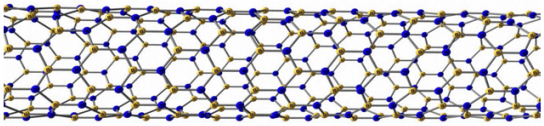

SAFETY DATA SHEET
BORON NITRIDE NANOBARBS™ / BORON NITRIDE NANOTUBES

1. Identification

GHS product identifier	Boron Nitride NanoBarbs™ (BNNB), Boron Nitride Nanotubes (BNNT)
SDS number	BNNANO - 001
Version No.	02
Issue Date	1-June-2020
Revision Date	16-March-2020
Supersedes Date	1-June-2017
CAS No.	Mixture
Recommended Use	Additive for textiles, plastics, composites, metals; Thermal Conductor, Fire Retardant, Water Filtration,
Recommended Restrictions	Not available.
Manufacturer	

BNNano, Inc.
2119 West Webb Avenue
Burlington, NC 27217 US
info@bnnano.com http://www.bnnano.com
Contact Person: Steve Wilcenski
Emergency +1 844-926-6266

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, >80% Boron Nitride Nanotubes (BNNB), <20% h-Boron Nitride	10043-11-5	80-99
Boron	7440-42-8	1-20%

Composition Comments * Typical value / All concentrations are in percent by weight

4. First aid measures

First Aid Procedures

Inhalation 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.

Skin Contact with dust: Wash area with soap and water. Get medical attention if irritation develops or persists.

Eye 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.

Ingestion Rinse mouth thoroughly if dust is ingested. Get medical attention if symptoms occur.

Most Important Symptoms and Effects, Both Acute and Delayed

Irritation of nose and throat. Irritation of eyes and mucous membranes. Coughing.

Notes to Physician Provide general supportive measures and treat symptomatically.

General Advice Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves.

5. Fire-fighting measures

Suitable Extinguishing Media Use fire-extinguishing media appropriate for surrounding materials.

Unsuitable Extinguishing Media None known

Specific Hazards Arising from the Chemical None known

Protective Equipment and Precautions for Firefighters 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.

Protection of Fire-Fighters Use standard firefighting procedures and consider the hazards of other involved materials.

6. Accidental release measures

Personal Precautions Ensure adequate ventilation. Avoid inhalation of dust and contact with skin and eyes. Wear suitable protective clothing. See Section 8 for personal protective equipment.

Environmental Precautions Avoid discharge into drains, water courses or onto the ground.

Methods for Containment Not available.

Methods for Cleaning Up Avoid dust formation. Collect dust using a vacuum cleaner equipped with HEPA filter.

7. Handling and storage

Handling 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.
Storage	Store in tightly closed original container in a well-ventilated place. Read and follow manufacturer's recommendations.

8. Exposure Controls / Personal Protection

Occupational Exposure Limits	No exposure limits noted for ingredient(s).
Recommended Monitoring Procedures	Follow standard monitoring procedures.
Engineering Controls	Provide sufficient ventilation for operations causing dust formation. ACGIH: OELs (8-hour TLV-TWA) for inhalable dust: 10 mg/m3; respirable dust 3 mg/m3. Observe occupational exposure limits and minimise the risk of exposure. Provide easy access to water supply and eye wash facilities.
Personal Protective Equipment	
Eye/Face Protection	Wear dust-resistant safety goggles where there is danger of eye contact.
Skin Protection	Wear suitable protective clothing.
Respiratory Protection	In case of inadequate ventilation or risk of inhalation of dust, use suitable respiratory equipment with particle filter.
Hand Protection	It is a good industrial hygiene practice to minimize skin contact. Risk of contact: Wear protective gloves.

9. Physical and Chemical Properties

Appearance

Physical State	Solid.
Color	White to light grey.
Form	Boron Nitride Nanotubes which is a Nanomaterial with at least one dimension of <100 NM (nanometers).
Odor	Not applicable.

pH	Not applicable.
Melting point/Freezing Point	2973 °C (5383.4 °F)
Boiling Point	Not applicable.
Flash Point	Not applicable.
Evaporation Rate	Not applicable.
Flammability (solid, gas)	Not available.
Flammability Limit - Lower (%) Temperature	Not applicable
Flammability Limit - Upper (%) Temperature	Not applicable
Vapor Pressure	Not applicable.
Vapor Density	Not applicable.
Relative Density	2.29
Solubility (H2O)	Insoluble in water.
Partition Coefficient (n-octanol/water)	Not applicable.
Auto-Ignition Temperature	Not applicable.
Decomposition Temperature	> 4000 °C (> 7232 °F)
Viscosity	Not applicable.
VOC (Weight %)	Not applicable.
Bulk Density	Variable depending on if compacted (UNIT)

10. Stability and reactivity

Chemical Stability	Stable at normal conditions.
Possibility of Hazardous Reactions	Will not occur.
Conditions to Avoid	Avoid dust formation.
Incompatible Materials	None known.
Hazardous Decomposition Products	Boron oxides. Nitrogen compounds.

11. Toxicological Information

Toxicological Data

Product	Species	Test results
Boron Nitride Nanotubes (BNNT) (CAS Mixture)		
Acute		
Dermal		
LD	Rabbit	> 20 ml/kg
Oral		
LD	Rat	> 50 g/kg

Components	Species	Test results
Boron (CAS 7440-42-8)		
Acute		
Oral		
LD50	Rat	650 mg/kg

Routes of Exposure Inhalation. Ingestion. Skin contact. Eye contact.

Toxicological Information Occupational exposure to the substance or mixture may cause adverse effects. (Dust or fiber).

Acute Toxicity May cause discomfort if swallowed. Causes severe eye irritation. May cause respiratory tract irritation.

Skin Corrosion/Irritation Dust may irritate skin.

Serious Eye Damage/Irritation Dust may irritate the eyes.

Respiratory Sensitizer No data available.

Skin Sensitization No data available.

Mutagenicity No data available.

Carcinogenicity No data available.

Reproductive Toxicity No data available.

Specific Target Organ Toxicity - Single Exposure May cause respiratory irritation.

Specific Target Organ Toxicity - Repeated Exposure Knowledge about health hazard is incomplete.

Aspiration Hazard No data available.

Local Effects Dust may irritate the respiratory tract, skin and eyes. May be harmful if swallowed.

Chronic Effects	Frequent inhalation of dust over a long period of time increases the risk of developing lung diseases.
Symptoms	Dust may irritate the eyes and the respiratory system.
Other Information	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

Ecotoxicity	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.
Persistence and Degradability	No data available.
Bioaccumulation	No data available.
Mobility	The product is insoluble in water and will sediment in water systems.
Other Adverse Effects	No data available.

13. Disposal Considerations

Disposal Methods	Avoid discharge into water courses or onto the ground. Dispose in accordance with all applicable regulations.
Waste from Residues / Unused Products	Dispose of waste and residues in accordance with local authority requirements.
Contaminated Packaging	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*
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
Country(s) or Region	Inventory name	On inventory*
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.