UltraPur™ TEB11

^{11}B Enriched triethylborate

Triethylborate (TEB) is an organic boron ester compound which is widely used as a boron source in the deposition of doped silicate glass in a low-pressure and plasma-enhanced CVD. Boron and phosphorus act as glass flow temperature modifiers and gettering agents. The softening temperature of the silicate glass is modified with varying concentrations of doping constituents.

It has been reported that collisions of boron nuclei with neutrons resulting from cosmic radiation can produce alpha particles in boron containing films. The effective size of the nucleus of the ^{10}B isotope makes it far more susceptible to this phenomenon than the ^{11}B isotope. By reducing the percent of ^{10}B, the probability of an event occurring that will produce an alpha particle is reduced.

Triethylborate (TEB) synthesized from naturally occurring boron is comprised of approximately 19.9% ^{10}B and 80.1% ^{11}B. The boron content of Entegris UltraPur™ TEB11 is less than 0.1% ^{10}B or greater than 99.9% ^{11}B. This reduction of ^{10}B content significantly reduces the probability of alpha particle producing collisions in films made with UltraPur TEB11.

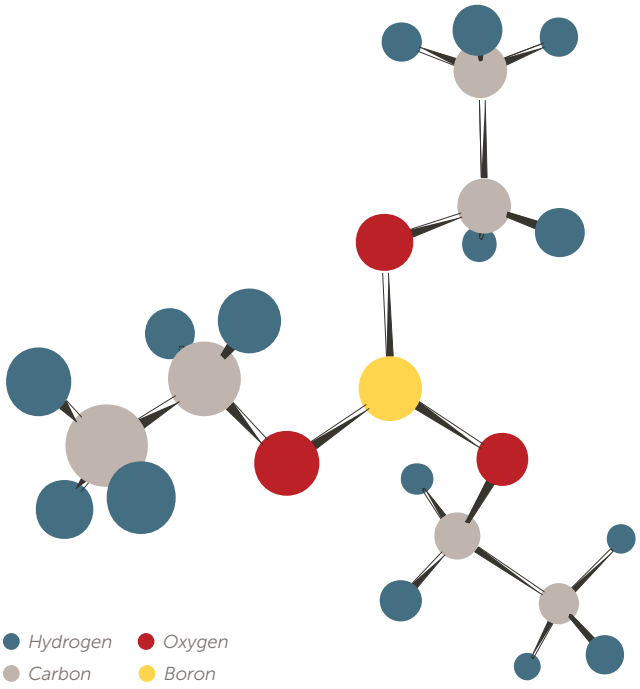
The only difference between TEB and UltraPur TEB11 is the isotopic enrichment in TEB11, therefore, TEB11 can be introduced into existing processes without the requirement to change other process parameters.

Entegris UltraPur TEB11 is synthesized from isotopically enriched boron starting materials, purified, and packaged in our state-of-the-art manufacturing facility in Burnet, Texas.

Canisters and delivery systems

Entegris UltraPur TEB11 is available in a wide variety of stainless steel canisters and ampoules to fit all tools and delivery systems. Standard sizes include 2-, 5- and 10-gallon minibulk canisters which can be configured to fit a wide range of applications. Options include automatic valves and level sensors. Entegris UltraPur TEB11 is also available in patented Entegris high-efficiency 12-liter ampoules for use in Entegris chemical delivery systems.

Entegris offers the Unichem™ 3100 chemical delivery system for single chemical applications.



APPLICATIONS

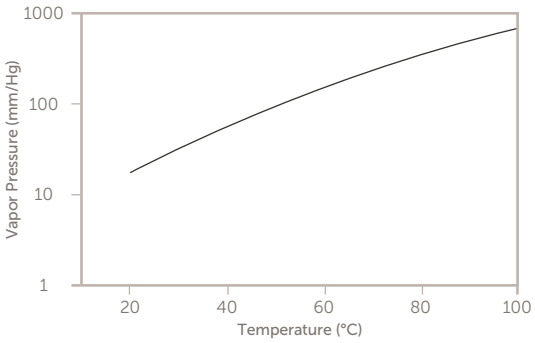
- Plasma-enhanced CVD deposition

FEATURES & BENEFITS

- Lower probability of damage or soft errors due to alpha particles created in the films
- Improved performance characteristics over diborane
- Replaces diborane and trimethylborate
- Ease of handling a liquid source
- Reduced health hazards
- Improved purity levels
- Standard shelf life of 24 months

PERFORMANCE DATA

Vapor Pressure Curve



SPECIFICATIONS

Physical properties

Chemical formula	$C_6H_{15}O_3B$
Molecular weight	146.02
Density	0.858 gm/mL
Boiling point	118.5°C (245.3°F) @ 0.1 mm Hg
Melting point	-85°C (-121°F)
Flash point (closed cup)	11°C (51.8°F)

Purity analysis

Element	Detection limit	Specification	Analytical method
Aluminum	0.012 ppb	0.200 ppb	ICP-MS
Antimony	0.018 ppb	0.100 ppb	ICP-MS
Arsenic	0.018 ppb	0.100 ppb	ICP-MS
Barium	0.003 ppb	0.100 ppb	ICP-MS
Beryllium	0.005 ppb	0.100 ppb	ICP-MS
Bismuth	0.004 ppb	0.100 ppb	ICP-MS
Cadmium	0.005 ppb	0.050 ppb	ICP-MS
Calcium	0.043 ppb	0.800 ppb	ICP-MS
Cerium	0.003 ppb	0.050 ppb	ICP-MS
Chromium	0.007 ppb	0.100 ppb	ICP-MS
Cobalt	0.005 ppb	0.050 ppb	ICP-MS
Copper	0.008 ppb	0.100 ppb	ICP-MS

Purity analysis (continued)

Element	Detection limit	Specification	Analytical method
Gallium	0.004 ppb	0.050 ppb	ICP-MS
Germanium	0.010 ppb	0.050 ppb	ICP-MS
Gold	0.006 ppb	0.100 ppb	ICP-MS
Hafnium	0.005 ppb	0.050 ppb	ICP-MS
Indium	0.004 ppb	0.050 ppb	ICP-MS
Iridium	0.004 ppb	0.050 ppb	ICP-MS
Iron	0.014 ppb	0.300 ppb	ICP-MS
Lead	0.004 ppb	0.100 ppb	ICP-MS
Lithium	0.006 ppb	0.050 ppb	ICP-MS
Magnesium	0.005 ppb	0.200 ppb	ICP-MS
Manganese	0.038 ppb	0.100 ppb	ICP-MS
Mercury	0.032 ppb	0.100 ppb	ICP-MS
Molybdenum	0.008 ppb	0.100 ppb	ICP-MS
Nickel	0.007 ppb	0.200 ppb	ICP-MS
Niobium	0.003 ppb	0.050 ppb	ICP-MS
Palladium	0.010 ppb	0.050 ppb	ICP-MS
Platinum	0.012 ppb	0.050 ppb	ICP-MS
Potassium	0.072 ppb	0.200 ppb	ICP-MS
Rhenium	0.003 ppb	0.050 ppb	ICP-MS
Rhodium	0.002 ppb	0.050 ppb	ICP-MS
Rubidium	0.003 ppb	0.050 ppb	ICP-MS
Silver	0.013 ppb	0.050 ppb	ICP-MS
Sodium	0.032 ppb	0.500 ppb	ICP-MS
Strontium	0.004 ppb	0.050 ppb	ICP-MS
Tantalum	0.003 ppb	0.050 ppb	ICP-MS
Thallium	0.003 ppb	0.050 ppb	ICP-MS
Thorium	0.004 ppb	0.050 ppb	ICP-MS
Tin	0.033 ppb	0.100 ppb	ICP-MS
Titanium	0.015 ppb	0.100 ppb	ICP-MS
Tungsten	0.006 ppb	0.050 ppb	ICP-MS
Uranium	0.004 ppb	0.100 ppb	ICP-MS
Vanadium	0.010 ppb	0.500 ppb	ICP-MS
Zinc	0.028 ppb	0.200 ppb	ICP-MS
Zirconium	0.004 ppb	0.050 ppb	ICP-MS

Purity analysis (continued)

Parameter	Detection limit	Specification	Analytical method
Assay	—	99.99%	GC
Chloride	—	50 ppb	Typical
Color	—	5	Typical
Purity	—	99.9999995%	ICP-MS
Water	1.3 ppm	10 ppm	KF Titrator

Standard TEB11 fill weights for Entegris canisters

5-gallon	15,750 grams
10-gallon	31,500 grams

FOR MORE INFORMATION

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