

Safety Data Sheet

acc. to OSHA

1 - Identification of Substance:

Product Identifiers: Silver Nanowires & Water

Formula: AG

Chemical Family: Silver Nanowires

Synonyms: AG nanowires, AGNWs, Silver Nws, Silver Nanowires, Silver Nanoparticles

CAS Number: **7440-22-4**

Manufacturer/Supplier:

Cheap Tubes Inc.

3992 Rte 121 E #3

Cambridgeport, VT 05141

Phone : (802) 869-5555

Fax: (802) 869-5554

www.cheaptubes.com

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All Materials Sold by Cheap Tubes Inc are for Research & Development Only.

2 - Hazards Identification

Potential Health Effects



Signal Word- Danger

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.

Information pertaining to particular dangers for man and environment R 36/37 Irritating to eyes and respiratory system.

3 - Composition/Data on Components:

Chemical Characterization:

Description: (CAS#) 7440-22-4

<u>Component</u>	<u>%</u>
Silver	0.1-5%
Water	up to 99.9%

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 swallowing If conscious, wash out mouth with water. Seek medical attention immediately

5 - Fire Fighting Measures

Fire: Any very finely divided particles (ultra-fine powder) may burn in air. Combustion of silver nanowire may cause the release of toxic metal oxide fume. Pyrophoric/Autoignition: No

Explosion: This material, like most materials in powder form, is capable of creating a dust explosion.

Fire Extinguishing Media: Sand or dry powder type specially designed for metal powder fires. Do not use water.

Special Information: 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.

NFPA Ratings: Health=1, Flammability=0, Reactivity=1

6 - Accidental Release Measures

In case of a leak or spill, evacuate area, shut off all sources of ignition and use nonsparking tools.

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. Do not let this chemical enter the environment.

7 - Handling and Storage

Store in a tightly closed container in a cool, dry, ventilated area. Protect from physical damage, ignition sources and electrostatic discharges. Isolate from incompatible substances. 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 - Airborne Exposure Limits:

- 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.

Respiratory Protection 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 and Chemical Properties

Appearance: Gray suspension

Color: Gray
Odor: Solution odour
Average diameter: 70~140nm
Length: 10~50µm
Purity: >99.6%
Dispersion: In Di Water
Theoretical Density: Not available
Bulk Density: Not available
Molecular Weight: Not available
PH: Not available
Boiling Point: Not available
Melting Point: Not available
Vapor Density (Air=1): Not available
Vapor Pressure: Not available
Evaporation Rate: Not available
Viscosity: Not applicable
Decomposition
Temp: Not available

10 - Stability and Reactivity

Stability: Stable under ordinary conditions of use and storage.

Hazardous Decomposition Products: Metal oxide fume.

Hazardous Polymerization: Will not occur.

Incompatibilities: Silver is incompatible with acetylene, ammonia, strong hydrogen peroxide solutions, strong acids, oxalic acid, tartaric acid, bromoazide, chlorine trifluoride, and ethyleneimine.

Conditions to Avoid: Dust generation and incompatibles.

11 - Toxicological Information

- **NTP Known Carcinogen:** No
- **NTP Anticipated Carcinogen:** No
- **IARC Category:** None
- **Acute toxicity:** Unknown
- **Inhalation:** May be harmful if inhaled. Material may be irritating to nasal septum, throat, mucous membranes and upper respiratory tract.
- **On the skin:** May cause skin irritation or ulceration.

- **On the eye:** May cause eye irritation or blue-gray eyes.
- **Sensitization:** No sensitizing effects known.

12 - Ecological information:

General notes:

Do not allow this material to be released to the environment!

This substance may be hazardous to the environment; special attention should be given to aquatic organisms

Ecological information on carbon nanotubes may be found at the website of the International Council on Nanotechnology at <http://icon.rice.edu/>. Cheap Tubes recommends the use of Hazardous Materials Remediation companies for dealing with Nano Waste. Companies such as Safety Kleen are good companies to dispose of your Nano waste with.

13 - Disposal considerations

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.

Recommendation:

Disposal must be made according to official regulations. Contact a hazardous materials removal company. Keep all silver nanowire waste, packaging, and contaminated items segregated from other waste and dispose of with a materials removal company such as Saftey Kleen or others.

14 - Transport information

Not a hazardous material for transportation in Di Water.

15 - Regulations

Product related hazard informations:

This material is listed on the US Toxic Substances Control Act (TSCA) Inventory and the following chemical inventories: Canadian Domestic Substances List (DSL), European Inventory of Existing Commercial Chemical Substances (EINECS), Korean Existing Chemicals List (ECL), Australian Inventory of Chemical Substances (AICS), the Philippines Inventory of Chemicals and Chemical Substances (PICCS), and the Swiss Giftliste 1 Inventory of Notified New Substances. In addition, this substance is not regulated in Japan and excluded from the Japanese Chemical Substances Control Law according to the Japanese Ministry of Economy, Trade and Industry, formerly the Ministry of International Trade and Industry (MITI).

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: 0

Reactivity: 0

Personal Protection: j

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

Health: 2

Flammability: 0

16 - Other Information:

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

Label Precautions:

Do not get in eyes, on skin or on clothing.

Do not breathe dust.

Wash thoroughly after handling.

Keep container closed.

Use with adequate ventilation.

Label First Aid:

If inhaled, remove to fresh air. If breathing difficulties persist, get medical attention. In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes. If irritation develops or persists, get medical attention.

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