

**1. Identification**

**GHS product identifier** Boron Nitride Nanotubes (BNNT)  
**SDS number** BNNT - 001  
**Version No.** 03  
**Issue date** 29-April-2013  
**Revision date** 7-July-2014  
**Supersedes date** 29-April-2013  
**CAS No.** Mixture  
**Recommended use** Property Studies; Compositing; Biomedical; Functionalization; Filters; Thermal conductor  
**Recommended Restrictions** Not available.  
**Manufacturer**

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**Emergency**
**2. Hazards identification**
**GHS classification**

**Physical hazards** Not classified.  
**Health hazards** Acute toxicity, oral Category 5  
 Serious eye damage/eye irritation Category 2A  
 Specific target organ toxicity, single exposure Category 3 respiratory tract irritation  
**Environmental hazards** Not classified.

**GHS label elements**

**Signal word** Warning



**Hazard statements** Causes serious eye irritation. May cause respiratory irritation. May be harmful if swallowed.

**Precautionary statements**

**Prevention** Wear protective gloves/protective clothing/eye protection/face protection. Avoid breathing dust/fume/gas/mist/vapours/spray.  
**Response** IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists: Get medical advice/attention. Call a POISON CENTRE or doctor/physician if you feel unwell.  
**Disposal** Dispose of contents/container in accordance with local/regional/national/international regulations.  
**Specific hazards** Dust may irritate the eyes and the respiratory system. Dust may irritate skin. Research on the dermal exposure of nanomaterials is ongoing. Ingestion may cause irritation and malaise.

**3. Composition/information on ingredients**

Components	CAS No.	Percent
Boron Nitride; BNNT, LLC (50% BNNT, 50% hexagonal Boron Nitride)	10043-11-5	30-99
Boron	7440-42-8	1-50

**Composition comments** \* Typical value  
 All concentrations are in percent by weight unless ingredient is a gas. Gas concentrations are in percent by volume.

## 4. First aid measures

### First aid procedures

<b>Inhalation</b>	Dust irritates the respiratory system, and may cause coughing and difficulties in breathing. If symptomatic, move to fresh air. Get medical attention if discomfort develops or persists.
<b>Skin</b>	Contact with dust: Wash area with soap and water. Get medical attention if irritation develops or persists.
<b>Eye</b>	Dust in the eyes: Do not rub eyes. Immediately flush eye(s) with plenty of water. Remove contact lenses, if present and easy to do. If irritation occurs, get medical assistance.
<b>Ingestion</b>	Rinse mouth thoroughly if dust is ingested. Get medical attention if symptoms occur.
<b>Most important symptoms and effects, both acute and delayed</b>	Irritation of nose and throat. Irritation of eyes and mucous membranes. Coughing.
<b>Notes to physician</b>	Provide general supportive measures and treat symptomatically.
<b>General advice</b>	Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves.

## 5. Fire-fighting measures

<b>Suitable extinguishing media</b>	Use fire-extinguishing media appropriate for surrounding materials.
<b>Unsuitable extinguishing media</b>	None known.
<b>Specific hazards arising from the chemical</b>	None known.
<b>Protective equipment and precautions for firefighters</b>	Self-contained breathing apparatus and full protective clothing must be worn in case of fire. Selection of respiratory protection for firefighting: follow the general fire precautions indicated in the workplace.
<b>Protection of fire-fighters</b>	Use standard firefighting procedures and consider the hazards of other involved materials.

## 6. Accidental release measures

<b>Personal precautions</b>	Ensure adequate ventilation. Avoid inhalation of dust and contact with skin and eyes. Wear suitable protective clothing. See Section 8 for personal protective equipment.
<b>Environmental precautions</b>	Avoid discharge into drains, water courses or onto the ground.
<b>Methods for containment</b>	Not available.
<b>Methods for cleaning up</b>	Avoid dust formation. Collect dust using a vacuum cleaner equipped with HEPA filter.

## 7. Handling and storage

<b>Handling</b>	Use work methods which minimise dust production. Local exhaust is recommended. Avoid inhalation of dust and contact with skin and eyes. Wear appropriate personal protective equipment. Wash hands after handling. Observe good industrial hygiene practices.
<b>Storage</b>	Store in tightly closed original container in a well-ventilated place. Read and follow manufacturer's recommendations.

## 8. Exposure controls / personal protection

<b>Occupational exposure limits</b>	No exposure limits noted for ingredient(s).
<b>Recommended monitoring procedures</b>	Follow standard monitoring procedures.
<b>Engineering controls</b>	Provide sufficient ventilation for operations causing dust formation. ACGIH: OELs (8-hour TLV-TWA) for inhalable dust: 10 mg/m <sup>3</sup> ; respirable dust 3 mg/m <sup>3</sup> . Observe occupational exposure limits and minimise the risk of exposure.  Provide easy access to water supply and eye wash facilities.
<b>Personal protective equipment</b>	
<b>Eye/face protection</b>	Wear dust-resistant safety goggles where there is danger of eye contact.
<b>Skin protection</b>	Wear suitable protective clothing.
<b>Respiratory protection</b>	In case of inadequate ventilation or risk of inhalation of dust, use suitable respiratory equipment with particle filter.
<b>Hand protection</b>	It is a good industrial hygiene practice to minimise skin contact. Risk of contact: Wear protective gloves.

## 9. Physical and chemical properties

### Appearance

<b>Physical state</b>	Solid.
<b>Colour</b>	White to light grey.

<b>Form</b>	Boron Nitride Nanotubes which is a Nanomaterial with at least one dimension of <100 NM (nanometers).
<b>Odour</b>	Not applicable.
<b>pH</b>	Not applicable.
<b>Melting point/freezing point</b>	2973 °C (5383.4 °F)
<b>Boiling point</b>	Not applicable.
<b>Flash point</b>	Not applicable.
<b>Evaporation rate</b>	Not applicable.
<b>Flammability (solid, gas)</b>	Not available.
<b>Flammability limit - lower (%) temperature</b>	Not applicable.
<b>Flammability limit - upper (%) temperature</b>	Not applicable.
<b>Vapour pressure</b>	Not applicable.
<b>Vapour density</b>	Not applicable.
<b>Relative density</b>	2.29
<b>Solubility (H2O)</b>	Insoluble in water.
<b>Partition coefficient (n-octanol/water)</b>	Not applicable.
<b>Auto-ignition temperature</b>	Not applicable.
<b>Decomposition temperature</b>	> 4000 °C (> 7232 °F)
<b>Viscosity</b>	Not applicable.
<b>VOC (Weight %)</b>	Not applicable.
<b>Bulk density</b>	Variable depending on if compacted (UNIT)

## 10. Stability and reactivity

<b>Chemical stability</b>	Stable at normal conditions.
<b>Possibility of hazardous reactions</b>	Will not occur.
<b>Conditions to avoid</b>	Avoid dust formation.
<b>Incompatible materials</b>	None known.
<b>Hazardous decomposition products</b>	Boron oxides. Nitrogen compounds.

## 11. Toxicological information

### Toxicological data

Product	Species	Test results
Boron Nitride Nanotubes (BNNT) (CAS Mixture)		
<b>Acute</b>		
<i>Dermal</i>		
LD	Rabbit	> 20 ml/kg
<i>Oral</i>		
LD	Rat	> 50 g/kg
Components	Species	Test results
Boron (CAS 7440-42-8)		
<b>Acute</b>		
<i>Oral</i>		
LD50	Rat	650 mg/kg
<b>Routes of exposure</b>	Inhalation. Ingestion. Skin contact. Eye contact.	
<b>Toxicological information</b>	Occupational exposure to the substance or mixture may cause adverse effects. (Dust or fiber).	
<b>Acute toxicity</b>	May cause discomfort if swallowed. Causes severe eye irritation. May cause respiratory tract irritation.	
<b>Skin corrosion/irritation</b>	Dust may irritate skin.	
<b>Serious eye damage/irritation</b>	Dust may irritate the eyes.	
<b>Respiratory sensitizer</b>	No data available.	
<b>Skin sensitisation</b>	No data available.	

<b>Mutagenicity</b>	No data available.
<b>Carcinogenicity</b>	No data available.
<b>Reproductive toxicity</b>	No data available.
<b>Specific target organ toxicity - single exposure</b>	May cause respiratory irritation.
<b>Specific target organ toxicity - repeated exposure</b>	Knowledge about health hazard is incomplete.
<b>Aspiration hazard</b>	No data available.
<b>Local effects</b>	Dust may irritate the respiratory tract, skin and eyes. May be harmful if swallowed.
<b>Chronic effects</b>	Frequent inhalation of dust over a long period of time increases the risk of developing lung diseases.
<b>Symptoms</b>	Dust may irritate the eyes and the respiratory system.
<b>Other information</b>	Information based on BN component of mixture. For BNNT component, acute and chronic toxicity of this substance is not known and is anticipated to be different based on morphology, i.e. BN and BNNT are anticipated to have different toxicities.

## 12. Ecological information

<b>Ecotoxicity</b>	The product is not classified as environmentally hazardous. However, as the BNNT component is a nanomaterial, use of Hazardous Materials Remediation companies are recommended for waste management, and this does not exclude the possibility that large or frequent spills can have a harmful or damaging effect on the environment.
<b>Persistence and degradability</b>	No data available.
<b>Bioaccumulation</b>	No data available.
<b>Mobility</b>	The product is insoluble in water and will sediment in water systems.
<b>Other adverse effects</b>	No data available.

## 13. Disposal considerations

<b>Disposal methods</b>	Avoid discharge into water courses or onto the ground. Dispose in accordance with all applicable regulations.
<b>Waste from residues / unused products</b>	Dispose of waste and residues in accordance with local authority requirements.
<b>Contaminated packaging</b>	Dispose of in accordance with local regulations. Empty containers should be taken to an approved waste handling site for recycling or disposal.

## 14. Transport information

### ADR

The product is not covered by international regulation on the transport of dangerous goods.

### IATA

The product is not covered by international regulation on the transport of dangerous goods.

### IMDG

The product is not covered by international regulation on the transport of dangerous goods.

### RID

The product is not covered by international regulation on the transport of dangerous goods.

**Transport in bulk according to Annex II of MARPOL73/78 and the IBC Code** No information available.

## 15. Regulatory information

**Regulatory information** The product has been classified according to the legislation in force.

### Inventory status

Country(s) or region	Inventory name	On inventory (yes/no)*
Australia	Australian Inventory of Chemical Substances (AICS)	Yes
Canada	Domestic Substances List (DSL)	Yes
Canada	Non-Domestic Substances List (NDSL)	No
China	Inventory of Existing Chemical Substances in China (IECSC)	Yes
Europe	European Inventory of Existing Commercial Chemical Substances (EINECS)	Yes
Europe	European List of Notified Chemical Substances (ELINCS)	No
Japan	Inventory of Existing and New Chemical Substances (ENCS)	Yes

<b>Country(s) or region</b>	<b>Inventory name</b>	<b>On inventory (yes/no)*</b>
Korea	Existing Chemicals List (ECL)	Yes
New Zealand	New Zealand Inventory	Yes
Philippines	Philippine Inventory of Chemicals and Chemical Substances (PICCS)	Yes
United States & Puerto Rico	Toxic Substances Control Act (TSCA) Inventory	Yes

\*A "Yes" indicates this product complies with the inventory requirements administered by the governing country(s)

## 16. Other information

### Disclaimer

The information in this SDS was obtained from sources which we believe are reliable, but no warranty or representation as to its accuracy or completeness is hereby given. Users should consider the information herein only as a supplement to other information gathered by them and must make independent determinations of suitability and completeness of information from all sources to assure proper use and disposal, the safety and health of employees and customers and the protection of the environment.

### List of abbreviations

Not available.