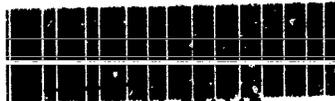


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Chemical Category		TRIETHYLAMINE; DABCO	

Chemicals Group
Air Products and Chemicals, Inc.
Box 538
Allentown, PA 18105
Telephone (215) 481-4911



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INIT 07/26/94



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00 115 AIR PRODUCTS

16 March 1988

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B

Mr. Robert Brink
Executive Secretary
TSCA Interagency Testing
Committee (TS-792)
Environmental Protection Agency
401 M Street, S.W.
Washington, DC 20460

Contains No CBI

Dear Mr. Brink:

In response to the ITCs request for information on tertiary amines in the Federal Register notice of Wednesday, 24 February 1988, I have enclosed our current Material Safety Data Sheet on Triethylamine which is synonymous with N,N-diethylethanamine, CASRN 121448.

Very truly yours,

Eugene I. Handwerk
Manager, Product Safety

EIH:mcs
7851L

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MAIL ROOM



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

MATERIAL SAFETY DATA SHEET

AIR
PRODUCTS 

EMERGENCY TELEPHONE NUMBERS
800-923-9374 (except PA) 800-322-9092 (PA only) 215-481-4911 (outside U.S.A.)

TRIETHYLAMINE

I--PRODUCT IDENTIFICATION

Manufacturing Site

U.S. Highway 90, Pace, Florida
St. Gabriel, Louisiana

Chemical Names and Synonyms

TEA
TEN
N,N-Diethylethanamine

Business Contact

Amines Business Area Manager
Industrial Chemicals Department

Chemical Family

Alkylamines
Aliphatic Amines

Sales Office

P.O. Box 538
Allentown, Pennsylvania 18105

Formula

$(\text{CH}_3\text{CH}_2)_3\text{N}$
 $\text{C}_6\text{H}_{15}\text{N}$

Sales Phone

(215) 481-4911

Chemical Abstract Registry Numbers

121-44-8

Issue Date, Revision 3

April 1983

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 single component liquid. The liquid and its vapors are severe irritants to the skin; eyes, and mucous membranes of the respiratory tract. Contact with the liquid may cause burns.

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

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

III--PHYSICAL DATA

Appearance	Colorless liquid
Odor	Strong, ammonia-like
pH	Basic in water
Solubility in Water(g/100cc) @ 68°F	1.5
Other Solvents	Acetone, benzene
Boiling Point	191.8°F (89.5°C)
Melting Point	(-175°F)(-114.8°C)
Vapor Pressure	53.5 mm Hg @ 68°F
Vapor Density (Air=1)	3.49
Specific Gravity (H ₂ O=1)	0.7275 @ 68°F
Percent Volatile by Volume	100
Evaporation Rate (Butyl acetate = 1)	1.0

IV--FIRE AND EXPLOSION DATA

Flash Point (Tag Open Cup)	25°F (-4°C)
Flammable Limits in Air	Lower 1.2%; Upper 8.0%

MATERIAL SAFETY DATA SHEET



The product is a volatile, extremely flammable liquid (by DOT classification) that releases vapors forming flammable mixtures in air and is dangerous when exposed to spark or flame. Vapors are heavier than air and are capable of traveling considerable distances to an ignition source causing a flashback.

Extinguishing Media:

Fires are Class B. Recommended extinguishers are carbon dioxide, dry chemical, alcohol foam or water fog. 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 Fire Fighting Procedures:

Fire fighters 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 VII).

Combustion products may be toxic (see Section VI).

V--HEALTH HAZARD INFORMATION

A Threshold Limit Value--Time Weighted Average (TLV-TLV, 8 hrs.) is 25 ppm--OSHA Standard. The American Conference of Governmental Industrial Hygienists (ACGIH) recommend a TLV = 10 ppm (TWA). Vapors cause irritation of the eyes, skin, and mucous membranes of the respiratory tract. Severe exposure may produce chemical pneumonitis, pulmonary edema and delayed scarring of the airway and other affected organs. Direct contact with the liquid causes burns.

Acute Toxicity Data:

Oral LD ₅₀	460 mg/kg (in rats)
Dermal LD ₅₀	570 mg/kg (in rabbits)
Inhalation LC ₅₀	>2.1 mg/l (508 ppm)(in rats)

The product is a severe eye irritant and demonstrates a trace of skin irritation when tested in rabbits.

MATERIAL SAFETY DATA SHEET

According to the definitions provided by the American National Standard for Precautionary Labeling of Hazardous Industrial Chemicals (ANSI Z-129.1-1976), the product requires a toxic label for ingestion and skin absorption.

Overexposure to the product may cause severe coughing and chest pain due to irritated air passages and lung edema. One may also experience skin and eye irritation accompanied by edema of the cornea.

Medical conditions aggravated by overexposure: May aggravate, through irritation, disorders of the skin or respiratory tract. May provoke asthmatic response in persons with asthma who are sensitive to airway irritants.

FIRST AID

Eye Contact:

NOTE: CONTACT LENSES SHOULD NOT BE USED BY PERSONS POTENTIALLY EXPOSED TO TRIETHYLAMINE.

Flush eyes IMMEDIATELY with large volumes of water for 15 minutes. Use fingers to assure that eyelids 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.

Contaminated leather wear (e.g. shoes and belts) should 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 mucus 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:

Triethylamine 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

MATERIAL SAFETY DATA SHEET



exposure. There is no specific treatment. Clinical management is based upon supportive treatment, which is similar to that for thermal burns.

VI--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, triethylamine 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 triethylamine 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.

VII--SPILL OR LEAK 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.

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MATERIAL SAFETY DATA SHEET



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. Product is slightly soluble in water and will float while slowly going into solution.

Triethylamines has a low odor threshold. Conveying of waste products should be done with dilute solutions at less than 75° and/or in closed systems.

Spills greater than 5000 pounds to navigable waterways must be reported to the National Response Center.

Waste Disposal:

Contain all contaminated water for disposal.

Most aliphatic amine compounds, such as propylamine, 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. However, do not dump waste product into municipal sewers or enclosed drains where entrapped product vapors may present an explosion hazard.

Contaminated liquids may be diluted to less than 50 ppm with large volumes of water and feed into a wastewater system designed for amines or similar compounds. Note: product is alkaline in water. Shock concentrations of amines to biological systems may cause the biomass to become inactive.

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

VIII--SPECIAL PROTECTION INFORMATION

Work areas must be well ventilated to maintain vapor concentration below 25 ppm. Local exhaust ventilation is required. 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 15 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 EXPOSED TO TRIETHYLAMINE.

Hands and Body:

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

MATERIAL SAFETY DATA SHEET

IX--SPECIAL PRECAUTIONS

Label:

UN1296

TRIETHYLAMINE

WARNING! FLAMMABLE!
HARMFUL IF INHALED
HARMFUL IF ABSORBED
THROUGH SKIN
HARMFUL IF SWALLOWED
CAUSES EYE IRRITATION

Keep away from heat, sparks, and open flame.

Keep container closed.

Do not breath vapor.

Use only with adequate ventilation.

Avoid contact with eyes, skin, and clothing.

Wash thoroughly after handling.

First Aid: In case of contact, immediately remove contaminated clothing, including shoes, and flush skin or eyes with plenty of water for at least fifteen minutes. For eyes, get medical attention. Wash clothing before reuse. Discard contaminated shoes.

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, water fog or alcohol foam. In case of spill or leak, flush area with water spray.

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.

X--Regulatory Concerns:

The Department of Transportation (DOT) proper shipping name is Triethylamine, Flammable liquid UN1296; (RQ-5000).

MATERIAL SAFETY DATA SHEET

DABCO®

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)

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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 October 1980

Trade Name
DABCO®

Chemical Names and Synonyms
1, 4-Diazabicyclo (2,2,2) octane
Triethylenediamine

Chemical Family
Aliphatic Tertiary Amine

Formula
 $C_6H_{12}N_2$

Chemical Abstract Registry Numbers
280-57-9

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 high-purity chemical compound as identified in Sections I and III. A small amount of residual flammable volatile solvent is present. Exposure to static charge build up, sparks, excessive heat and open flames should be avoided.

The product is an eye irritant.

III—PHYSICAL DATA

Appearance	Hygroscopic, white crystals
Color	Ammoniacal
Purity	99.95% minimum on a water free, amines basis
Basicity in Aqueous Solution	$pK_{a1} = 2.95$ $pK_{a2} = 9.60$
Solubility in Water, g/100g Water	
@ 26°C	46
@ 45°C	127
@ 65°C	149
Crystal Structure	Hexagonal
Melting Point	159.8°C
Heat of Fusion, cal/mole	1776
Transition Point	77.9°C
Heat of Transition, cal/mole	2524
Boiling Point	174°C
Heat Capacity of Solid	
@ 25°C, cal/mole	36.49
Heat Capacity of Liquid	
@ 167°C, cal/mole	57.83
Heat of Sublimation	
Low Temp. Form, Kcal/mole	14.8
High Temp. Form, Kcal/mole	12.5
Vapor Pressure,	
50°C	2.9 mm Hg
70°C	11.2 mm Hg
90°C	33.8 mm Hg
110°C	83.4 mm Hg
130°C	187.5 mm Hg
150°C	390.9 mm Hg
Density, g/ml at 28°C	1.14

IV—FIRE AND EXPLOSION DATA

Flash Point (Pensky Martens Closed Cup) greater than 100°F (38°C).

The product is a solid material with a low vapor pressure. The product readily undergoes sublimation. The potential accumulation of flammable solvent vapors in the head space of unopened stored drums should be recognized and appropriate precautions exercised. Avoid static charge build up, sparks, excessive heat and open flames which could provide an ignition source for the solvent vapors released from freshly opened drums. The product will burn under conditions prevailing in a fire and would be classified as a combustible solid.

Extinguishing Media

Fire is to be treated as a Class A fire. Such fires are best extinguished with a water or water-based extinguisher to lower temperature of burning material, or by coating the burning combustibles with a "multi-purpose" dry chemical.

Avoid excessive inhalation of combustion gases since nitrogen oxides will be produced.

V—HEALTH HAZARD INFORMATION

A Threshold Limit Value for the product has not been established. There are no known reports of systemic occupational intoxication. Dermatitis due to the product has been reported only in rare cases.

Routes of Exposure

Exposure to the product is most likely to occur by contact with the skin. Although the vapor pressure is low, exposure to vapors at low levels at ambient temperatures and to dust is a possibility.

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). The results of these tests are given below:

Acute Oral Toxicity LD_{50}	700 mg/kg (in rats)
Acute Dermal Toxicity LD_{50}	>2000 mg/kg (in rabbits)
Acute Inhalation Toxicity LC_{50}	>4 mg/l (in rats)

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

An industrial chemical such as the product, with the acute toxicity values shown above, and with mists or vapor concentrations in excess of 2 mg/l, is not likely to be encountered by humans when used in any reasonably foreseeable manner, and 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 not a primary skin irritant (16 CFR 1500.41).

The product is a *primary eye irritant* (16 CFR 1500.42).

Supplemental toxicity tests gave the following results:

Acute Vapor Toxicity Tests: Mice exposed to an atmosphere saturated with the product vapor developed mild irritation of eyes and mucous membranes and changes in respiratory pattern. All signs of irritation disappeared rapidly when animals were removed from the test chamber. None of the animals died and no signs of toxic injury were observed during the subsequent observation period of two weeks.

Skin Absorption Test: Tests on albino rabbits indicate that the product is not absorbed through the skin or only in a minor degree.

Eye Irritation Test: A 3.3% aqueous solution of the product caused no irritation when introduced into the eyes of albino rabbits.

Skin Irritation Test: A 25% aqueous solution of the product covering a large part of the skin surface of rabbits did not cause irritation when applied for short periods of time. After having been in contact with the skin for 24 hours, two out of six rabbits showed moderate to severe irritation, while the remaining four rabbits exhibited only a mild reddening.

The same 25% aqueous solution was applied to the arms of six human test subjects. Four out of these six subjects had a marked or severe reaction to 24 hour contact. (The closed patch procedure used here is a very severe test.)

The application of a 3.3% aqueous solution to fifty male subjects gave two positive reactions on first application. Early irritation was apparent in one

subject on the second application of a 1.65% solution. On continued application (twelve times) of a 1.65% solution, the skin became intolerant (fati-gued) in three subjects. No true allergic re-action was observed.

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

First Aid

Eye Contact: Immediately flush eyes with plenty of water for at least 15 minutes. Call a physician.

Skin Contact: Wash exposed skin with plenty of water.

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 indicated. Supplemental oxygen may be indicated. 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.

VI—REACTIVITY DATA

Product is stable and very hygroscopic. Reactivity is characteristic of tertiary aliphatic amines (i.e., it will give an alkaline reaction in water and form salts with acids with the generation of heat).

VII—SPILL OR LEAK PROCEDURES

If material is released or spilled, scoop up the solid material and place in drums or other containers for disposal or recovery. Clean the spill area with water.

Waste Disposal

Incineration is the recommended disposal method, providing such procedures are in compliance with federal, state 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 is recommended.

Avoid prolonged or repeated contact with skin. Protective gloves are recommended. Wash hands, and exposed skin thoroughly after handling.

Keep container tightly closed. Avoid breathing dust. In confined areas, masks of the cartridge type, National Institute for Occupational Safety and Health (NIOSH) certified for amines or organic vapors, are recommended. Generally, respiratory protection is unnecessary provided there is adequate ventilation.

IX—SPECIAL PRECAUTIONS

Label

DABCO®
WARNING! CAUSES EYE IRRITATION
COMBUSTIBLE

Avoid contact with eyes.

Wash thoroughly after handling.

Keep away from heat, sparks and flame.

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

Special Handling

Avoid contact with eyes or skin. Wash thoroughly after handling. Wear eye goggles and dry gloves when handling.

Storage

Store in a cool, dry place away from open flames and sparks. Keep container tightly closed and free from moisture.

Special Packaging

Twelve-gallon level-pack fiber drums, 25 kg.

Regulatory Concerns

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

The logo for Air Products, featuring a stylized 'A' inside a circle followed by the words 'Air Products' in a script font.

Printed in U.S.A. MSDS-0127