



Material Safety Data Sheet

Silver Nanowires SLV-NW-60/90/300/900

Silver Nanoparticles SLV-NP-100

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1 – Identification of Substance

Trade Name: Silver
Chemical Family: Metal powder
Synonyms: Silver Nanowires, SNW, Silver Nanoparticles, SNP
CAS Number: 7440-22-4
Manufacturer/Supplier: Blue Nano
17323 Connor Quay Ct, Cornelius, NC 28031, U.S.
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2 - Composition / Information on Ingredients

Component	CAS Number	Amount (%)
Silver	7440-22-4	>99.9%

3 - Hazards Identification: Potential health effects

Eye contact	May cause eye irritation or blue-gray eyes
Skin contact	May cause skin irritation or ulceration
Inhalation	May be harmful if inhaled. Material may be irritating to nasal septum, throat, mucous membranes and upper respiratory tract
Ingestion	May be harmful if swallowed. May cause gastrointestinal irritation with nausea, vomiting and diarrhea.
Chronic Exposure	Absorption of silver compounds by ingestion, inhalation or through broken skin can cause argyria, a permanent bluish-gray discoloration of the skin, conjunctiva and mucous membranes.

4 - First Aid Measures

After inhalation	Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Seek medical attention immediately.
After skin contact	Flush with copious amounts of soap and water for at least 15 minutes. Remove contaminated clothing and shoes. Seek medical attention if irritation develops or persists. Wash clothing before reuse. Thoroughly clean shoes before reuse.
After eye contact	Flush with copious amounts of water for at least 15 minutes, occasionally lifting lower and upper eyelids. Seek medical attention immediately.
After ingestion	If conscious, wash out mouth with water. Seek medical attention immediately.

5 - Fire Fighting Measures

Flash point	Any very finely divided particles (ultra-fine powder) may burn in air. Combustion of silver powder may cause the release of toxic metal oxide fume.
Explosion limits	This material, like most materials in powder form, is capable of creating a dust explosion.
Extinguisher medium	Sand or dry powder type specially designed for metal powder fires. Do not use water.
Special procedures	None
Decomposition products	Carbon monoxide, carbon dioxide
Pyrophoric/Autoignition	No
NFPA Ratings	Health=0, Flammability=0, Reactivity=1
Special hazards caused by the material, its products of combustion or resulting gases	In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full face piece operated in the pressure demand or other positive pressure mode.

6 - Accidental Release Measures

Person-related safety precautions	Wear eye protection, self-contained breathing apparatus, boots, and protective gloves. Wear disposable coveralls and discard after use. Sweep up the spill, place in a bag and hold for waste disposal. Avoid raising dust. Ventilate area and wash spill site after material pick-up is complete.
Measures for environmental protection	Do not let this chemical enter the environment.
Measures for cleaning/collecting	In case of a leak or spill, evacuate area, shut off all sources of ignition and use non-sparking tools.
Additional information	See Section 7 for information on safe handling. See Section 8 for information on personal protection equipment. See Section 13 for disposal information.

7 - Handling and Storage

Information about protection against explosions and fires	Protect from physical damage, ignition sources and electrostatic discharges.
Storage	Store in a tightly closed container in a cool, dry, ventilated, and dark area
Requirements to be met by storerooms and receptacles	Containers of this material may be hazardous when empty since they retain product residues (dust, solids); observe all warnings and precautions listed for the product.

8 - Exposure Controls / Personal Protection

Airborne Exposure Limits	<ul style="list-style-type: none">- OSHA Permissible Exposure Limit (PEL) 0.01 mg/m³ (TWA)- NIOSH Recommended Exposure Level (REL) 0.01 mg/m³ (TWA)- NIOSH Immediately Dangerous to Life or Health Concentration (IDLH) 10 mg/m³- ACGIH Threshold Limit Value (TLV) 0.1 mg/m³ (TWA)
Ventilation System	A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emission of the contaminant at its source, preventing dispersion of it into the general work area.
Breathing equipment	Respirators may be necessary when engineering and administrative controls do not adequately prevent exposures. Currently, there are no specific exposure limits for airborne exposures to engineered nanoparticles although occupational exposure limits exist for larger particles of similar chemical composition. The decision to use respiratory protection should be based on professional judgment that takes into account toxicity information, exposure measurement data, and frequency and likelihood of the worker's exposure. Preliminary evidence shows that for respiration filtration media there is no deviation from the classical single-fiber theory for particulates as small as 2.5 nm in diameter. While this evidence needs confirmation, NIOSH certified respirators will be useful for protecting workers from nanoparticles inhalation when properly selected and fit tested as part of a complete respiratory protection program. Use NIOSH approved positive flow mask if dust becomes airborne. Try to avoid creating dust conditions.
Skin Protection	Wear impervious protective clothing including boots, gloves, lab coat, apron or coveralls, as appropriate, to prevent skin contact. Wash thoroughly after handling. Maintain quick-drench facilities in work area.
Eye protection	Use chemical safety goggles and/or full face shield where dusting or splashing of solution is possible. Maintain eye wash fountain in work area.

9 - Physical & Chemical Properties

<i>General Information</i>	
Form	Gray powder
Color	Black
Odor	Odorless
<i>Value/Range Unit Method</i>	
Melting Point / Melting Range	962C (1764F)
Boiling Point / Boiling Range	2212C (4014F)
Evaporation Rate	Not available
Viscosity	Not applicable
Decomposition Temperature	Not available
<i>Explosion Limits</i>	
Lower	Not available
Vapor Density (Air=1)	Not available
Vapor pressure	Not available
pH	Not available
Molecular Weight	107.868 AMU
Theoretical Density	10.49 g/cm ³
Bulk Density	0.5 g/cm ³
Solubility in / miscibility with water	Insoluble in water

10 - Stability & Reactivity

Stability	Stable under ordinary conditions of use and storage.
Conditions to be avoided	Dust generation and incompatibles.
Materials to be avoided	Acetylene, ammonia, strong hydrogen peroxide solutions, strong acids, oxalic acid, tartaric acid, bromoazide, chlorine trifluoride, and ethyleneimine.
Dangerous products of decomposition	Metal oxide fume.
Hazardous Polymerization	Will not occur

11 - Toxicological Information

NTP Known Carcinogen	No
NTP Anticipated Carcinogen	No
IARC Category	None

12 – Ecological Information

General notes	This substance may be hazardous to the environment; special attention should be given to aquatic organisms.
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13 – Disposal Considerations

General	All components of this product are listed in the U.S. Environmental Protection Agency Toxic Substances Control Act Chemical Substance Inventory. This material and its container must be disposed of as hazardous waste. Processing, use, or contamination of this product may change the waste management options. All components of this product are listed on the Canadian Domestic Substances List (DSL).
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14 – Transport Information

Classification	Not a hazardous material for transportation.
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15 - Regulations

Federal and State:

Rhode Island RTK hazardous substances: Silver

Pennsylvania RTK: Silver

Minnesota: Silver

Massachusetts RTK: Silver

New Jersey: Silver

TSCA 8(b) inventory: Silver

TSCA 8(a) PAIR: Silver

TSCA 8(d) H and S data reporting: Silver

SARA 313 toxic chemical notification and release reporting: Silver: 1%

CERCLA: Hazardous substances.: Silver: 1000 lbs. (453.6 kg)

Other Regulations:

OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200).

EINECS: This product is on the European Inventory of Existing Commercial Chemical Substances.

Other Classifications:

WHMIS (Canada):

CLASS D-1B: Material causing immediate and serious toxic effects (TOXIC).

CLASS D-2B: Material causing other toxic effects (TOXIC).

DSCL (EEC): R41- Risk of serious damage to eyes.

HMIS (U.S.A.):

Health Hazard: 2

Fire Hazard: 1

Reactivity: 0

Personal Protection: j

National Fire Protection Association (U.S.A.):

Health: 2

Flammability: 1

Reactivity: 0

Specific hazard:

Protective Equipment:

Not applicable.

Lab coat.

Wear appropriate respirator when ventilation is inadequate.

Splash goggles.

16 – Other Information

Employers should use this information only as a supplement to other information gathered by them, and should make independent judgment of suitability of this information to ensure proper use and protect the health and safety of employees. This information is furnished without warranty, and any use of the product not in conformance with this Material Safety Data Sheet, or in combination with any other product or process, is the responsibility of the user.

Label Precautions:

Avoid contact with eyes, skin and clothing.

Wash thoroughly after handling.

Avoid breathing dust or vapors.

Keep container closed.

Use only with adequate ventilation.

Label First Aid:

If swallowed, induce vomiting immediately as directed by medical personnel. Never give anything by mouth to an unconscious person. If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes. Remove contaminated clothing and shoes. Wash clothing before reuse. In all cases, seek medical attention.

Product Use: Laboratory Reagent.

Disclaimer:

Blue Nano provides the information contained herein in good faith and makes no representation as to its comprehensiveness or accuracy. This document is intended only as a guide to the appropriate precautionary handling of the material by a properly trained person using this product. Individuals receiving the information must exercise their independent judgment in determining its appropriateness for a particular purpose. Blue Nano makes no representations or warranties either express or implied, regarding the suitability of the material for any purpose or the accuracy of the information contained within this document. Accordingly, Blue Nano will not be responsible for damages resulting from use of or reliance upon this information.