Product Safety Assessment

Trimethyl Borate


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Names
• CAS No. 121-43-7
• Trimethyl borate
• Boric acid, trimethyl ester
• Methyl borate
• Trimethyl borate azeotrope
• Trimethoxyborane

Product Overview
• Trimethyl borate (TMB) is a colorless, clear liquid of relatively pure (>99 %) trimethyl borate. It is miscible with most organic liquids. It is also available as a 70% solution in methanol (CAS No. 67-56-1) known as TMB azeotrope.\(^1\) For further details, see Product Description.
• Trimethyl borate is used in the production of complex molecules for pharmaceuticals and other products via Suzuki chemistry, which are increasingly used in the synthesis of active ingredients for agrochemical and pharmaceutical use.\(^3\) For further details, see Product Uses.
• Dow does not sell trimethyl borate for direct consumer use. Direct consumer contact with this product is unlikely.\(^1\) For further details, see Exposure Potential.
• Contact may cause moderate eye or skin irritation. This product may be harmful if absorbed through the skin. Inhalation of vapor or mist may cause irritation of the nose, throat, and lungs, headache, nausea, vomiting, dizziness, drowsiness, and lack of coordination. Swallowing this product may cause headache, dizziness, and lack of coordination as well as gastrointestinal irritation.\(^1\) For further details, see Health Information.
• Trimethyl borate will not persist in the environment. The compound reacts rapidly with water to form methanol, hydrogen gas and boric acid. These compounds have a low bioconcentration potential and are not likely to accumulate in the food chain. Methanol is practically non-toxic to aquatic organisms on an acute basis while boric acid is considered moderately toxic.\(^1,5\) For further details, see Environmental Information.
• Trimethyl borate is stable under recommended storage and normal use conditions. Avoid contact with water. Avoid contact with oxidizing agents and acids. This product is flammable as liquid and vapor.\(^1\) For further details, see Physical Hazard Information.

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The Dow Chemical Company
Product Safety Assessment: Trimethyl Borate

Manufacture of Product
- **Location** – Rohm and Haas Company, a wholly owned subsidiary of The Dow Chemical Company, and its global affiliates manufacture trimethyl borate in the U.S.A.
- **Process** – Trimethyl borate is produced from boric acid and methanol.

Product Description
Trimethyl borate (TMB) is a colorless, clear liquid of relatively pure (>99 %) trimethyl borate. It is miscible with most organic liquids and hydrolyzes rapidly in water to form methanol and boric acid. It is also available as a 70% solution in methanol (CAS No. 67-56-1) known as TMB azeotrope.

Product Uses
Trimethyl borate is a precursor to boronics, which are chemicals used in Suzuki coupling. It is used in the production of complex molecules for pharmaceuticals and other products using Suzuki chemistry, which are increasingly used in the synthesis of active ingredients for agrochemical and pharmaceutical use. Trimethyl borate can also be used as a solvent or dehydrating agent.

Exposure Potential
Trimethyl borate is used in the production of industrial products. Based on the uses for this product, individuals could be exposed through:
- **Workplace exposure** – Exposure can occur either in facilities that manufacture trimethyl borate or in the various industrial or manufacturing facilities that use this product. Trimethyl borate is produced, transported, and stored in closed containers until time for use. Those working with trimethyl borate in manufacturing operations could be exposed during maintenance, sampling, testing, or other procedures. Each manufacturing facility should have a thorough training program for employees and appropriate work processes, ventilation, and safety equipment in place to limit exposure. See Health Information.
- **Consumer exposure to products containing trimethyl borate** – Dow does not sell trimethyl borate for direct consumer use. Direct consumer contact with this product is unlikely.
- **Environmental releases** – Releases of trimethyl borate to the environment are expected to be limited since most of the product is used in closed systems. Releases to the environment would result in trimethyl borate reacting rapidly with water or moisture in the air resulting in the release of methanol, hydrogen gas, and boric acid. Since methanol is readily biodegradable, it would be removed from water and soil environments, including wastewater treatment facilities. Hydrogen would rapidly volatilize to the atmosphere while boric acid would remain in the aqueous environment. Keep spills and cleaning runoff out of municipal sewers and open bodies of water. Contain spills immediately with inert materials (e.g. sand, earth). Transfer liquids and solid diking material to separate, suitable containers for recovery or disposal. Environmental, Health, and Physical Hazard Information.
- **Large release** – Industrial spills or releases are infrequent and generally contained. If a large spill does occur, the product should be captured, collected, and reprocessed or disposed of according to applicable governmental requirements. An approved positive-pressure, self-contained breathing apparatus (SCBA) with a full-face mask is recommended for emergency work. Eliminate all sources of ignition immediately. Use only explosion-proof equipment; ground and bond all containers and handling equipment. See Environmental, Health, and Physical Hazard Information.
- **In case of fire** – Trimethyl borate is flammable. Store away from potential sources of ignition. Deny any unnecessary entry into the area. Use water spray or fog, carbon-dioxide or dry-chemical extinguishers, or foam to fight the fire. Use of a direct water stream may spread the fire and will produce flammable materials as the product hydrolyzes. Toxic vapors may be produced when this product is heated or burned. Firefighters should wear positive-pressure, self-contained breathing apparatus (SCBA) and protective firefighting clothing. Keep vapors out of sewers. Vapors are heavier than air and may travel a long distance and accumulate in low-lying areas. The public should be warned of downwind vapor explosion hazards. Immediately withdraw all personnel from the area in case of rising sounds from venting safety device or discolorations of the container. Keep fire water out of waterways and sewers to minimize the potential for environmental damage. Follow emergency procedures carefully. See Environmental, Health, and Physical Hazard Information.

For more information, see the relevant Safety Data Sheet.
Health Information

Eye contact – Contact may cause moderate irritation.

Skin contact – Contact may cause moderate irritation. Prolonged or repeated contact with liquid may cause defatting of the skin resulting in dryness, redness, and possible blistering. This product may be harmful if absorbed through the skin.

Inhalation – Inhalation of vapor or mist may cause irritation of the nose, throat, and lungs, headache, nausea, vomiting, dizziness, drowsiness, and lack of coordination.

Ingestion – Swallowing this product may cause headache, dizziness, and lack of coordination, as well as gastrointestinal irritation, abdominal pain, nausea, vomiting, and diarrhea.

For more information, see the relevant Safety Data Sheet.

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Environmental Information

Trimethyl borate reacts rapidly with water or moisture in the air to form methanol, hydrogen gas, and boric acid. The methanol and boric acid will tend to remain in water with little tendency to bind to soil or sediment, while hydrogen will volatilize to the atmosphere.

Trimethyl borate will not persist in the environment due to its rapid reaction with water. Since methanol is readily biodegradable, it would be removed from water and soil environments, including wastewater treatment facilities.

Methanol, hydrogen, and boric acid have a low bioconcentration potential and are not likely to accumulate in the food chain. Methanol is practically non-toxic to aquatic organisms on an acute basis (LC₅₀/EC₅₀ >100 mg/L) while boric acid is considered moderately toxic (LC₅₀/EC₅₀ between 1 and 10 mg/L for the most sensitive species).

For more information, see the relevant Safety Data Sheet.

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Physical Hazard Information

Trimethyl borate is considered stable under recommended storage and normal use conditions. Avoid contact with water. Trimethyl borate rapidly reacts in the presence of water.

Trimethyl borate is flammable as liquid and vapor. Store away from excessive heat and potential sources of ignition. Avoid contact with oxidizing agents and acids.

For more information, see the relevant Safety Data Sheet.

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Regulatory Information

Regulations may exist that govern the manufacture, sale, transportation, use, and/or disposal of trimethyl borate. These regulations may vary by city, state, country, or geographic region. Information may be found by consulting the relevant Safety Data Sheet, Technical Data Sheet, or Contact Us.

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Additional Information

- Contact Us ([www.dow.com/assistance/dowcig](http://www.dow.com/assistance/dowcig))

For more business information about trimethyl borate, visit the website for VenPure™ Products for Fine Chemical Synthesis at [www.dow.com/sbh](http://www.dow.com/sbh) or [www.hydridesolutions.com](http://www.hydridesolutions.com).

References

1. Trimethyl Borate Material Safety Data Sheet, The Dow Chemical Company
2. Product List for Borohydride and Companion Products, The Dow Chemical Company, Form No. 844-00018
3. Trimethyl Borate Pure: Precursor for Boronic Acids/Esters Technical Data Sheet, Rohm and Haas Company
6. Trimethyl Borate CASRN: 121-43-7, Hazardous Substances Data Bank (HSDB), U.S. National Library of Medicine, TOXNET, Environmental Fate & Exposure section.
NOTICES

As part of its 2015 Sustainability Goals, Dow has committed to make publicly available safety assessments for its products globally. This product safety assessment is intended to give general information about the chemical (or categories of chemicals) addressed. It is not intended to provide an in-depth discussion of health and safety information. Additional information is available through the relevant Safety Data Sheet, which should be consulted before use of the chemical. This product safety assessment does not replace required communication documents such as the Safety Data Sheet.

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