

BOC GASES
MATERIAL SAFETY DATA SHEET

Joe Johnson
Areal Katalios system 11/3/04

PRODUCT NAME: TRIMETHYL GALLIUM

1. Product and Company Identification

BOC Gases,
Division of,
The BOC Group, Inc.
575 Mountain Avenue
Murray Hill, NJ 07974

BOC Gases
Division of
BOC Canada Limited
5975 Falbourne Street, Unit 2
Mississauga, Ontario L5R 3W6

TELEPHONE NUMBER: (908) 464-8100
24-HOUR EMERGENCY TELEPHONE NUMBER:
CHEMTREC (800) 424-9300

TELEPHONE NUMBER: (905) 501-1700
24-HOUR EMERGENCY TELEPHONE NUMBER:
(905) 501-0802
EMERGENCY RESPONSE PLAN NO: 2-0101

PRODUCT NAME: TRIMETHYL GALLIUM
CHEMICAL NAME: Trimethyl Gallium
COMMON NAMES/SYNONYMS: TMG, Trimethylgallane, Trimethylgallium
TDG (Canada) CLASSIFICATION: 4.2
WHMIS CLASSIFICATION: B6, E, D2B

PREPARED BY: Loss Control (908)464-8100/(905)501-1700
PREPARATION DATE: 6/1/95
REVIEW DATES: 11/11/03

2. Composition, Information on Ingredients

EXPOSURE LIMITS¹:

INGREDIENT	% VOLUME	PEL-OSHA ²	TLV-ACGIH ³	LD ₅₀ or LC ₅₀ Route/Species
Trimethyl Gallium FORMULA: (CH ₃) ₃ Ga CAS: 1445-79-0 RTECS #: Not Available	100.0	Not Available	Not Available	Not Available

¹ Refer to individual state or provincial regulations, as applicable, for limits which may be more stringent than those listed here.

² As stated in 29 CFR 1910, Subpart Z (revised July 1, 1993)

³ As stated in the ACGIH 2003 Threshold Limit Values for Chemical Substances and Physical Agents

OSHA Regulatory Status: This material is classified as hazardous under OSHA regulations.

3. Hazards Identification

EMERGENCY OVERVIEW

Colorless liquid which is corrosive to exposed tissues. Inhalation of vapors may result in pulmonary edema and chemical pneumonitis. Exposure to this material may result in toxicity to the kidneys and bone marrow. Dangerous fire and explosion hazard. Spontaneously ignites in air. Contents under pressure. Use and store below 125 °F. Trimethyl gallium is being sold for research and development only. Physical hazards and health hazards have not been determined (See Section 16).

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ROUTE OF ENTRY:

Skin Contact Yes	Skin Absorption No	Eye Contact Yes	Inhalation Yes	Ingestion Yes
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HEALTH EFFECTS:

Exposure Limits No	Irritant Yes	Sensitization No
Teratogen No	Reproductive Hazard No	Mutagen No
Synergistic Effects None reported		

Carcinogenicity: -- NTP: No IARC: No OSHA: No

EYE EFFECTS: May cause severe burns of eye tissue and possible permanent damage.

SKIN EFFECTS: May cause severe burns and residual scarring of tissue. Deep painful burns may result from contact with pure product since it will spontaneously ignite upon contact with air and reacts violently with water. Exposure to fumes during decomposition or fire may produce skin rash.

INGESTION EFFECTS: Ingestion is unlikely; however, gastrointestinal burns may result.

INHALATION EFFECTS: Inhalation of fire decomposition products may cause metallic taste, irritation of mucous membranes and muscle weakness. Inhalation of pure product will cause burns of the upper respiratory tract and burns of the lung tissue, likely resulting in pulmonary edema and associated complications.

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE: May aggravate pre-existing eye, skin, and respiratory conditions.

POTENTIAL ENVIRONMENTAL EFFECTS: Ecotoxicity values were unavailable.

4. First Aid Measures

EYES: PERSONS WITH POTENTIAL EXPOSURE TO TRIMETHYL GALLIUM SHOULD NOT WEAR CONTACT LENSES. Immediately flush with water for at least 15 minutes including under the eyelids. Obtain immediate medical attention.

SKIN: Immediately remove contaminated clothing and any excess material off skin. Flush affected area with plenty of water and get medical attention.

INGESTION: DO NOT INDUCE VOMITING. PROMPT MEDICAL ATTENTION IS MANDATORY IN ALL CASES OF INGESTION SINCE DEEP PENETRATING BURNS ARE LIKELY.

INHALATION: PROMPT MEDICAL ATTENTION IS MANDATORY IN ALL CASES OF OVER EXPOSURE TO TRIMETHYL GALLIUM. RESCUE PERSONNEL SHOULD BE EQUIPPED WITH SELF-CONTAINED BREATHING APPARATUS. Conscious persons should be assisted to an uncontaminated area and inhale fresh air. Unconscious persons should be moved to an uncontaminated area and given artificial resuscitation and supplemental oxygen. Keep the victim warm and quiet. Assure that mucus or vomited material does not obstruct the airway by positional drainage. Delayed pulmonary edema may occur. Keep patient under medical observation for at least 24 hours.

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5. Fire Fighting Measures

Conditions of Flammability: This material spontaneously combusts in air		
Flash point: Not Available	Method: Not Applicable	Autoignition Temperature: Not Available
LEL(%): Not Available		UEL(%): Not Available
Hazardous combustion products: Oxides of gallium		
Sensitivity to mechanical shock: None		
Sensitivity to static discharge: Not Available		

FIRE AND EXPLOSION HAZARDS: PYROPHORIC! SPONTANEOUSLY IGNITES IN AIR. Reacts violently with water. Smoke may contain toxic oxides of gallium.

EXTINGUISHING MEDIA: Use dry chemical powder followed by dry sand or dolomite. Reacts violently with water. DO NOT USE WATER, FOAM OR HALOGENS. Reigniting may occur. Use caution when handling extinguished material.

FIRE FIGHTING INSTRUCTIONS: Wear self-contained breathing apparatus and full protective clothing with additional chemical protective clothing to prevent exposure. Use caution when cleaning up extinguished material since re-ignition may occur when material is disturbed. Avoid contact at all times. If material is splashed on clothing, remove as soon as possible.

For cylinders:

If possible, stop the flow of gas. Inerting the atmosphere to reduce oxygen levels may extinguish flame, allowing capping of leaking container. Do not attempt this unless specifically trained. Reduce the rate of flow and inject an inert gas, if possible, before completely stopping the flow to prevent flashback. Do not extinguish the fire until the supply is shut off as otherwise and explosive re-ignition may occur. If the fire is extinguished and the flow of gas continues, use increased ventilation to prevent build-up of explosive atmosphere. Ventilation fans must be explosion proof. Use non-sparking tools to close container valves.

Use water spray to cool surrounding containers. Be cautious of a Boiling Liquid Evaporating Vapor Explosion, BLEVE, if flame is impinging on surrounding containers. Direct 500 GPM water stream onto containers above liquid level with remote monitors. Limit the number of personnel in proximity to the fire. Evacuate surrounding areas to at least 3000 feet in all directions. Be alert of water runoff for environmental contamination.

6. Accidental Release Measures

Immediately isolate hazard area and evacuate all personnel from affected areas. Deny entry to unauthorized and unprotected individuals. Trimethylgallium is corrosive and may spontaneously ignite. Appropriate protective equipment is essential to prevent exposure (See Section 8). For cylinders: Stop the flow of gas or remove cylinder to outdoor location if this can be done without risk. Provide maximum explosion-proof ventilation and ventilate enclosed areas. Cover spill with dry sand or dolomite and allow to completely decompose or let fire burn out, if safe to do so. Place into appropriate container for disposal. Consult a HAZMAT specialist, the appropriate emergency telephone number listed in Section 1 and your closest BOC location. Do NOT use water.

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7. Handling and Storage

Store drums and cylinders upright in cool, dry, well-ventilated area of non-combustible construction away from heavily trafficked areas and emergency exits. Separate from incompatible materials including air, water, acids, and oxidizers. Outside or detached storage is preferred. Post "NO SMOKING" signs in storage and use areas. There should be no source of accidental ignition in storage and use areas.

Use only in areas equipped with appropriate ventilation systems. Keep container tightly closed when not in use. Protect full and empty containers from physical damage and heat. Do not weld on or near full or empty containers. Do not re-use empty containers. Empty containers contain product residue, recycle and dispose of accordingly. Segregate full and empty drums and cylinders. Use a "first in-first out" inventory system to prevent product from being stored for excessive periods of time. Do not drag, slide, or roll cylinders or drums. Use a suitable hand truck, drum truck or other appropriate equipment.

Valve protection caps must remain in place unless container is secured with valve outlet piped to use point. Use a pressure reducing regulator when connecting cylinder to lower pressure piping or systems. Do not heat cylinder by any means to increase rate of product from cylinder. Use a check valve or trap in the discharge line to prevent hazardous back flow into cylinder. Do not insert any object (i.e.: screwdriver) into valve cap openings as this can damage the valve causing leakage. Do not allow the temperature where cylinders are stored to exceed 125 °F (52 °C). Cylinders should be firmly secured to prevent falling or being knocked over. For additional recommendations consult Compressed Gas Association's Pamphlet P-1.

Wear flame resistant clothing when handling. Do not eat, drink, smoke, or apply cosmetics in areas where this product is used or stored. Do not store cigarettes, food or other personal items in storage and use areas. Wash hands and face thoroughly after handling and before meals and breaks. Change contaminated clothing promptly. Segregate contaminated clothing and launder appropriately. Shower at the end of the work shift.

Do not carry this product in an enclosed space such as a car trunk, van or station wagon. A leak can result in a toxic exposure.

8. Exposure Controls, Personal Protection

ENGINEERING CONTROLS: Use glove box or dry inert atmosphere to exclude oxygen.

EYE/FACE PROTECTION: Chemical safety goggles with full faceshield or full-facepiece respirator.

SKIN PROTECTION: Appropriate protective and chemical-resistant gloves, clothing and splash protection, or fully encapsulating vapor protective clothing. For materials of construction, consult protective clothing manufacturer's specific data. Wear heat and fire resistant gloves and flame resistant clothing when handling.

RESPIRATORY PROTECTION: For emergency release and conditions with exposures above the applicable exposure limits use a positive pressure NIOSH approved air-supplying respirator systems (SCBA or airline/escape bottle) using a full-face mask and at a minimum Grade D air.

OTHER/GENERAL PROTECTION: Safety shoes, safety shower, eyewash "fountain", face shield.

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9. Physical and Chemical Properties

PARAMETER	VALUE	UNITS
Physical state (gas, liquid, solid)	: Liquid	
Vapor pressure at 0 °C	: 64.5	psia
Vapor density (Air = 1)	: Not Available	
Evaporation point	: Not Available	
Boiling point	: Not Available	°F
	: 57.5	°C
Freezing point	: Not Available	°F
	: -15.8	°C
pH	: Not Available	
Specific gravity	: 1.1	
Oil/water partition coefficient	: Not Available	
Solubility (H ₂ O)	: Reacts violently	
Odor threshold	: Not Available	
Odor and appearance	: A colorless liquid	

10. Stability and Reactivity

STABILITY: Reactive

INCOMPATIBLE MATERIALS/CONDITIONS: Air, water, acids and oxidizers. Spontaneously flammable in air. Reacts violently with water, giving off flammable methane gas and gallium hydroxide.

HAZARDOUS DECOMPOSITION PRODUCTS: Thermal decomposition or combustion may result in release of CO, CO₂ and toxic oxides of gallium. Reaction with water liberates methane.

HAZARDOUS POLYMERIZATION: Will not occur

11. Toxicological Information

Radioactive and stable gallium compounds in therapeutic doses have been reported to cause dermatitis, gastrointestinal disturbance and bone marrow depression. Trimethylgallium may result in similar effects, however no information is available regarding systemic effects of trimethylgallium (See Section 16).

Gallium compounds have been shown to cause kidney damage in dogs when chronically injected intravenously; degenerative changes in the gastric glands and mucosa and kidney damage have occurred in mice when chronically treated subcutaneously.

12. Ecological Information

Product does not contain Class I or Class II ozone depleting substances. Ecotoxicity and bioconcentration data was unavailable.

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13. Disposal Considerations

Do not attempt to dispose of residual waste or unused quantities. Return in the shipping container PROPERLY LABELED, WITH ANY VALVE OUTLET PLUGS OR CAPS SECURED AND VALVE PROTECTION CAP IN PLACE to BOC Gases or authorized distributor for proper disposal.

Spill residues or product is regulated as a hazardous waste under RCRA ID # D001 or D003. Contact local, state or federal EPA for proper disposal.

14. Transport Information

PARAMETER	United States DOT	Canada TDG*
PROPER SHIPPING NAME:	Pyrophoric liquid, organic, n.o.s. (Trimethyl Gallium)	Pyrophoric liquid, organic, n.o.s. (Trimethyl Gallium)
HAZARD CLASS:	4.2	4.2
IDENTIFICATION NUMBER:	UN 2845	UN 2845
SHIPPING LABEL:	SPONTANEOUSLY COMBUSTIBLE, CORROSIVE	SPONTANEOUSLY COMBUSTIBLE, CORROSIVE

*Effective August 15, 2002

Packing Group: I

15. Regulatory Information

SARA TITLE III NOTIFICATIONS AND INFORMATION

SARA TITLE III - HAZARD CLASSES:

Acute Health Hazard
Chronic Health Hazard
Fire Hazard
Reactivity Hazard

SARA TITLE III - SECTION 313 SUPPLIER NOTIFICATION:

This product does not contain toxic chemicals subject to reporting requirements of section 313 of the Emergency Planning and Community Right-To-Know Act (EPCRA) of 1986 and of 40 CFR 372.

U.S. TSCA/Canadian DSL: All ingredients are listed on the U.S. Toxic Substances Control Act (TSCA) inventory or exempt from listing and on the Canadian Domestic Substance List (DSL).

California Proposition 65: This product does not contain ingredient(s) known to the State of California to cause cancer or reproductive toxicity.

Canadian Controlled Products Regulations (CPR): This product has been classified in accordance with the hazard criteria of the CPR and the MSDS contains all the information required by the CPR.

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16. Other Information

NFPA HAZARD CODES

Health: 3
Flammability: 4
Instability: 2

HMIS HAZARD CODES

Health: 3
Flammability: 4
Reactivity: 2

RATINGS SYSTEM

0 = No Hazard
1 = Slight Hazard
2 = Moderate Hazard
3 = Serious Hazard
4 = Severe Hazard

Note: The Reactivity Hazard Rating is based on the 2nd Edition of the National Paint and Coatings Association's (NPCA's) Hazardous Materials Identification System (HMIS®). Hazard ratings were based on the best available information at the time of the review. Ratings will be re-assigned in accordance with Compressed Gas Association (CGA) guidelines as published in the future edition of CGA Pamphlet P-19.

ACGIH
DOT
IARC
NTP
OSHA
PEL
SARA
STEL
TDG
TLV
WHMIS

American Conference of Governmental Industrial Hygienists
Department of Transportation
International Agency for Research on Cancer
National Toxicology Program
Occupational Safety and Health Administration
Permissible Exposure Limit
Superfund Amendments and Reauthorization Act
Short Term Exposure Limit
Transportation of Dangerous Goods
Threshold Limit Value
Workplace Hazardous Materials Information System

WARNING! THIS PRODUCT IS BEING SOLD FOR RESEARCH AND DEVELOPMENT PURPOSES ONLY. THE TOXICOLOGICAL AND ECOLOGICAL PROPERTIES OF THIS PRODUCT HAVE NOT BEEN DETERMINED AND ITS USE OR HANDLING MAY BE HAZARDOUS. THE PRODUCT SHOULD ONLY BE USED UNDER THE SUPERVISION OF A TECHNICALLY QUALIFIED INDIVIDUAL FOLLOWING PRUDENT LABORATORY PRACTICES FOR HANDLING SUBSTANCES OF UNKNOWN TOXICITY.

Compressed gas cylinders shall not be refilled without the express written permission of the owner. Shipment of a compressed gas cylinder which has not been filled by the owner or with his/her (written) consent is a violation of transportation regulations.

DISCLAIMER OF EXPRESSED AND IMPLIED WARRANTIES:

Although reasonable care has been taken in the preparation of this document, we extend no warranties and make no representations as to the accuracy or completeness of the information contained herein, and assume no responsibility regarding the suitability of this information for the user's intended purposes or for the consequences of its use. Each individual should make a determination as to the suitability of the information for their particular purpose(s).