely soluble in water.

SPECIAL FIREFIGHTING PROCEDURES:

In confined areas, firefighters must wear a self-contained breathing apparatus to avoid breathing product vapors and nitrogen oxide(s) fumes generated by combustion (see also Section VI). Skin contact should be avoided by wearing complete body-protecting clothing of butyl rubber.

Expended liquids upon the aftermath of fire should be contained for disposal. Prevent contamination of streams and drinking supplies (See Section VII).

FIRE AND EXPLOSION HAZARD:

Sudden reaction and fire may result when the product is mixed with oxidizing agents (See Section VI).

SECTION 5: HEALTH HAZARD INFORMATION/FIRST AID

Toxicology:

- o Skin/Eye Contact Data - Severe irritant, corrosive to the skin and eyes of rabbits.
- o Oral LD₅₀ (rat): 157-614 mg/kg
- o Dermal LD₅₀ (rabbit): 277 mg/kg
- o Inhalation LC₅₀ (rat): <1200 ppm/7 H

- o Delayed, Chronic, Subchronic Test Results - Sub-chronic exposures in test animals has caused changes in testicular size.

Routes of Entry:

- o Ingestion
- o Skin absorption
- o Inhalation

Exposure Standards:

- o ACGIH TLV-TWA 10 ppm 40 mg/m³

Health Hazards:

- o Severe irritant to the eyes and skin
- o Corrosive liquid
- o Toxic (ANSI Z129.1 1988) (a) by ingestion (b) by skin absorption (c) by inhalation
- o Reproductive hazard
- o Skin hazard
- o Eye hazard
- o Respiratory hazard

Signs and Symptoms of Exposure:

- o Contact of undiluted product with eyes or skin quickly causes severe irritation and pain and may cause burns, necrosis and permanent injury. Burns of the eye may cause blindness.
- o Product vapor in low concentrations can cause lacrimation, conjunctivitis and corneal edema when absorbed into the tissue of the eye from the atmosphere. Corneal edema may give rise to a perception of "blue haze" or "fog" around lights. The effect is transient and has no known residual effect.
- o Inhalation of vapors may severely damage contacted tissue and produce scarring.
- o Ingestion may cause malaise, discomfort and death unless treated promptly.
- o Product is readily absorbed through the skin and may cause malaise, discomfort, injury and death unless treated promptly.
- o Repeated and/or prolonged exposure to low concentrations of vapor may cause sore throat, eye irritation, nausea, faintness and/or headache which are transient.
- o Repeated and/or prolonged exposure to vapors may cause chronic irritation of the respiratory tract and bronchopneumonia.
- o Repeated and/or prolonged exposure at low levels may result in:
 - o adverse respiratory effects
 - o reproductive disorders
 - o adverse skin effects
 - o adverse eye effects

Chemicals Group
Air Products and Chemicals, Inc.
Allentown, PA 18195
Telephone (215) 481-4911
Telecopy (215) 481-8051

AIR
PRODUCTS 

Medical Conditions Generally Aggravated by Exposure:

- o Asthma
- o Skin disorders and allergies
- o Chronic respiratory disease, e.g., bronchitis, emphysema
- o Eye disease

FIRST AID:

EYE CONTACT:

(Note: CONTACT LENSES SHOULD NOT BE USED BY PERSONS WHO WORK WITH THE PRODUCT.)

Flush eyes IMMEDIATELY and gently with large volumes of water for 15 minutes. Use fingers to assure that eye lids are separated and that eye is being irrigated. Obtain medical assistance promptly.

SKIN CONTACT:

Flush affected area promptly with large quantities of water for 15 minutes. Except in the most minor, superficial, and localized burns, cover the affected area with a sterile dressing or clean sheeting and transport for medical care. DO NOT APPLY GREASES OR OINTMENTS. Control shock, if present. Launder contaminated clothing prior to reuse. Leather absorbs the product very rapidly so contaminated leather wear (e.g. belts, shoes) must be discarded.

INHALATION:

Move affected person to uncontaminated atmosphere. If breathing has stopped or is impaired, give assisted respiration (e.g. mouth-to-mouth); supplemental oxygen should be given if available. Assure that victim does not aspirate vomited material by use of postural drainage. Assure that mucous does not obstruct the airway. Seek medical attention.

INGESTION:

In the event of ingestion, administer 3-4 glasses of milk or water. DO NOT INDUCE VOMITING. Obtain medical care and hospital treatment as soon as possible.

NOTE TO PHYSICIAN:

The product has effects similar to those of ammonia, and is highly injurious to all tissues. Chemical pneumonitis, pulmonary edema, laryngeal edema, and delayed scarring of the airway or other affected organs may occur following exposure. There is no specific treatment. Clinical management is based upon supportive treatment, which is similar to that for thermal burns.

Victims with major skin contact should be maintained under medical observation for at least 24 hours due to possibility of delayed reaction.

SECTION 6: REACTIVITY DATA

The product is chemically stable at ambient temperatures and insensitive to light.

INCOMPATIBILITIES:

Violent reaction and fire may result when the product is mixed with oxidizing agents such as perchlorates, nitrates, permanganates, chromates, nitric acid, halogens, peroxides, and some cleaning solutions, such as chromerge (sulfuric acid/dichromate) and aqua regia.

A reaction accompanied by large heat release occurs when the product is mixed with acids. Heat generated may be sufficient to cause vigorous boiling, creating a hazard due to splashing or splattering of hot materials.

The product corrodes copper, aluminum, zinc and galvanized surfaces. Materials for confinement should be constructed of iron or steel.

Upon decomposition, ammonia vapors are liberated. Such vapors are irritating to skin, eyes, and respiratory tract lining. Observe handling procedures recommended for the product. (See Sections VIII and IX.)

Upon combustion in the presence of sufficient oxygen, product generates harmful carbon monoxide, carbon dioxide, and nitrogen oxide gases. Combustion of product under oxygen starved conditions can be expected to produce numerous toxic products including carbon monoxide, hydrogen cyanide, nitriles, cyanic acid, isocyanates, cyanogens, amides, and carbamates.

SECTION 7: SPILL, LEAK AND DISPOSAL PROCEDURES

Personnel downwind to the spill should be evacuated. The risk of fire is a primary concern, so remove all sources of ignition. Since resultant air pollution is harmful to health, wear respiratory and body protection equipment.

Minor spills should be covered with sodium bisulfate to neutralize the products and then sprayed with water. The contaminated amine should be contained for proper waste disposal according to environmental regulations.

Leaks should be continuously sprayed with water to keep containers cool, to control vapors and protect workmen attempting to stop the leak. Continue spraying until leak is stopped or container is empty. Only persons equipped with respiratory protection may be allowed in the area; respirators should be approved for the purpose by the National Institute for Occupational Safety and Health (NIOSH). Wear butyl rubber gloves, boots and body suit to prevent skin contact.

Chemicals Group
Air Products and Chemicals, Inc.
Allentown, PA 18195

Telephone (215) 481-1911
Telecopy (215) 481-7051



All spilled liquids should be contained for proper waste disposal. Do not contaminate streams or local drinking water supplies.

The product has a strong offensive odor and its vapors are toxic. Personnel downwind to the spill should be evacuated. Only persons equipped with respiratory protection, approved for the purpose by the National Institute for Occupational Safety and Health (NIOSH) may be allowed in the area. Personnel involved in spill control and clean up must wear a full body suit construction of butyl rubber and self-contained breathing apparatus.

CAUTION!

Aqueous solutions of 5% or greater are flammable.

WASTE DISPOSAL:

Contain all contaminated water for disposal. Do not dump into municipal sewers or enclosed drains that present fire or explosion hazards.

Aquatic toxicity rating: TLm 96 = 10-100 ppm (wt/vol); slightly toxic.

Most aliphatic amine compounds, such as this product, and their by-products can be chemically or biologically degraded. A suitable industrial or municipal waste treatment system can be used depending on the quality and quantity of waste to be treated, the treatment plant capability and discharge water quality standards

Incineration is acceptable and the preferred method of disposal, however, nitrogen oxide emission controls may be required to meet environmental regulations.

All federal, state and local regulations regarding health and pollution should be followed in waste disposal.

SECTION 8: SPECIAL PROTECTION INFORMATION

Work areas must be well ventilated to maintain vapor concentration below an irritable level.

Emergency showers and eye baths should be readily accessible.

PROTECTIVE EQUIPMENT:

RESPIRATORY:

NIOSH-approved, full facepiece, air-supplied or self-contained breathing apparatus should be worn (follow manufacturer's instruction) under the following conditions:

Chemicals Group
Air Products and Chemicals, Inc.
Allentown, PA 18195

Telephone (215) 481-4911
Telecopy (215) 481-8051

AIR
PRODUCTS 

- (1) emergency situations;
- (2) when product vapor concentration is greater than 20 ppm for a period longer than 15 minutes.
- (3) during repair and cleaning of equipment;
- (4) during transfer or discharge of the product.

EYES:

Chemical safety goggles should be worn whenever there is danger of material contacting the eyes. Plastic face shields should be worn in addition to safety goggles for complete face protection.

CONTACT LENSES SHOULD NOT BE WORN BY PERSONS WHO WORK WITH THE PRODUCT.

HANDS AND BODY:

Cuffed butyl rubber gloves, apron, and boots should be worn to protect against accidental contact.

SECTION 9: SPECIAL PRECAUTIONS AND HANDLING INFORMATION

HANDLING:

UN2357

CYCLOHEXYLAMINE

**DANGER! HARMFUL IF SWALLOWED, INHALED, AND
ABSORBED THROUGH SKIN. CAUSES SEVERE EYE AND
SKIN BURNS. FLAMMABLE.**

Avoid contact with eyes, skin, and
clothing.
Keep container closed.
Use with adequate ventilation.
Keep away from heat, sparks, and flame.
Avoid breathing vapors or mists.
Wash thoroughly after handling.

OTHER HANDLING AND STORAGE REQUIREMENTS:

Containers should be grounded before product is transferred to reduce chance of spark by static electricity. Electrical installations should be in accordance with Article 501 of the National Electrical Code for Class 1, Division 2 locations.

Store in steel containers preferably located outdoors, above ground, and surrounded by dikes to contain spills or leaks.

Protect containers against physical damage.

Chemicals Group
Air Products and Chemicals, Inc.
Allentown, PA 18195
Telephone (215) 481-9111
Telecopy (215) 481-8051



During loading and transfer operations when vapors may be present, shut down or remove from the area mechanical or electrical equipment capable of causing an ignition.

Smoking in the area is prohibited.

Label empty tank cars: "DANGEROUS--EMPTY".

Empty containers may contain explosive vapors. Flush empty containers with water to remove residual flammable liquid and vapors (see Section VII for rinse water disposal).

See "Flammable and Combustible Liquids Code", NFPA No. 30, National Fire Protection Association, Boston, Massachusetts.

SECTION 10: ADDITIONAL INFORMATION

All components are included in the EPA Toxic Substance Control Act Chemical Substance Inventory.

H.M.I.S.

HEALTH : 3
FLAMMABILITY: 3
REACTIVITY : 0

These ratings should be used only as part of an H.M.I.S. program.

Cyclohexylamine is included in SARA TITLE III Section 300 Appendix D - List of Extremely Hazardous Substances with a reportable quantity of 1 (one) pound and is subject to the emergency release notification requirements cited in 40 CFR Part 300.94.

OSHA Hazard Communication Standard (29CFR1910.1200) hazard class:
a) flammable, b) toxic by inhalation, ingestion and absorption through skin, and c) corrosive.

EPA SARA Title III hazard class: a) fire hazard and b) immediate health hazard.

MATERIAL SAFETY DATA SHEET

SECTION 1: PRODUCT IDENTIFICATION

MATERIAL NAME (TRADE NAME): Morpholine, Morpholine 88% Solution,
Morpholine 40% Solution

MANUFACTURER : Air Products and Chemicals, Inc. Allentown, PA 18195

CHEMICAL NAME : Tetrahydro-1,4-oxazine
Diethylenimide Oxide
Diethylene Oximide

CHEMICAL FAMILY: Alkanolamine

EMERGENCY TELEPHONE NUMBERS
1-800-523-9374
1-215-481-4911 (outside U.S.A.)

SALES & PRODUCT INFO PHONE
1-800-345-3148

MSDS NUMBER: 6315-03 EFFECTIVE DATE: August 1987 VISION: 3

SECTION 2: HAZARDOUS INGREDIENTS

Morpholine is distributed as an anhydrous liquid and as 40% and 88% solutions with water. The products are strongly alkaline and cause severe burns upon contact with skin or eyes. Morpholine is flammable. Morpholine 40% and 88% solutions are combustible.

The Chemical Abstract Registry Number for Morpholine is 110-91-8.

SECTION 3: PHYSICAL DATA

BOILING POINT (Anhydrous) : 128.9 C (263 F)
MELTING POINT (Anhydrous) : -4.9 C
(40%, 88% Solutions) : <-60 C (<-76 F)
DENSITY : 0.994 g/cm³ @ 20 C
SOLUBILITY IN WATER : Complete
VAPOR PRESSURE (mm Hg) :
(Air=1) (Anhydrous) : 3
(40%, 88% Solutions) : 11 @ 21 C (70 F)
: 31 @ 38 C (100 F)
VAPOR DENSITY : 1.3
% VOLATILE BY VOLUME : 100
PH : 9.61 in water
APPEARANCE/ODOR : Clear, colorless, oily liquid/Ammonia-like

SECTION 4: FIRE AND EXPLOSION DATA

FLASH POINT (Anhydrous): 35 C (95 F) 88% solution 107 F
(Tag closed cup)
FLAMMABLE LIMITS (%) Lower: 1.8% 40% Solution >107 F
(Anhydrous) Upper: 10.8%
IGNITION TEMP. 310 C (590 F)
(Anhydrous)

Morpholine is a Class IC flammable liquid according to Occupational Safety and Health Standards (29CFR1910.106). Morpholine 40% and 88% solutions are Class II combustible liquid (OSHA).

EXTINGUISHING MEDIA : Upon ignition the products generate a Class B fire. Recommended extinguishing agents are water spray, carbon dioxide, dry chemical or "alcohol" foam. Water may be ineffective on flames, but should be used to cool fire-exposed containers and to disperse vapors.

SPECIAL FIREFIGHTING PROCEDURES:

Firefighters should wear a self-contained breathing apparatus to prevent inhalation of toxic ammonia, carbon monoxide or nitrogen oxide gases which may form when the product is burned or is heated. Suits, gloves and boots impervious to chemicals (e.g., butyl rubber) should be worn.

FIRE AND EXPLOSION HAZARD:

If the product is heated to temperatures above 95 F, explosive air-vapor mixtures may form.

SECTION 5: HEALTH HAZARD INFORMATION/FIRST AID

Toxicology:

- o Skin/Eye Contact Data - Severe irritant to the eyes and skin of a rabbit. Corrosive
- o Oral LD₅₀ (rat): 1050 mg/kg
- o Dermal LD₅₀ (rabbit): 500 mg/kg
- o Inhalation LC₅₀ (rat): 1.3 mg/1/2 H

- o Delayed, Chronic, Subchronic Test Results - no delayed, sub-chronic or chronic toxicological test data are known.

Routes of Entry:

- o Ingestion
- o Skin absorption
- o Inhalation

Exposure Standards:

- o OSHA PEL-TWA 20 ppm, 70 mg/m³ (skin)
- o ACGIH TLV-TWA 20 ppm, 70 mg/m³ (skin)
- o ACGIH TLV-STEL 30 ppm, 105 mg/m³ (skin)

Health Hazards:

- o Severe irritant to the eyes and skin
- o Corrosive liquid
- o Toxic (ANSI Z129.1 1988) by skin absorption and by inhalation
- o Eye hazard
- o Respiratory hazard
- o Skin hazard

Signs and Symptoms of Exposure:

- o Contact of undiluted product with eyes or skin quickly causes severe irritation and pain and may cause burns, necrosis and permanent injury. Burns of the eye may cause blindness.
- o Product is readily absorbed through the skin and may cause malaise, discomfort, injury and death unless treated promptly.
- o Product vapor in low concentrations can cause lacrimation, conjunctivitis and corneal edema when absorbed into the tissue of the eye from the atmosphere. Corneal edema may give rise to a perception of "blue haze" or "fog" around lights. The effect is transient and has no known residual effect.
- o Inhalation of vapors may cause irritation of the respiratory tract. Coughing and chest pain may result.
- o Repeated and/or prolonged exposure to vapors may cause chronic irritation of the respiratory tract and bronchopneumonia.
- o Repeated and/or prolonged exposure at low levels may result in:
 - o adverse respiratory effects
 - o adverse skin effects
 - o adverse eye effects

Medical Conditions Generally Aggravated by Exposure:

- o Asthma
- o Skin disorders and allergies
- o Chronic respiratory disease, e.g., bronchitis, emphysema
- o Eye disease

FIRST AID:

EYE CONTACT:

(Note: CONTACT LENSES SHOULD NOT BE USED BY PERSONS WHO WORK WITH THE PRODUCT.)

Flush eyes IMMEDIATELY and gently with large volumes of water for 15 minutes. Use fingers to assure that eye lids are separated and that eye is being irrigated. Obtain medical assistance promptly.

SKIN CONTACT:

Flush affected area promptly with large quantities of water for 15 minutes. Except in the most minor, superficial, and localized burns, cover the affected area with a sterile dressing or clean sheeting and transport for medical care. DO NOT APPLY GREASES OR OINTMENTS. Control shock, if present. Launder contaminated clothing prior to reuse. Leather absorbs the product very rapidly so contaminated leather wear (e.g. belts, shoes) must be discarded.

INHALATION:

Move affected person to uncontaminated atmosphere. If breathing has stopped or is impaired, give assisted respiration (e.g. mouth-to-mouth); supplemental oxygen should be given if available. Assure that victim does not aspirate vomited material by use of postural drainage. Assure that mucous does not obstruct the airway. Seek medical attention.

INGESTION:

In the event of ingestion, administer 3-4 glasses of milk or water. DO NOT INDUCE VOMITING. Obtain medical care and hospital treatment as soon as possible.

NOTE TO PHYSICIAN:

The product has effects similar to those of ammonia, and is highly injurious to all tissues. Chemical pneumonitis, pulmonary edema, laryngeal edema, and delayed scarring of the airway or other affected organs may occur following exposure. There is no specific treatment. Clinical management is based upon supportive treatment, which is similar to that for thermal burns.

Victims with major skin contact should be maintained under medical observation for at least 24 hours due to possibility of delayed reaction.

SECTION 6: REACTIVITY DATA

The product is chemically stable and insensitive to light.

INCOMPATIBILITIES:

Violent reaction and fire may result when the product is mixed with oxidizing agents such as perchlorates, nitrates, permanganates, chromates, nitric acid, halogens, peroxides, and some cleaning solutions containing acids.

A reaction accompanied by large heat release occurs when the product is mixed with acids. Heat generated may be sufficient to cause vigorous boiling, creating a hazard due to splashing or splattering of hot material.

The product corrodes copper, aluminum, zinc, and galvanized surfaces. Materials for containment should be constructed of iron or steel.

Upon decomposition, ammonia vapors are liberated. Such vapors are irritating to skin, eyes, and respiratory tract lining. Observe handling procedures recommended for the product.

Upon combustion in the presence of sufficient oxygen, product generates harmful carbon monoxide, carbon dioxide, and nitrogen oxide gases. Nitrogen oxide can react with water vapors to yield corrosive nitric acid (TLV = 2 ppm).

Combustion of product under oxygen starved conditions can be expected to produce numerous toxic products including carbon monoxide, hydrogen cyanide, nitriles, cyanic acid, isocyanates, cyanogens, nitrosamines, amides and carbamates.

Liquid morpholine will attack some forms of plastics, rubber and coating.

CAUTION!

N-nitrosamines, known to be potent carcinogens, may be formed when the product comes in contact with nitrous acid, nitrites or atmospheres with high nitrogen oxide concentrations.

SECTION 7: SPILL, LEAK AND DISPOSAL PROCEDURES

Remove all sources of ignition. Stop leak if without risk.

Spills should be contained and covered with sodium bisulfate to neutralize the product.

Spray with water and scoop up into steel containers for proper disposal.

Prevent spilled product from entering drinking water supplies or streams. Product is soluble in water.

Personnel involved in spill control and clean up must wear full protective clothing made of butyl rubber and a self-contained breathing apparatus.

The product has a strong offensive odor and its vapors are toxic. Personnel downwind to the spill should be evacuated. Only persons equipped with respiratory protection, approved for the purpose by the National Institute for Occupational Safety and Health (NIOSH), may be allowed in the area. Personnel involved in spill control and clean up must wear a full body suit construction of butyl rubber and a self-contained breathing apparatus.

WASTE DISPOSAL:

Most aliphatic amine compounds, such as this product, and their by-products can be chemically or biologically degraded. A suitable industrial or municipal waste treatment system can be used depending on the quality and quantity of waste to be treated, the treatment plant capability, and discharge water quality standards.

Incineration is acceptable and the preferred method of disposal, however nitrogen oxide emission controls may be required to meet environmental regulations.

Landfill disposal of amine containing waste is acceptable only where landfill sites meet specifications equivalent or exceeding California Class I specifications. Amines containing waste may present long term environmental hazards, thus landfill disposal must be considered less acceptable than incineration.

All federal, state and local pollution abatement regulations must be observed when disposing of contaminated or waste materials.

SECTION 8: SPECIAL PROTECTION INFORMATION

Work areas must be well ventilated to maintain vapor concentration below an irritable level.

Emergency showers and eye baths should be readily accessible.

PROTECTIVE EQUIPMENT:

RESPIRATORY:

NIOSH-approved, full facepiece, air-supplied or self-contained breathing apparatus should be worn (follow manufacturer's instruction) under the following conditions:

- (1) emergency situations;
- (2) when product vapor concentration is greater than 20 ppm for a period longer than 15 minutes.
- (3) during repair and cleaning of equipment;
- (4) during transfer or discharge of the product.

Chemicals Group
Air Products and Chemicals, Inc.
Allentown, PA 18195

Telephone (215) 481-4911
Telecopy (215) 481-8051

AIR
PRODUCTS 

EYES:

Chemical safety goggles should be worn whenever there is danger of material contacting the eyes. Plastic face shields should be worn in addition to safety goggles for complete face protection.

CONTACT LENSES SHOULD NOT BE WORN BY PERSONS WHO WORK WITH THE PRODUCT.

HANDS AND BODY:

Cuffed butyl rubber gloves, apron, and boots should be worn to protect against accidental contact.

SECTION 9: SPECIAL PRECAUTIONS AND HANDLING INFORMATION

HANDLING:

UN2054

MORPHOLINE
DANGER!

HARMFUL IF INHALED AND
ABSORBED THROUGH SKIN.
CAUSES SEVERE BURNS
TO EYES AND SKIN.
FLAMMABLE LIQUID.

Avoid contact with skin, eyes and clothing.
Avoid breathing vapors.
Use with adequate ventilation.
Keep container closed.
Wash thoroughly after handling.
Keep away from heat, sparks and flame.

Do not use sodium nitrite or other nitrosating agents in formulations containing this product. Suspected cancer-causing nitrosamines could be formed.

FIRST AID: In case of contact, immediately flush skin and eyes with plenty of water while removing contaminated clothing. Call a physician. Wash clothing before reuse. Discard contaminated shoes.

In case of fire, use dry chemical, carbon dioxide, "alcohol" foam or water fog.

Chemicals Group
Air Products and Chemicals, Inc.
Allentown, PA 18195
Telephone (215) 481-4911
Telecopy (215) 481-8051

AIR
PRODUCTS 

NA1760
MORPHOLINE 40% SOLUTION
MORPHOLINE 88% SOLUTION
DANGER!
HARMFUL
IF ABSORBED THROUGH SKIN
CAUSES SEVERE BURNS,
EYES AND SKIN
COMBUSTIBLE LIQUID

Avoid contact with skin, eyes and clothing.
Avoid breathing vapors.
Keep container closed.
Wash thoroughly after handling.
Keep away from heat, sparks and flame.

Do not use sodium nitrite or other nitrosating agents in formulations containing this product. Suspected cancer-causing nitrosamines could be formed.

FIRST AID: In case of contact, immediately flush skin and eyes with plenty of water while removing contaminated clothing. Call a physician. Wash clothing before reuse. Discard contaminated shoes.

In case of fire, use dry chemical, carbon dioxide, "alcohol" foam or water fog.

OTHER HANDLING AND STORAGE REQUIREMENTS:

Containers should be grounded before product is transferred to reduce chance of spark by static electricity. Electrical installations should be in accordance with Article 501 of the National Electrical Code for Class 1, Division 2 locations.

Store in steel containers preferably located outdoors, above ground, and surrounded by dikes to contain spills or leaks.

Protect containers against physical damage.

During loading and transfer operations when vapors may be present, shut down or remove from the area mechanical or electrical equipment capable of causing an ignition.

0019

Chemicals Group
Air Products and Chemicals, Inc.
Allentown, PA 18195
Telephone (215) 481-4911
Telecopy (215) 481-8051



Smoking in the area is prohibited.

Label empty tank cars: "DANGEROUS--EMPTY".

Empty containers may contain explosive vapors. Flush empty containers with water to remove residual flammable liquid and vapors (see Section VII for rinse water disposal).

Protect containers against physical damage. Keep containers tightly closed and store in a cool, dark place. Do not use sodium nitrite or other nitrosating agents in the formulations containing this product. Suspected cancer-causing nitrosamines could be formed.

See "Flammable and Combustible Liquids Code", NFPA No. 30, National Fire Protection Association, Boston, Massachusetts.

SECTION 10: ADDITIONAL INFORMATION

REGULATORY CONCERNS:

The Department of Transportation (DOT) Proper Shipping Name for anhydrous morpholine is Morpholine, Flammable Liquid, UN 2054. The Department of Transportation (DOT) proper shipping name for morpholine solutions is Morpholine, aqueous mixture, Corrosive Material, NA1760.

All components are included in the EPA Toxic Substance Control Act Chemical Substance Inventory.

H.M.I.S.

HEALTH : 2
FLAMMABILITY: 3
REACTIVITY : 0

These ratings should be used only as part of H.M.I.S. program.

OSHA Hazard Communication Standard (29CFR1910.1200) hazard class for anhydrous morpholine: a) toxic by absorption through skin and inhalation, b) corrosive and c) flammable.

EPA SARA Title III hazard class: a) fire hazard and b) immediate health hazard.

Chemicals Group
Air Products and Chemicals, Inc.
Allentown, PA 18195
Telephone (215) 481-4911
Telecopy (215) 481-8051

AIR
PRODUCTS 

MATERIAL SAFETY DATA SHEET

SECTION 1: PRODUCT IDENTIFICATION

MATERIAL NAME (TRADE NAME): DIISOPROPYLAMINE

MANUFACTURER : Air Products and Chemicals, Inc. Allentown, PA 18195

CHEMICAL NAME : DIPA
N-(1-Methylethyl)-2-propanamine

CHEMICAL FAMILY: Alkyl Amines
Aliphatic Amine

EMERGENCY TELEPHONE NUMBERS
1-800-523-9374
1-215-481-4911 (outside U.S.A.)

SALES & PRODUCT INFO PHONE
1-800-345-3148

MSDS NUMBER: 6304-03 EFFECTIVE DATE: August 1987 REVISION: 3

SECTION 2: HAZARDOUS INGREDIENTS

Diisopropylamine is a single component liquid. The liquid and its vapors are severe irritants to the skin, eyes, and mucous membranes of the respiratory tract.

The Chemical Abstract Registry Number for Diisopropylamine is 108-18-9.

The product is classified a flammable liquid according to DOT regulations and presents a dangerous fire hazard.

A strong ammonia-like odor gives warning of its presence.

SECTION 3: PHYSICAL DATA

BOILING POINT : 183 F (83.9 C)
MELTING POINT : -77.8 F (-61 C)
SOLUBILITY IN WATER : Slight
VAPOR PRESSURE (mm Hg) : 60.3 mm Hg @ 68 F (20 C)
VAPOR DENSITY (Air=1) : 3.49
% VOLATILE BY VOLUME : 100
PH : Strongly basic; pKa = 11.5 in water
SPECIFIC GRAVITY (H2O=1) : 0.7178 @ 20/20 C
APPEARANCE/ODOR : Colorless liquid/Pungent; Ammonia-like
EVAPORATION RATE : less than 1
(Butyl acetate = 1)

SECTION 4: FIRE AND EXPLOSION DATA

FLASH POINT (Tag Open Cup): 30 F (-1 C)

AUTOIGNITION TEMPERATURE : 755 F (402.2 C)

FLAMMABLE LIMITS (%) : Not Applicable

EXTINGUISHING MEDIA:

Upon ignition, the product generates a Class B fire. Recommended extinguishers are carbon dioxide dry chemical, alcohol foam or water spray. Use water spray to cool fire-exposed tanks and to disperse vapors.

SPECIAL FIREFIGHTING PROCEDURES:

Firefighters must wear a self-contained breathing apparatus to avoid breathing product vapors and nitrogen oxide fumes generated by combustion (see also Section VI). Rubber boots and gloves are recommended. Prevent contamination of streams and drinking supplies.

Spent liquids used to fight a fire should be contained for proper waste disposal (see Section VII).

FIRE AND EXPLOSION HAZARD:

The product is a volatile, flammable liquid (by DOT classification) which under ambient conditions in an open vessel releases vapors capable of forming flammable mixtures with air. Vapors are heavier than air and are capable of traveling considerable distances to an ignition source causing a flashback.

Sudden reaction and fire may result when the product is mixed with oxidizing agents (see Section VI).

SECTION 5: HEALTH HAZARD INFORMATION/FIRST AID

Toxicology:

- o Skin/Eye Contact Data - Severe irritant to the eyes of a rabbit, mild skin irritant
- o Oral LD₅₀ (rat): 770 mg/kg
- o Dermal LD₅₀ (rabbit): >1000 mg/kg
- o Inhalation LC₅₀ (rat): >2 mg/l/1h.

- o Delayed, Chronic, Subchronic Test Results - sub-chronic exposures in test animals has caused changes in red and white blood cell counts.

Routes of Entry:

- o Ingestion
- o Skin absorption
- o Inhalation

Chemicals Group
Air Products and Chemicals, Inc.
Allentown, PA 18195
Telephone (215) 481-4911
Telecopy (215) 481-8051

**AIR
PRODUCTS** 

Exposure Standards:

- o OSHA PEL-TWA 5 ppm, 20 mg/m³ (skin)
- o ACGIH TLV-TWA 5 ppm, 20 mg/m³ (skin)

Health Hazards:

- o Severe irritant to the eyes and mild irritant to the skin
- o Toxic (ANSI Z129.1 1988) by inhalation
- o Blood toxin
- o Eye hazard
- o Respiratory hazard
- o Skin hazard

Signs and Symptoms of Exposure:

- o Contact with the eyes or skin causes severe irritation and pain. Prolonged contact may result in chemical burns and permanent damage. Blindness and scarring may occur.
- o Product is absorbed through the skin and may cause nausea, headache and general discomfort.
- o Product vapor in low concentrations can cause lacrimation, conjunctivitis and corneal edema when absorbed into the tissue of the eye from the atmosphere. Corneal edema may give rise to a perception of "blue haze" or "fog" around lights. The effect is transient and has no known residual effect.
- o Inhalation of vapors may cause irritation of the respiratory tract. Coughing and chest pain may result.
- o Repeated and/or prolonged exposure to vapors may cause chronic irritation of the respiratory tract and bronchopneumonia.
- o Ingestion may cause malaise, discomfort and death unless treated promptly.
- o Repeated and/or prolonged exposure at low levels may result in:
 - o blood chemistry changes
 - o adverse respiratory effects
 - o adverse eye effects

Medical Conditions Generally Aggravated by Exposure:

- o Asthma
- o Skin disorders and allergies
- o Chronic respiratory disease, e.g., bronchitis, emphysema
- o Eye disease

Chemicals Group
Air Products and Chemicals, Inc.
Allentown, PA 18195
Telephone (215) 481-4911
Telecopy (215) 481-8051

AIR
PRODUCTS 

FIRST AID:

EYE CONTACT:

(Note: CONTACT LENSES SHOULD NOT BE USED BY PERSONS WHO WORK WITH THE PRODUCT.)

Flush eyes IMMEDIATELY and gently with large volumes of water for 15 minutes. Use fingers to assure that eye lids are separated and that eye is being irrigated. Obtain medical assistance promptly.

SKIN CONTACT:

Flush affected area promptly with large quantities of water for 15 minutes. Except in the most minor, superficial, and localized burns, cover the affected area with a sterile dressing or clean sheeting and transport for medical care. DO NOT APPLY GREASES OR OINTMENTS. Control shock, if present. Launder contaminated clothing prior to reuse. Leather absorbs the product very rapidly so contaminated leather wear (e.g. belts, shoes) must be discarded.

INHALATION:

Move affected person to uncontaminated atmosphere. If breathing has stopped or is impaired, give assisted respiration (e.g. mouth-to-mouth); supplemental oxygen should be given if available. Assure that victim does not aspirate vomited material by use of postural drainage. Assure that mucous does not obstruct the airway. Seek medical attention.

INGESTION:

In the event of ingestion, administer 3-4 glasses of milk or water. DO NOT INDUCE VOMITING. Obtain medical care and hospital treatment as soon as possible.

NOTE TO PHYSICIAN:

The product has effects similar to those of ammonia, and is highly injurious to all tissues. Chemical pneumonitis, pulmonary edema, laryngeal edema, and delayed scarring of the airway or other affected organs may occur following exposure. There is no specific treatment. Clinical management is based upon supportive treatment, which is similar to that for thermal burns.

Victims with major skin contact should be maintained under medical observation for at least 24 hours due to possibility of delayed reaction.

SECTION 6: REACTIVITY DATA

The product is chemically stable and insensitive to light.

Chemicals Group
Air Products and Chemicals, Inc.
Allentown, PA 18195
Telephone (215) 481-4911
Telecopy (215) 481-8051

AIR
PRODUCTS 

INCOMPATIBILITIES:

Violent reaction and fire may result when the product is mixed with oxidizing agents such as perchlorates, nitrates, permanganates, chromates, nitric acid, halogens, peroxides, and some cleaning solutions containing acids.

A reaction accompanied by large heat release occurs when the product is mixed with acids. Heat generated may be sufficient to cause vigorous boiling, creating a hazard due to splashing or splattering of hot material.

The product corrodes copper, aluminum, zinc, and galvanized surfaces. Materials for containment should be constructed of iron or steel.

Upon decomposition, ammonia vapors are liberated. Such vapors are irritating to skin, eyes, and respiratory tract lining. Observe handling procedures recommended for the product.

Upon combustion in the presence of sufficient oxygen, product generates harmful carbon monoxide, carbon dioxide, and nitrogen oxide gases. Nitrogen oxide can react with water vapors to yield corrosive nitric acid (TLV = 2 ppm).

Combustion of product under oxygen starved conditions can be expected to produce numerous toxic products including carbon monoxide, hydrogen cyanide, nitriles, cyanic acid, isocyanates, cyanogens, nitrosamines, amides and carbamates.

CAUTION!

N-nitrosamines, known to be potent carcinogens, may be formed when the product comes in contact with nitrous acid, nitrites or atmospheres with high nitrogen oxide concentrations.

SECTION 7: SPILL, LEAK AND DISPOSAL PROCEDURES

Remove all sources of ignition. Stop leak if without risk.

Spills should be contained and covered with sodium bisulfate to neutralize the product.

Spray with water and scoop up into steel containers for proper disposal.

Prevent spilled product from entering drinking water supplies or streams. Product is soluble in water.

Personnel involved in spill control and clean up must wear full protective clothing made of butyl rubber and a self-contained breathing apparatus.

Chemicals Group
Air Products and Chemicals, Inc.
Allentown, PA 18195
Telephone (215) 481-4911
Telecopy (215) 481-8051

AIR
PRODUCTS 

The product has a strong offensive odor and its vapors are toxic. Personnel downwind to the spill should be evacuated. Only persons equipped with respiratory protection, approved for the purpose by the National Institute for Occupational Safety and Health (NIOSH), may be allowed in the area. Personnel involved in spill control and clean up must wear a full body suit construction of butyl rubber and a self-contained breathing apparatus.

Waste Disposal:
Most aliphatic amine compounds, such as this product, and their by-products can be chemically or biologically degraded. A suitable industrial or municipal waste treatment system can be used depending on the quality and quantity of waste to be treated, the treatment plant capability, and discharge water quality standards.

Incineration is acceptable and the preferred method of disposal, however nitrogen oxide emission controls may be required to meet environmental regulations.

Landfill disposal of amine containing waste is acceptable only where landfill sites meet specifications equivalent or exceeding California Class I specifications. Amines containing waste may present long term environmental hazards, thus landfill disposal must be considered less acceptable than incineration.

All federal, state and local pollution abatement regulations must be observed when disposing of contaminated or waste materials.

SECTION 8: SPECIAL PROTECTION INFORMATION

Work areas must be well ventilated to maintain vapor concentration below an irritable level.

Emergency showers and eye baths should be readily accessible.

PROTECTIVE EQUIPMENT:

RESPIRATORY:

NIOSH-approved, full facepiece, air-supplied or self-contained breathing apparatus should be worn (follow manufacturer's instruction) under the following conditions:

- (1) emergency situations;
- (2) when product vapor concentration is greater than 20 ppm for a period longer than 15 minutes.
- (3) during repair and cleaning of equipment;
- (4) during transfer or discharge of the product.

Chemicals Group
Air Products and Chemicals, Inc.
Allentown, PA 18195
Telephone (215) 481-4911
Telecopy (215) 481-8051



EYES:

Chemical safety goggles should be worn whenever there is danger of material contacting the eyes. Plastic face shields should be worn in addition to safety goggles for complete face protection.

CONTACT LENSES SHOULD NOT BE WORN BY PERSONS WHO WORK WITH THE PRODUCT.

HANDS AND BODY:

Cuffed butyl rubber gloves, apron, and boots should be worn to protect against accidental contact.

SECTION 9: SPECIAL PRECAUTIONS AND HANDLING INFORMATION

HANDLING:

UN1158

DIISOPROPYLAMINE

DANGER! CAUSES SEVERE EYE AND SKIN BURNS.

FLAMMABLE.

HARMFUL IF INHALED.

MAY CAUSE RESPIRATORY TRACT DAMAGE BASED ON ANIMAL DATA.

Keep away from heat, sparks, and open flame.
Keep container closed.
Do not breathe vapor.
Use adequate ventilation.
Avoid contact with eyes, skin, and clothing.
Wash thoroughly after handling.
Do not mix with nitrites or other nitrosating agents which can form nitrosamines.

First Aid: In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Call a physician.
If inhaled, remove to fresh air. If not breathing, give artificial respiration, preferably mouth-to-mouth. If breathing is difficult, give oxygen. Call a physician.
In case of fire, use dry chemical, carbon dioxide, alcohol foam or water spray.

Chemicals Group
Air Products and Chemicals, Inc.
Allentown, PA 18195
Telephone (215) 481-4911
Telecopy (215) 481-8051

AIR
PRODUCTS 

OTHER HANDLING AND STORAGE REQUIREMENTS:

Containers should be grounded before product is transferred to reduce chance of spark by static electricity. Electrical installations should be in accordance with Article 501 of the National Electrical Code for Class 1, Division 2 locations.

Store in steel containers preferably located outdoors, above ground, and surrounded by dikes to contain spills or leaks.

Protect containers against physical damage.

During loading and transfer operations when vapors may be present, shut down or remove from the area mechanical or electrical equipment capable of causing an ignition.

Smoking in the area is prohibited.

Label empty tank cars: "DANGEROUS EMPTY - FLAMMABLE".

Empty containers may contain explosive vapors. Flush empty containers with water to remove residual flammable liquid and vapors (see Section VII for rinse water disposal).

See "Flammable and Combustible Liquids Code", NFPA No. 30, National Fire Protection Association, Boston, Massachusetts.

SECTION 10: ADDITIONAL INFORMATION

REGULATORY CONCERNS:

The Department of Transportation (DOT) proper shipping name is Diisopropylamine, Flammable Liquid, N.O.S. UN1158.

All components are included in the EPA Toxic Substance Control Act Chemical Substance Inventory.

H.M.I.S.

HEALTH : 3
FLAMMABILITY: 3
REACTIVITY : 0

These ratings should be used only as part of an H.M.I.S. program.

OSHA Hazard Communication Standard (29CFR1910.1200) hazard class:
a) flammable, b) irritant and c) toxic.

EPA SARA Title III hazard class: a) fire hazard and b) immediate health hazard.

Chemicals Group
Air Products and Chemicals Inc
Allentown, PA 18195
Telephone (215) 481-4911
Telecopy (215) 481-8051



MATERIAL SAFETY DATA SHEET

SECTION 1: PRODUCT IDENTIFICATION

MATERIAL NAME (TRADE NAME): Dicyclohexylamine

MANUFACTURER : Air Products and Chemicals, Inc. Allentown, PA 18195

CHEMICAL NAME : Dicyclohexylamine; DCHA

CHEMICAL FAMILY: Alicyclic Amine

EMERGENCY TELEPHONE NUMBERS

1-800-523-9374

1-215-481-4911 (outside U.S.A.)

SALES & PRODUCT INFO PHONE

1-800-345-3148

MSDS NUMBER: 6403-01

EFFECTIVE DATE: August 1987

REVISION: 1

SECTION 2: HAZARDOUS INGREDIENTS

The product is a single component liquid. The liquid and its vapors are severely irritating to the skin, eyes, and mucous membrane of the respiratory tract. Contact with the liquid causes burns. Ingestion and inhalation may be harmful.

The product is a combustible liquid and presents a dangerous fire hazard.

The Chemical Abstract Registry Number for Dicyclohexylamine is 101-83-7.

A strong ammonia-like or fishy odor gives warning of its presence.

SECTION 3: PHYSICAL DATA

BOILING POINT : 256 C; 493 F
MELTING POINT : 0 C
SOLUBILITY IN WATER : Slightly Soluble
VAPOR PRESSURE (mm Hg) : 12mmHg at 100 F
VAPOR DENSITY (Air=1) : 6
% VOLATILE BY VOLUME : 100
PH : 10.5 (0.1% Aqueous Solution)
SPECIFIC GRAVITY (H2O=1) : .9141
APPEARANCE/ODOR : Clear, colorless liquid with characteristic amine odor
EVAPORATION RATE : No Data

SECTION 4: FIRE AND EXPLOSION DATA

FLASH POINT (Tag Closed Cup) : 219 F
FLAMMABLE LIMITS (%) : Lower No Data; Upper No Data

Dicyclohexylamine is classified as a Combustible Liquid, Class III B.

EXTINGUISHING MEDIA:

Fires are Class B. Recommended extinguishers are carbon dioxide, dry chemical, alcohol foam or water fog/spray. Water may be ineffective in extinguishing the fire but may be used to protect firemen from the heat, to cool fire-exposed containers, or to disperse vapors.

SPECIAL FIREFIGHTING PROCEDURES:

Firefighters should wear butyl rubber boots, gloves and body suit and a self contained breathing apparatus.

Contain spent liquids used to fight a fire for proper waste disposal (See Section 7).

FIRE AND EXPLOSION HAZARD:

Combustion products may be toxic.

SECTION 5: HEALTH HAZARD INFORMATION/FIRST AID

Toxicology:

- Skin/Eye Contact Data - Severe irritant, corrosive to the eyes and skin of a rabbit.
 - Oral LD₅₀ (rat): 373 mg/kg
 - Dermal LD₅₀ (rabbit): Not available
 - Inhalation LC₅₀ (rat): Not available
- Delayed, Chronic, Subchronic Test Results - no delayed, sub-chronic or chronic toxicological test data are known.

Routes of Entry:

- Ingestion
- Skin absorption
- Inhalation

Exposure Standards:

- No standards established

Health Hazards:

- Severe irritant and corrosive liquid to eyes and skin.
- Corrosive liquid
- Toxic (ANSI Z129.1 1988) (a) by ingestion (b) by skin absorption (c) by inhalation
- Eye hazard
- Respiratory hazard
- Skin hazard

Chemicals Group
Air Products and Chemicals, Inc.
Allentown, PA 18195
Telephone (215) 481-4911
Telecopy (215) 481-8051

AIR
PRODUCTS 

Signs and Symptoms of Exposure:

- Contact with the eyes or skin causes severe irritation and pain. Prolonged contact may result in chemical burns and permanent damage. Blindness and scarring may occur.
- Product vapor in low concentrations can cause lacrimation, conjunctivitis and corneal edema when absorbed into the tissue of the eye from the atmosphere. Corneal edema may give rise to a perception of "blue haze" or "fog" around lights. The effect is transient and has no known residual effect.
- Inhalation of vapors may cause irritation of the respiratory tract. Coughing and chest pain may result.
- Repeated and/or prolonged exposure to low concentrations of vapor may cause sore throat, eye irritation, nausea, faintness and/or headache which are transient.
- Ingestion may cause malaise, discomfort and death unless treated promptly.
- Repeated and/or prolonged exposure at low levels may result in:
 - adverse respiratory effects
 - adverse skin effects
 - adverse eye effects

Medical Conditions Generally Aggravated by Exposure:

- Asthma
- Skin disorders and allergies
- Chronic respiratory disease, e.g., bronchitis, emphysema
- Eye disease

FIRST AID:

EYE CONTACT:

(Note: CONTACT LENSES SHOULD NOT BE USED BY PERSONS WHO WORK WITH THE PRODUCT.)

Flush eyes IMMEDIATELY and gently with large volumes of water for 15 minutes. Use fingers to assure that eye lids are separated and that eye is being irrigated. Obtain medical assistance promptly.

SKIN CONTACT:

Flush affected area promptly with large quantities of water for 15 minutes. Except in the most minor, superficial, and localized burns, cover the affected area with a sterile dressing or clean sheeting and transport for medical care. DO NOT APPLY GREASES OR OINTMENTS. Control shock, if present. Launder contaminated clothing prior to reuse. Leather absorbs the product very rapidly so contaminated leather wear (e.g. belts, shoes) must be discarded.

Chemicals Group
Air Products and Chemicals, Inc.
Allentown, PA 18195

Telephone (215) 481-4911
Telecopy (215) 481-8051

AIR
PRODUCTS 

INHALATION:

Move affected person to uncontaminated atmosphere. If breathing has stopped or is impaired, give assisted respiration (e.g. mouth-to-mouth); supplemental oxygen should be given if available. Assure that victim does not aspirate vomited material by use of postural drainage. Assure that mucous does not obstruct the airway. Seek medical attention.

INGESTION:

In the event of ingestion, administer 3-4 glasses of milk or water. DO NOT INDUCE VOMITING. Obtain medical care and hospital treatment as soon as possible.

NOTE TO PHYSICIAN:

The product has effects similar to those of ammonia, and is highly injurious to all tissues. Chemical pneumonitis, pulmonary edema, laryngeal edema, and delayed scarring of the airway or other affected organs may occur following exposure. There is no specific treatment. Clinical management is based upon supportive treatment, which is similar to that for thermal burns.

Victims with major skin contact should be maintained under medical observation for at least 24 hours due to possibility of delayed reaction.

SECTION 6: REACTIVITY DATA

The product is chemically stable and insensitive to light.

INCOMPATIBILITIES:

Violent reaction and fire may result when the product is mixed with oxidizing agents such as perchlorates, nitrates, permanganates, chromates, nitric acid, halogens, peroxides, and some cleaning solutions containing acids.

A reaction accompanied by large heat release occurs when the product is mixed with acids. Heat generated may be sufficient to cause vigorous boiling, creating a hazard due to splashing or splattering of hot material.

The product corrodes copper, aluminum, zinc, and galvanized surfaces. Materials for containment should be constructed of iron or steel.

Upon decomposition, ammonia vapors are liberated. Such vapors are irritating to skin, eyes, and respiratory tract lining. Observe handling procedures recommended for the product.

Upon combustion in the presence of sufficient oxygen, product generates harmful carbon monoxide, carbon dioxide, and nitrogen oxide gases. Nitrogen oxide can react with water vapors to yield corrosive nitric acid (TLV = 2 ppm).

Chemicals Group
Air Products and Chemicals, Inc.
Allentown, PA 18195
Telephone (215) 481-4911
Telecopy (215) 481-8051

AIR
PRODUCTS 

Combustion of product under oxygen starved conditions can be expected to produce numerous toxic products including carbon monoxide, hydrogen cyanide, nitriles, cyanic acid, isocyanates, cyanogens, nitrosamines, amides and carbamates.

CAUTION!

N-nitrosamines, known to be potent carcinogens, may be formed when the product comes in contact with nitrous acid, nitrites or atmospheres with high nitrogen oxide concentrations.

SECTION 7: SPILL, LEAK AND DISPOSAL PROCEDURES

Personnel downwind to the spill should be evacuated. Since resultant air pollution is harmful to health, wear respiratory and body protection equipment.

Minor spills should be covered with sodium bisulfate to neutralize the products and then sprayed with water. The contaminated amine should be contained for proper waste disposal according to environmental regulations.

Leaks should be continuously sprayed with water to keep containers cool, to control vapors and to protect workmen attempting to stop the leak. Continue spraying until leak is stopped or container is empty. Only persons equipped with respiratory protection may be allowed in the area; respirators should be approved for the purpose by the National Institute for Occupational Safety and Health (NIOSH). Wear butyl rubber gloves, boots and body suit to prevent skin contact.

All spilled liquids should be contained for proper waste disposal. Do not contaminate streams or local drinking water supplies.

The product has a strong offensive odor and its vapors are toxic. Personnel downwind to the spill should be evacuated. Only persons equipped with respiratory protection, approved for the purpose by the National Institute for Occupational Safety and Health (NIOSH) may be allowed in the area. Personnel involved in spill control and clean up must wear a full body suit construction of butyl rubber and self-contained breathing apparatus.

WASTE DISPOSAL:

Contain all contaminated water for disposal. Do not dump into municipal sewers or enclosed drains that present fire or explosion hazards.

Most aliphatic amine compounds, such as this product, and their by-products can be chemically or biologically degraded. A suitable industrial or municipal waste treatment system can be used depending on the quality and quantity of waste to be treated, the treatment plant capability and discharge water quality standards.

Chemicals Group
Air Products and Chemicals, Inc.
Allentown, PA 18195

Telephone (215) 481-4911
Telecopy (215) 481-8051



Incineration is acceptable and the preferred method of disposal, however, nitrogen oxide emission controls may be required to meet environmental regulations.

All federal, state and local regulations regarding health and pollution should be followed in waste disposal.

SECTION 8: SPECIAL PROTECTION INFORMATION

Work areas must be well ventilated to maintain vapor concentration below an irritable level.

Emergency showers and eye baths should be readily accessible.

PROTECTIVE EQUIPMENT:

RESPIRATORY:

NIOSH-approved, full facepiece, air-supplied or self-contained breathing apparatus should be worn (follow manufacturer's instruction) under the following conditions:

- (1) emergency situations;
- (2) when product vapor concentration is greater than 20 ppm for a period longer than 15 minutes.
- (3) during repair and cleaning of equipment;
- (4) during transfer or discharge of the product.

EYES:

Chemical safety goggles should be worn whenever there is danger of material contacting the eyes. Plastic face shields should be worn in addition to safety goggles for complete face protection.

CONTACT LENSES SHOULD NOT BE WORN BY PERSONS WHO WORK WITH THE PRODUCT.

HANDS AND BODY:

Cuffed butyl rubber gloves, apron, and boots should be worn to protect against accidental contact.

Chemicals Group
Air Products and Chemicals, Inc.
Allentown, PA 18195
Telephone (215) 481-4911
Telecopy (215) 481-8051

AIR
PRODUCTS 

SECTION 9: SPECIAL PRECAUTIONS AND HANDLING INFORMATION

HANDLING:

UN1760

DICYCLOHEXYLAMINE

**DANGER! HARMFUL IF SWALLOWED,
INHALED AND ABSORBED THROUGH SKIN
CAUSES SEVERE BURNS TO SKIN AND EYES**

Avoid contact with skin, eyes, and
clothing.
Avoid breathing of mists and fumes.
Keep container closed.
Use with adequate ventilation.
Wash thoroughly after handling.

OTHER HANDLING AND STORAGE REQUIREMENTS:

Containers should be grounded before product is transferred to reduce chance of spark by static electricity. Electrical installations should be in accordance with Article 501 of the National Electrical Code for Class 1, Division 2 locations.

Store in steel containers preferably located outdoors, above ground, and surrounded by dikes to contain spills or leaks.

Protect containers against physical damage.

During loading and transfer operations when vapors may be present, shut down or remove from the area mechanical or electrical equipment capable of causing an ignition.

Smoking in the area is prohibited.

Label empty tank cars: "DANGEROUS--EMPTY".

Empty containers may contain explosive vapors. Flush empty containers with water to remove residual flammable liquid and vapors (see Section VII for rinse water disposal).

See "Flammable and Combustible Liquids Code", NFPA No. 30, National Fire Protection Association, Boston, Massachusetts.

Chemicals Group
Air Products and Chemicals, Inc.
Allentown, PA 18195
Telephone (215) 481-4911
Telecopy (215) 481-8051



SECTION 10: ADDITIONAL INFORMATION

The Department of Transportation (DOT) proper shipping name is Corrosive Liquid, N.O.S., (Dicyclohexylamine) UN1760.

All components are included in the EPA Toxic Substance Control Act Chemical Substance Inventory.

H.M.I.S.

HEALTH : 3
FLAMMABILITY: 1
REACTIVITY : 0

These ratings should be used only as part of an H.M.I.S. program.

OSHA Hazard Communication Standard (29CFR1910.1200) hazard class:
a) toxic by inhalation, ingestion and absorption through skin and
b) corrosive.

EPA SARA Title III hazard class: immediate health hazard.

MATERIAL SAFETY DATA SHEET

DABCO R-8020®

Air Products and Chemicals, Inc.
P.O. Box 538
Allentown, PA 18105

EMERGENCY TELEPHONE NUMBERS

800-523-9374 (except Pennsylvania)
800-322-9092 (Pennsylvania only)

RECEIVED
94 JUL 26 PM 3:52

I—PRODUCT IDENTIFICATION

Manufacturing Site

Paulsboro, New Jersey

Trade Name

DABCO R-8020® Catalyst

Business Contact

Product Manager
Chemical Additives
Performance Chemicals Division

Chemical Names and Synonyms

Triethylenediamine & Dimethylethanolamine
TEDA & DMEA
1,4-Diazobicyclo, (2,2,2) octane & N,N-Dimethyl-
2-aminoethanol

Sales Office

P.O. Box 538
Allentown, Pennsylvania 18105

Chemical Family

Heterocyclic Amines and Aminoalcohol
Urethane catalyst

Sales Phone

(215) 481-4911

Formula:

$C_6H_{12}N_2$ - TEDA
 $C_4H_{11}NO$ - DMEA

Issue Date, Revision 2

1 August 1980

Chemical Abstract Registry Numbers

280-57-9 (for TEDA)
108-01-0 (for DMEA)

The Material Safety Data Sheet is furnished without charge to responsible persons who use it at their discretion and risk. Although the information and suggestions contained herein have been compiled from sources believed to be reliable, there is no warranty of any kind, express or implied, as to the completeness or accuracy thereof.

II—HAZARDOUS INGREDIENTS

The product is a blend of triethylenediamine (20%) and dimethylethanolamine (80%). The product is a combustible liquid and is irritating to the eyes and skin.

Triethylenediamine (TEDA) is a primary eye irritant, but not a primary skin irritant when tested on albino rabbits. Dermatitis due to TEDA has been reported in rare cases. Acute TEDA toxicity tests on animals yielded the following results:

Acute Oral LD ₅₀	700 mg/kg (in rats)
Acute Dermal LD ₅₀	> 2,000 mg/kg (in rabbits)
Acute Inhalation LC ₅₀	> 2 mg/l (in rats)

Dimethylethanolamine (DMEA) is a recognized central nervous system stimulant, and is a normal constituent in the brain, possibly a precursor of brain acetylcholine. Persons susceptible to epileptic seizure may have a lowered threshold to the central nervous system effect of DMEA. Toxicological studies of the effect of DMEA on animals have produced the following results:

Acute Oral LD ₅₀	2,340 mg/kg (in rats)
Acute Dermal LD ₅₀	1,370 mg/kg (in rabbits)

III—PHYSICAL DATA

Appearance	Pale yellow liquid
Odor	Ammonia-like; fishy
pH in Water	Alkaline
Solubility in Water	100 ml/100 ml water
Boiling Point	137°C

Specific Gravity
(H₂O = 1) 0.916 20/20°C

Viscosity
(centistokes)
@ 77°F 5.17

IV—FIRE AND EXPLOSION DATA

Flash Point
(Tag Open cup) 124°F (51°C)

The product is a Class II combustible liquid according to Occupational Safety and Health Administration (OSHA) standards (29 CFR1910) and is a moderate fire hazard when exposed to flame or spark.

Extinguishing Media

Fire is to be treated as a Class B fire. Such fires are best extinguished with water spray, dry chemical or carbon dioxide. Due to the solubility of the product, flooding with water will extinguish a fire but should only be done if the burning liquid and water run off are adequately contained.

Excessive inhalation of fumes should be avoided since nitrogen oxides and carbon monoxide will be produced upon combustion.

There are no unusual fire or explosion hazards.

V—HEALTH HAZARD INFORMATION

A Threshold Limit Value (TLV) for the product has not been established. There are no known reports of systemic occupational intoxication. Contact with the skin and eyes causes severe burns.

Toxicological Studies

Acute toxicity tests, as well as primary skin and eye irritation tests have been carried out on the product using methodology described in the Federal Hazardous Substances Act (see 16 CFR 1500.3, 1500.40, 1500.41, 1500.42) by an independent testing laboratory.

The results of these tests are given below:*

Acute Oral LD ₅₀	1,920 mg/kg (in rats)
Acute Dermal LD ₅₀	> 1,800 mg/kg (in rabbits)
Acute Inhalation LC ₅₀	> 20.1 mg/l (in rats)

An industrial chemical such as the product with the acute toxicity values shown above, would not require a toxic label according to the American National Standard for Precautionary Labeling of Hazardous Industrial Chemicals (ANSI Z129-1-1976).

The product is a primary skin irritant (16 CFR1500.41).

The product is a primary eye irritant (16 CFR1500.42).

The product may be a skin sensitizer upon prolonged and repeated contact, at low levels or when diluted.

The effects of acute exposure to humans are unknown but may be inferred from the animal testing. Chronic exposure effects are unknown.

*Air Products & Chemicals, Inc. data. Report available upon request

First Aid

Eye Contact: Immediately flush with copious quantities of water for a minimum of 15 minutes. Use fingers to assure that eye lids are separated and that eye is being irrigated. Call a physician.

Skin Contact: Wash exposed skin with copious quantities of water. Except in the most minor superficial and localized burns, cover the affected area with a sterile dressing or clean sheeting and transport victim for medical care. Control shock if present.

Inhalation: There has been no clinical experience with overexposure via the respiratory route. If such overexposure should occur, remove patient to fresh air. If breathing is

impaired, assisted respiration (e.g., mouth-to-mouth) may be necessary. Supplemental oxygen may be necessary. Seek medical advice.

Ingestion: In the event DABCO R-8020 catalyst is swallowed, administer 3-4 glasses of milk or water. DO NOT INDUCE VOMITING. Obtain medical care.

VI—REACTIVITY DATA

The product is stable. As a mixture (blend), the reactivity of the product is characteristic of both tertiary amines and aminoalcohols. Tertiary amines will give an alkaline reaction in water and form salts with acids with the generation of heat.

Combustion may generate toxic carbon monoxide and nitrogen oxide gases.

VII—SPILL OR LEAK PROCEDURES

Cuffed rubber gloves, rubber boots and splash goggles should be worn to prevent contact with skin and eyes.

Contain spilled material and pump into drums for disposal. Use an absorbant such as vermiculite to pick up as much remaining material as possible. Remove the final traces of material by diluting and washing with water. Contaminated water should be contained for proper disposal.

Waste Disposal

Incineration is the preferred method of disposal. Class I secured landfills are alternate routes for disposal where the state and EPA has granted approval.

Incineration will result in carbon monoxide and nitrogen oxide generation. Federal, state and local regulations may restrict disposal procedures.

Experience has shown that incineration of 3-5% by weight triethylenediamine solutions at temperatures of 1400-1600°F has been successful without detectable emission of nitrous oxides.

VIII—SPECIAL PROTECTION INFORMATION

Avoid contact with the eyes. Eye protection in the form of chemical safety goggles is recommended. Contact lenses should not be used by persons working with DABCO R-8020 Catalyst. Avoid contact with the skin. Cuffed rubber gloves, rubber boots and a lab apron are recommended. Wash hands thoroughly after handling or exposure. Avoid breathing of vapors or mists. Generally, where there is adequate ventilation, respiratory protection is unnecessary.

IX—SPECIAL PRECAUTIONS

Label

DABCO R-8020® CATALYST

DANGER!
CAUSES SEVERE BURNS
COMBUSTIBLE LIQUID

Avoid contact with eyes, skin and clothing.

Wash thoroughly after handling.

Avoid prolonged breathing of vapors.

Keep away from flames or sparks.

Launder or discard contaminated clothing.

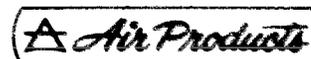
First Aid: In case of contact, immediately flush eyes and skin with plenty of water for at least 15 minutes. Call a physician.

Storage

Keep container tightly closed. Minimize exposure to atmosphere. Store in a cool, dry area away from oxidizing materials.

Regulatory Concerns

According to Department of Transportation (DOT) and International Air Transport Association (IATA) regulations, the proper shipping name for DABCO R-8020 catalyst is: CORROSIVE LIQUID, N.O.S.



MATERIAL SAFETY DATA SHEET

DABCO 33-LV®

Air Products and Chemicals, Inc.
P.O. Box 538
Allentown, PA 18105

EMERGENCY TELEPHONE NUMBERS

800-523-9374 (except Pennsylvania)
800-322-9092 (Pennsylvania only)

94 JUL 26 PM 3:53
RECEIVED

I—PRODUCT IDENTIFICATION

Manufacturing Site
Paulsboro, New Jersey

Product Contact
Product Manager
Chemical Additives Division

Sales Office
P.O. Box 538
Allentown, Pennsylvania 18105

Sales Phone
(215) 481-4911

Issue Date, Revision 1
1 April 1980

Trade Name
DABCO 33-LV®

Chemical Names and Synonyms
Solution of Triethylenediamine in
Dipropylene Glycol
TEDA and DPG
Urethane Catalyst

Chemical Family
Heterocyclic Amine and Diol Ether

Formula
 $C_6H_{12}N_2$ —TEDA
 $C_6H_{14}O_3$ —DPG

Chemical Abstract Registry Numbers
280-57-9 (for TEDA)
25265-71-8 (for DPG)

The Material Safety Data Sheet is furnished without charge to responsible persons who use it at their discretion and risk. Although the information and suggestions contained herein have been compiled from sources believed to be reliable, there is no warranty of any kind, express or implied, as to the completeness or accuracy thereof.

II—HAZARDOUS INGREDIENTS

DABCO 33-LV is a mixture of approximately 33% triethylenediamine and 67% dipropylene glycol.

III—PHYSICAL DATA

Appearance	Clear, colorless liquid
Odor	Ammonia-like
pH in Water	Slightly basic
Solubility in Water	Infinite
Vapor Pressure (mm Hg)	2 @ 100°F (38°C) 17 @ 200°F (93°C) 65 @ 300°F (149°C)
Viscosity, Brookfield Model LVF	
Spindle #1 - 6 rpm	
cps @ 36°F (2°C)	700
cps @ 75°F (24°C)	100
Density (g/cc)	1.03 @ 75°F
Density (lbs/gal)	8.59 @ 75°F

IV—FIRE AND EXPLOSION DATA

Flash Point
(Pensky-Martens Closed Cup) > 230°F

The product is not classified as a combustible liquid. Nevertheless, it will burn.

Extinguishing Media

A DABCO 33-LV catalyst fire is to be treated as a Class B fire. Such fires are best extinguished with water spray, foam, dry chemical or carbon dioxide. Due to the infinite solubility of the product, flooding with water will extinguish a fire but this should be done only if the water runoff is adequately contained.

Nitrogen oxides and carbon monoxide will be produced upon combustion. Inhalation of fumes, vapors, and combustion products should be avoided. There are no unusual fire or explosion hazards.

V—HEALTH HAZARD INFORMATION

A Threshold Limit Value (TLV) for DABCO 33-LV catalyst has not been established. There

are no known reports of systemic occupational intoxication. The product is irritating to the eyes.

Toxicological Studies

Acute toxicity tests, as well as primary skin and eye irritation tests on DABCO 33-LV catalyst, using methodology described in the Federal Hazardous Substances Control Act (see 17CFR1500.3, 1500.40, 1500.41, 1500.42), have been conducted. The results of these tests are shown below:

Acute Oral Toxicity (LD₅₀) 3800 mg/kg (in rats)
Acute Dermal Toxicity (LD₅₀) > 2000 mg/kg (in rabbits)
Acute Inhalation Toxicity (LC₅₀) > 10 mg/l (in rats)

An industrial chemical such as DABCO 33-LV catalyst, with the acute toxicity values shown above and with mists or vapor concentrations in excess of 10 mg/l, not likely to be encountered by humans when the product is used in any reasonable foreseeable manner, would not require a toxic label according to the American National Standard for Precautionary Labeling of Hazardous Industrial Chemicals (ANSI Z129-1-1976).

DABCO 33-LV catalyst is not a primary skin irritant (Federal Hazardous Substances Control Act, 16CFR1500.41).

DABCO 33-LV catalyst is an *eye irritant* (Federal Hazardous Substances Control Act, 16CFR1500.42).

The product may be a skin sensitizer upon prolonged or repeated contact.

DABCO 33-LV catalyst, in an Ames mutagenicity test using Salmonella Strain TA-100, gave a negative mutagen response with and without S-9 activation.

The effects of acute exposure to humans are unknown but may be inferred from animal testing.

Comprehensive physical examinations (including chest X-rays, studies of pulmonary function, blood chemistry, and hematology) of persons engaged in the synthesis of DABCO and DABCO 33-LV catalysts for varying

time intervals up to 12 years have revealed no physical abnormalities attributable to occupational exposure.

First Aid

Eye Contact: Immediately flush with copious quantities of water for a minimum of fifteen minutes. Use fingers to assure that eyelids are separated and that eye is being irrigated. Call a physician.

Skin Contact: Wash exposed skin with copious quantities of water.

Inhalation: There has been no clinical experience with overexposure via the respiratory route. If such overexposure should occur, prudent practice would dictate removal of the patient to fresh air. If breathing is impaired, assisted respiration (e.g., mouth-to-mouth) may be necessary. Supplemental oxygen may be needed. Seek medical advice.

Ingestion: The consequences of the ingestion of large amounts in man are unknown; however, in such cases it is recommended that the stomach be emptied by induced vomiting or gastric suction. Medical advice should be obtained if ingestion has occurred. Note: Product contains glycols which may cause kidney injury if ingested.

VI—REACTIVITY DATA

The product is stable but is hygroscopic. Its reactivity is characteristic of both tertiary aliphatic amines and aliphatic diols. Tertiary aliphatic amines will give an alkaline reaction in water and form salts with acids with the generation of heat.

Combustion may generate toxic carbon monoxide, carbon dioxide and nitrogen oxide gases.

VII—SPILL OR LEAK PROCEDURES

If material is released or spilled, avoid contamination of surface waters, ground waters and drinking supplies.

Spilled material should be contained and pumped into steel containers for recovery or waste disposal. Vermiculite absorbent should be spread over the spill area to absorb

as much remaining product as possible. Scoop up solid absorbent for waste disposal. The area should then be washed down to dilute and remove remaining traces of material.

Waste Disposal

Incineration is the recommended disposal method, providing available facilities and procedures are in compliance with federal and local environmental pollution abatement laws and regulations. The potential for carbon monoxide and nitrogen oxide generation must be recognized.

VIII—SPECIAL PROTECTION INFORMATION

Avoid contact with the eyes. Eye protection in the form of chemical safety goggles is recommended. Contact lenses should not be used by persons who work with DABCO 33-LV catalyst. Avoid prolonged or repeated contact with the skin. Cuffed rubber gloves are recommended. Wash hands thoroughly after handling or exposure. Launder or discard contaminated clothing.

Generally, respiratory protection is unnecessary provided there is adequate ventilation. In unventilated areas, a cartridge mask National Institute for Occupational Safety and Health (NIOSH) approved for organic vapors is recommended. During emergencies, a self-contained breathing apparatus should be worn.

IX—SPECIAL PRECAUTIONS

Label

DABCO 33-LV® Catalyst

WARNING!

CAUSES EYE IRRITATION

Avoid contact with skin and eyes.
Avoid breathing vapors or mist.
Wash thoroughly after handling or exposure.
Launder or discard contaminated clothing.

FIRST AID: In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Call a physician.

Storage

Keep container tightly closed. Minimize exposure to atmosphere. Store in cool, dry area.

X—REGULATORY CONCERNS

DABCO 33-LV catalyst is not a restricted article under Department of Transportation or International Air Transport Association regulations.

Xi—REFERENCES

Air Products and Chemicals, inc. "DABCO® Catalyst." Material Safety Data Sheet, 1978.

Air Products and Chemicals, Inc. "DABCO 33-LV® Liquid Urethane Foam Catalyst." Technical Bulletin, 1975.

Dow Chemical Company. "Dipropylene Glycol." Material Safety Data Sheet, 1974.

Goldberg, M.E. and Johnson, H.E. "Autonomic Ganglion Activity and Acute Toxicologic Effects of N, N, N', N'-Tetramethyl-1, 3-Butanediamine and Triethylenediamine, Two Foam-Catalyst Amines." Toxicology and Applied Pharmacology, Vol. 4, 1962, p. 522-545.

Klauder, J. "Patch Test Study to Determine Cutaneous Reaction to New Compounds." Archives of Environmental Health, Vol. 1, 1960, pp. 407-416.

National Institute for Occupational Safety and Health. Registry of Toxic Effects of Chemical Substances, 1976, pp. 1520.

Patty, F.A. Toxicology. Industrial Hygiene and Toxicology, Vol. 2. John Wiley and Sons: New York, 1958.



Contains No CBI



MATERIAL SAFETY DATA SHEET

Air Products and Chemicals, Inc.

P.O. Box 538
Allentown, PA 18105

EMERGENCY TELEPHONE NUMBERS

800-523-9374 (except Pennsylvania)
800-322-9092 (Pennsylvania only)

DABCO® S-25 Catalyst

I—PRODUCT IDENTIFICATION

Manufacturing Site
Paulsboro, New Jersey

Business Contact
Product Manager
Chemical Additives
Performance Chemicals Division

Sales Office
P.O. Box 538
Allentown, Pennsylvania 18105

Sales Phone
(215) 481-4911

Issue Date, Revision 1
1 November 1981

Trade Name
DABCO® S-25 Catalyst

Chemical Names and Synonyms
Mixture of Triethylenediamine and
1,4-Butanediol

Chemical Family
Tertiary Amine and Alcohol

Formula
 $C_6H_{12}N_2 + C_4H_{10}O$

Chemical Abstract Registry Numbers
For Triethylenediamine: 280-57-9
For Butanediol: 110-63-4

RECEIVED
JUL 26 PM 3:52

This Material Safety Data Sheet is furnished without charge to responsible persons who use it at their discretion and risk. Although the information and suggestions contained herein have been compiled, as of the issue date above, from sources believed to be reliable, there is no warranty of any kind, express or implied, as to the completeness or accuracy thereof.

II—HAZARDOUS INGREDIENTS

The product is a liquid mixture of 25% triethylenediamine and 75% 1,4-butanediol. As an industrial chemical mixture, the product does not require a toxic label. It does cause severe eye irritation.

III—PHYSICAL DATA

Appearance	Light amber liquid
Odor	Slight, ammonia-like
Specific Gravity (H ₂ O=1)	1.024 @ 25°C
Brookfield Viscosity @ 23°C	132 cps
Solubility in Water	Miscible

IV—FIRE AND EXPLOSION DATA

Flash Point (Setflash)	226°F (108°C)
---------------------------	---------------

DABCO S-25 catalyst is a Class III B combustible liquid and requires substantial heating (to a temperature greater than 225°F) for ignition to occur (see Occupational Safety and Health Administration (OSHA) Standard 29 CFR 1910.106).

Extinguishing Media

Use water, carbon dioxide (CO₂), or dry chemical.

Special Fire Fighting Instructions

Firemen must wear a self-contained air breathing apparatus to prevent inhalation of toxic nitrogen oxides given off when the product burns.

V—HEALTH HAZARD INFORMATION

DABCO S-25 catalyst is a liquid at room temperature and pressure. Contact with the eyes will cause severe irritation. Exposures to DABCO S-25 catalyst sufficient to cause intoxication are unlikely to occur in industrial atmospheres.

Toxicological Studies

Acute toxicity tests, as well as primary skin and eye irritation tests, have been conducted on DABCO S-25 catalyst by an independent laboratory using methodology described in the Federal Hazardous Substances Act (see 16 CFR 1500.3, 1500.40, 1500.41, 1500.42). The results of these tests are given below:*

Acute Oral Toxicity LD ₅₀	2800 mg/kg (in rats)
Acute Dermal Toxicity LD ₅₀	> 1000 mg/kg (in rabbits)
Acute Inhalation Toxicity LC ₅₀	> 20 mg/l (in rats)

An industrial chemical such as DABCO S-25 catalyst, with the acute toxicity values shown above, would not require a toxic label according to the American National Standard for Precautionary Labeling of Hazardous Industrial Chemicals (ANSI Z129.1-1976).

DABCO S-25 catalyst is an eye irritant (16 CFR 1500.42).

DABCO S-25 catalyst is not a primary skin irritant (16 CFR 1500.41).

The product may be a skin sensitizer upon prolonged and repeated contact.

The effects of acute exposure to humans are unknown, but may be inferred from the animal testing. There is no evidence that prolonged or repeated exposure of humans to low concentrations of DABCO S-25 catalyst has any chronic effect.

First Aid

Eye Contact: If even minute quantities of DABCO S-25 enter the eyes, the eyes should be irrigated immediately with copious quantities of water for a minimum of 15 minutes. The eyelids should be held open and away from the eyeball during the irrigation to ensure contact of water with all the tissues of the surface of the eye and lids. A physician, preferably an eye specialist, should be called promptly.

*Air Products and Chemicals, Inc. data. Report available upon request.

No ointment or other preparation should be used unless ordered by a physician.

Skin Contact: Wash exposed skin with soap and large quantities of water.

Inhalation: There has been no clinical experience with overexposure. If respiratory overexposure should occur, remove patient to fresh air. If breathing is impaired, assisted respiration (e.g. mouth-to-mouth) or supplemental oxygen may be indicated; seek medical advice.

Ingestion: The consequences of ingestion in man are unknown; however, in such cases it is recommended that the stomach be emptied by induced vomiting or gastric suction. Medical advice should be obtained if ingestion has occurred. The LD₅₀ of DABCO S-25 catalyst for rodents is in excess of 2000 mg/kg; serious accidental systemic poisoning by the oral route is considered unlikely in the industrial environment.

VI—REACTIVITY DATA

The product is stable at ambient temperatures and pressure. It is hygroscopic. Its reactivity is characteristic of both tertiary aliphatic amines and aliphatic diols. Tertiary aliphatic amines will give an alkaline reaction in water and form salts with acids with the generation of heat.

Combustion may generate toxic carbon monoxide and nitrogen oxide(s) gases.

VII—SPILL OR LEAK PROCEDURES

If material is released or spilled, prevent contamination of surface waters, ground waters, and drinking water supplies. Cleanup personnel must wear chemical splash goggles. Pooled material should be pumped into steel containers for recovery or disposal. Vermiculite absorbent or sawdust should be spread over the spill area to absorb as much remaining product as possible. Scoop up solid absorbent for waste disposal. Wash down the area with water to dilute and remove remaining traces of material.

Waste Disposal

Incineration is the recommended disposal method. The potential for generating nitrogen oxide(s) must be recognized.

VIII—SPECIAL PROTECTION INFORMATION

Chemical splash goggles and cuffed rubber gloves should be worn to provide protection from product contacting the eyes and skin. Wash thoroughly after handling. Properly designed emergency eyewash fountains should be placed in convenient locations wherever DABCO S-25 catalyst is used, and all employees should be familiar with the locations and operation of such equipment.

Respiratory protection is generally unnecessary provided there is adequate ventilation.

IX—SPECIAL PRECAUTIONS

Label

DABCO® S-25 Catalyst WARNING! CAUSES EYE IRRITATION

Avoid contact with eyes and skin.

Wash thoroughly after handling or exposure.

Avoid breathing vapors or mist.

First Aid: In case of contact, immediately flush eyes with copious quantities of water for at least 15 minutes. Call a physician.

Handling and Storage

Wear splash goggles and cuffed rubber gloves when handling the product.

Keep container tightly closed. Minimize exposure to atmosphere.

Regulatory Concerns

The product is not a restricted article according to Department of Transportation (DOT) and International Air Transport Association (IATA) regulations.

