

MATERIAL SAFETY DATA SHEET

Date prepared: November 9, 1999

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1. Product and Company Identification

PRODUCT IDENTIFIER: **Triethylborane (TEB)**

PRODUCT USE: Chemical intermediate

MANUFACTURED BY: Callery Chemical Company
Division of Mine Safety Appliances Company
PO Box 429; Pittsburgh, PA 15230
Callery Customer Service: 1-412-967-4141
Callery 24-Hour Telephone: 1-412-967-4100
Transportation Emergency: 1-800-424-9300 in USA or 1-703-527-3887 outside USA

2. Composition/Information on Ingredients

	<u>wt%</u>	<u>Synonym(s)</u>
Triethylborane (CASRN: 97-94-9)	>99 wt%	TEB

OSHA REGULATORY STATUS: Hazardous by definition of Hazard Communication Standard, 29 CFR 1910.1200.

Indications of danger (Annex II): Highly flammable, Harmful

Nature of special risk attributed to dangerous substances (Annex III): R17, R34, R22

Safety advice concerning dangerous chemical substances (Annex IV): S6, S7/8, S23, S36, S43, S33

3. Hazards Identification

EMERGENCY OVERVIEW: Clear, colorless liquid with pungent odor. Pyrophoric liquid. Extremely flammable. Catches fire if exposed to air. Causes severe eye, skin, and respiratory tract burns. Vapor may cause respiratory tract irritation and central nervous system effects such as excitation. Harmful if swallowed.

PHYSICAL HAZARDS: Pyrophoric liquid. Extremely flammable. Catches fire if exposed to air.

POTENTIAL HEALTH EFFECTS: Causes eye, skin, and respiratory tract burns.

Primary Routes of Entry: Eye and skin contact, inhalation, ingestion

Target Organs: Eyes, skin, respiratory tract, central nervous system

Medical Conditions Generally Recognized as Aggravated by Exposure: Persons with preexisting skin and respiratory conditions may be more susceptible to the effects of this product.

Carcinogenicity: Triethylborane is not listed in the National Toxicology Program (NTP) Annual Report on Carcinogens, not found to be a potential carcinogen in the International Agency for Research on Cancer (IARC) Monographs, and not listed as an OSHA carcinogen.

POTENTIAL ENVIRONMENTAL EFFECTS: No environmental toxicity data for the product.

4. First Aid Measures

CAUSES THERMAL BURNS! SEND TO A PHYSICIAN IN ALL CASES.

Eyes: Immediately flush eyes with plenty of water for at least 20 minutes while holding eyelids open.

Skin: Immediately flush skin with plenty of cool water for at least 20 minutes while removing contaminated clothing and shoes. Dispose of contaminated clothing and shoes in compliance with all local, state, and federal laws and regulations.

Ingestion: For any accidental contamination of the mouth, gargle with water and rinse mouth thoroughly for at least 20 minutes. If swallowed, do not induce vomiting. Give demulcent such as milk, olive oil, or margarine in small amounts up to 2 or 3 ounces. Never give anything by mouth to an unconscious person.

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

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5. Fire Fighting Measures

FLAMMABLE PROPERTIES: Pyrophoric liquid. Extremely flammable. Catches fire if exposed to air.

Flashpoint (Setaflash closed cup): <0°C/<32°F

Flammable Limits: Spontaneous ignition in air at partial pressures of approximately one mm Hg (1300 ppm)

Autoignition Temperature: -20°C/-4°F

EXTINGUISHING MEDIA: Shut off source as soon as possible without risk. Control and confine the fire. Use water spray to control heat and protect equipment. If practical, allow fire to burn itself out. Temporary control may be obtained with foam, water spray, dry chemical, or carbon dioxide; but TEB may reignite when extinguisher is discontinued. DO NOT use halogenated fire extinguishing agents.

UNUSUAL FIRE AND EXPLOSION HAZARDS: Catches fire if exposed to air. Detonations or violent reactions may occur when mixed with strong oxidizing agents or halogenated hydrocarbons. TEB floats on water and use of water as an extinguishing agent may spread the fire. TEB burns with a green and yellow flame and produces a dense black smoke.

PROTECTION OF FIRE FIGHTERS: Wear full protective clothing, including protective gloves and boots. For respiratory protection, wear a NIOSH approved self-contained breathing apparatus with full facepiece operated in a positive-pressure mode.

6. Accidental Release Measures

PROCEDURES FOR CLEANUP: Wear recommended personal protective equipment. Be prepared to fight fire.

Eliminate ignition sources. Spills of TEB will ignite. See Section 5, "Fire Fighting Measures". Properly dispose of all residues immediately. Handle in compliance with all local, state, and federal laws and regulations.

7. Handling And Storage

HYGIENIC PRACTICES: Do not get in eyes, on skin, or on clothing. Wash thoroughly after handling. Keep container tightly closed. Do not breathe vapor or mist. Use only with adequate ventilation. Do not take internally.

STORAGE: Do not expose to air. Handle and store in a DRY closed system under DRY nitrogen gas. Do not store residues. Properly dispose of all residues immediately.

WORK PRACTICES: Keep away heat, sparks, flame, air, oxidizers, halogenated hydrocarbons, and combustible materials. Do not expose to air. Handle and store in a DRY closed system under DRY nitrogen gas in a cool, dry, well-ventilated area. Use only with clean, completely enclosed systems that have been purged with DRY nitrogen gas to inert containers, transfer lines, vessels, tanks, etc., such that the atmosphere stays below 3% oxygen. Use packless valves, welded piping, and other leakproof construction. Maintain a leakproof system. Use non-sparking tools when opening or closing containers. Bond and ground all systems when handling. Since empty containers retain product residue, follow label warnings even after container is emptied.

PROTECTIVE MEASURES DURING REPAIR AND MAINTENANCE OF CONTAMINATED EQUIPMENT: See Section 8.

8. Exposure Controls/Personal Protection

ENGINEERING CONTROLS: Maintain a leakproof system. Use packless valves, welded piping, and other leakproof construction. Use only with clean, completely enclosed systems that have been thoroughly purged with DRY nitrogen gas including containers, transfer lines, vessels, tanks, etc., such that the atmosphere stays below 3% oxygen. Handle in a DRY closed system under DRY nitrogen gas. Provide adequate local exhaust ventilation to minimize worker exposure. Prevent electrostatic charge buildup by using common bonding and grounding techniques.

EXPOSURE CONTROLS: None established for TEB.

PERSONAL PROTECTIVE EQUIPMENT:

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Normal Use & Handling: When exposure to eyes and skin is possible, wear chemical protective goggles with a faceshield and flame-retardant protective clothing. Glove permeation data does not exist for this product. Exposure limits have not been established for Triethylborane. When inhalation of vapor or mist is possible, wear a NIOSH-approved self-contained breathing apparatus with full facepiece operated in a positive-pressure mode. Eye wash and safety showers must be available and in good working order.

Emergency Handling: For firefighting, wear full protective clothing, including protective gloves and boots. For chemical spills, wear special protective clothing (vapor-protective suit with additional chemical flash fire escape protection, as specified in NFPA 1991). For respiratory protection, wear a NIOSH-approved self-contained breathing apparatus with full facepiece operated in a positive-pressure mode.

9. Physical And Chemical Properties

APPEARANCE: Clear, colorless liquid

ODOR: Pungent odor

FREEZING POINT: -135°F/-93°C

BOILING POINT: 95°C/203°F

VAPOR PRESSURE @ 20°C: 42.6 mm Hg

REID VAPOR PRESSURE @ 100°F: 14 psia

DENSITY @ 25°C: 0.68 gm/cm³

VISCOSITY @ 25°C: 0.30 centipoise

HEAT OF COMBUSTION: 20,230 BTU/pound (net); 115,500 BTU/gallon (net)

STABILITY TO AIR: Liquid will ignite when exposed to air

STABILITY TO WATER: No reaction, immiscible

STABILITY TO HEAT: Slow decomposition begins above 200°F/93.3°C

MOLECULAR WEIGHT: 98

FORMULA: (C₂H₅)₃B

10. Stability And Reactivity

STABILITY (CONDITIONS TO AVOID): Stable. Keep away from heat, sparks, and flame.

INCOMPATIBILITY (SPECIFIC MATERIALS TO AVOID): Air, oxidizers, halogenated hydrocarbons, temperatures above 200°F/94°C (slow decomposition above this temperature; rate reported to be 4% in 60 hours at 212°F/100°C).

HAZARDOUS DECOMPOSITION PRODUCTS: Carbon monoxide, carbon dioxide, boron compounds

HAZARDOUS POLYMERIZATION: Not expected to occur.

11. Toxicological Information

TEB is pyrophoric and exposure can cause eye, skin, and mucous membrane burns.

Oral LD50 for rat of 235 mg/kg; toxic to animals when dose was administered directly into the stomach; unlikely that humans could be exposed to toxic oral dose since liquid TEB is pyrophoric. Inhalation LC50 rat of 700 ppm (four hours exposure), is not defined as toxic or highly toxic via inhalation route; vapor is pyrophoric at 1300 ppm. No dermal toxicity, skin or ocular irritation, or skin sensitization testing reported because exposure to skin and eyes would cause immediate, deep burns and subsequent scarring if not treated immediately.

Animals exposed to low non-pyrophoric concentrations of TEB in air became excited and had nasal irritation; at high concentration, some animals frothed at the mouth and/or nose, had convulsions. Death occurred in some animals but not all which showed frothing or had convulsions. Humans would be expected to have irritation of nose, throat, and mucous membranes and central nervous symptoms. Liquid splashed on the skin or in the eyes is expected to cause a fire and burns.

TOXICOLOGY DATA: For triethylborane, LD50(oral-rat)= 235 mg/kg
LC50(inh-rat)= 700 ppm/4H

12. Ecological Information

ECOLOGICAL DATA: No environmental toxicity data for the product.

13. Disposal Considerations

WASTE DISPOSAL: Do not flush to sewer. Dispose in compliance with all local, state, and federal laws and regulations.

14. Transport Information

UPS and air shipments are forbidden.

HAZARDOUS MATERIALS/DANGEROUS GOODS CLASSIFICATION:

Proper Shipping Name: Pyrophoric liquid, inorganic, n.o.s. (triethylborane)
Hazard Class: 4.2
Packaging Group: I
Identification Number: UN3194
Labels: Spontaneously combustible

15. Regulatory Information

TSCA: Triethylborane is listed on the TSCA Public Inventory.

SARA 313 INFORMATION: Triethylborane does not contain a toxic chemical or chemicals subject to the reporting requirements of section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 and 40 CFR 372.

CERCLA/SUPERFUND: Contains no CERCLA Extremely Hazardous Substances.

EINECS: 202-620-9 for triethylborane

EUROPEAN LABEL INFORMATION:

Symbols: F, Xn

Indications of danger (Annex II): Highly flammable, Harmful

Nature of special risk attributed to dangerous substances (Annex III):

- R17 Spontaneously combustible in air.
- R34 Causes burns.
- R22 Harmful if swallowed.

Safety advice concerning dangerous chemical substances (Annex IV):

- S6 Keep under DRY nitrogen.
- S7/8 Keep container tightly closed and dry.
- S23 Do not breathe vapor.
- S36 Wear suitable protective clothing.
- S43 In case of fire, do not use halogenated fire extinguishing agents.
- S33 Take precautionary measures against static discharge.

NEW JERSEY: This product does not contain a chemical listed on the New Jersey Department of Health Hazard Right-to-Know Program Hazardous Substance List.

PENNSYLVANIA: This product does not contain a chemical subject to the Pennsylvania Worker and Community Right-to-Know Act.

16. Other Information

WARNING: This is a dangerous chemical product. By following the directions and warnings provided with this product, the dangers associated with the use of this product can be greatly reduced but never entirely eliminated. Callery Chemical Company makes no warranties, expressed or implied, with respect to this product and EXPRESSLY DISCLAIMS THE WARRANTY OF MERCHANTABILITY AND ANY WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE. Users assume all risks in handling, using or storing this product.

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