

SAFETY DATA SHEET

Issuing date 2013-08-26

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Version 1.03

1. IDENTIFICATION OF THE SUBSTANCE/MIXTURE AND OF THE COMPANY/UNDERTAKING

Product name: Ag NANOWIRE IN IPA 55 NM CLASS

Product code: 27018267

Supplier Carestream Health, Inc., 150 Verona Street, Rochester, New York 14608

For Emergency Health Information call: 800-424-9300

For other information contact: 800-328-2910

Synonyms AgNW in IPA - 1.85 +/- 0.04% solids

Product Use: Manufacturing chemical.

2. HAZARDS IDENTIFICATION

Classification

Serious eye damage/eye Irritation	Category 2
Specific target organ toxicity (single exposure)	Category 3
Flammable liquids	Category 2

Label Elements

Emergency Overview

Signal Word

DANGER

Hazard statements

May be harmful if swallowed

Causes serious eye irritation

May cause respiratory irritation. May cause drowsiness or dizziness

Highly flammable liquid and vapor



Appearance No information available

Physical state liquid

Odor Irritating

Precautionary Statements - Prevention

Wash face, hands and any exposed skin thoroughly after handling. Avoid breathing dust/fume/gas/mist/vapors/spray. Use only outdoors or in a well-ventilated area. Keep away from heat/sparks/open flames/hot surfaces. — No smoking. Keep container tightly closed. Ground/bond container and receiving equipment. Use explosion-proof electrical/ventilating/lighting/ other /equipment. Use only non-sparking tools. Take precautionary measures against static discharge. Wear protective gloves/protective clothing/eye protection/face protection. Keep cool.

Precautionary Statement - Response

IF exposed or concerned.

Eyes

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.

Skin

IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower.

Inhalation

IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing. Call a POISON CENTER or doctor/physician if you feel unwell.

Fire

In case of fire: Use CO₂, dry chemical, or foam for extinction.

Precautionary Statement - Storage

Store in a closed container.

Precautionary Statements - Disposal

Dispose of contents/container to an approved waste disposal plant.

Hazards not otherwise classified (HNOC)

- not applicable

Other information

Very toxic to aquatic life Very toxic to aquatic life with long lasting effects The toxicological properties of silver nanowires have not been fully investigated. Some studies suggest that exposure to some engineered nanoparticles can cause adverse health effects in lab animals. Silver nanoparticles may cause pulmonary inflammation and may be a weak skin sensitizer. Take precautions to prevent exposure.

3. COMPOSITION/INFORMATION ON INGREDIENTS

Synonyms

AgNW in IPA - 1.85 +/- 0.04% solids.

Chemical Name	CAS-No	Weight %	Trade Secret
Isopropyl alcohol 67-63-0	67-63-0	85-95	*
Silver 7440-22-4	7440-22-4	1-10	*
Polyvinyl pyrrolidone 9003-39-8	9003-39-8	0.1-1.0	*

*The exact percentages (concentrations) have been withheld as trade secrets.

4. FIRST AID MEASURES

First Aid Measures**General advice**

Call 911 or emergency medical service. Remove and isolate contaminated clothing and shoes.

Eye contact

In case of contact with substance, immediately flush skin or eyes with running water for at least 20 minutes.

Skin contact

Wash off immediately with soap and plenty of water while removing all contaminated clothes and shoes. If symptoms persist, call a physician.

Inhalation

Move victim to fresh air. Apply artificial respiration if victim is not breathing. Administer oxygen if breathing is difficult.

Ingestion	Do NOT induce vomiting. Drink plenty of water. Rinse mouth. Never give anything by mouth to an unconscious person. Call a physician or Poison Control Center immediately.
Protection of First-aiders	Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves.
<u>Most important symptoms and effects, both acute and delayed</u>	
Main Symptoms	Irritation. Central nervous system depression.
<u>Indication of any immediate medical attention and special treatment needed</u>	
Notes to physician	Keep victim warm and quiet. Effects of exposure (inhalation, ingestion or skin contact) to substance may be delayed.

5. FIRE-FIGHTING MEASURES

Suitable Extinguishing Media

Dry chemical, CO₂, water spray or alcohol-resistant foam. Water spray, fog or alcohol-resistant foam.

Unsuitable Extinguishing Media

CAUTION: All these products have a very low flash point. Use of water spray when fighting fire may be inefficient. Do not use straight streams. Do not use dry chemical extinguishers to control fires involving nitromethane or nitroethane.

Specific hazards arising from the chemical

Most vapors are heavier than air. They will spread along ground and collect in low or confined areas (sewers, basements, tanks). Vapors may form explosive mixtures with air. Vapors may travel to source of ignition and flash back. Vapor explosion hazard indoors, outdoors or in sewers. Those substances designated with a "P" may polymerize explosively when heated or involved in a fire. Runoff to sewer may create fire or explosion hazard.

Hazardous Combustion Products

Carbon monoxide. Carbon dioxide (CO₂). Silver oxides.

Explosion Data

Sensitivity to Mechanical Impact None.

Sensitivity to Static Discharge None.

Protective Equipment and Precautions for Firefighters

Move containers from fire area if you can do it without risk. As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures

Personal precautions ELIMINATE all ignition sources (no smoking, flares, sparks or flames in immediate area). All equipment used when handling the product must be grounded. Do not touch or walk through spilled material. Stop leak if you can do it without risk. Use personal protective equipment. Avoid contact with skin, eyes and clothing.

Other information Water spray may reduce vapor; but may not prevent ignition in closed spaces.

Environmental precautions

Environmental precautions Prevent entry into waterways, sewers, basements or confined areas. Beware of vapors accumulating to form explosive concentrations. Vapors can accumulate in low areas. Try to prevent the material from entering drains or water courses. Prevention of fire and explosion. Recover the product in solid form, if possible.

Methods and material for containment and cleaning up

Methods for Containment	A vapor suppressing foam may be used to reduce vapors. Absorb or cover with dry earth, sand or other non-combustible material and transfer to containers.
Methods for cleaning up	Use a non-combustible material like vermiculite, sand or earth to soak up the product and place into a container for later disposal.

7. HANDLING AND STORAGE**Precautions for safe handling**

Advice on safe handling	Keep away from open flames, hot surfaces and sources of ignition. Take precautionary measures against static discharges. Use only in an area containing flame proof equipment. To avoid ignition of vapors by static electricity discharge, all metal parts of the equipment must be grounded. Use only in area provided with appropriate exhaust ventilation. Wear personal protective equipment. Prevent the formation of vapors, mists and aerosols. There is a hazard associated with rags, paper or any other material used to remove spills which become soaked with product. Avoid accumulation of these: they are to be disposed of safely after use. Avoid static electricity build up with connection to earth.
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Conditions for safe storage, including any incompatibilities

Technical measures/Storage conditions	Keep containers tightly closed in a dry, cool and well-ventilated place. Keep away from open flames, hot surfaces and sources of ignition.
Incompatible products	Strong oxidizing agents. Strong acids.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION**Control parameters****Exposure Guidelines**

Chemical Name	ACGIH TLV	AIHA - Workplace Environmental Exposure Levels (WEELs) - TWAs	OSHA PEL	Advisory OEL
Isopropyl alcohol 67-63-0	STEL 400 ppm TWA: 200 ppm		TWA: 400 ppm TWA: 980 mg/m ³	
Silver 7440-22-4	TWA: 0.1 mg/m ³		TWA: 0.01 mg/m ³	

Other Exposure Guidelines	Little is known about the occupational exposure to silver nanowires which means that regulatory bodies like OSHA have not identified any exposure guidelines for silver nanowires. Refer to "Approaches to Safe Nanotechnology" by the National Institute Occupational Safety & Health (NIOSH) for hazard assessment and risk management techniques.
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Appropriate engineering controls

Engineering Measures	Ensure adequate ventilation. Apply technical measures to comply with the occupational exposure limits. Showers. Eyewash stations.
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Individual protection measures, such as personal protective equipment

Eye/Face Protection	Tightly fitting safety goggles Face-shield
Skin and body protection	Wear protective gloves/clothing.

Respiratory protection

If exposure limits are exceeded or irritation is experienced, NIOSH/MSHA approved respiratory protection should be worn. Positive-pressure supplied air respirators may be required for high airborne contaminant concentrations. Respiratory protection must be provided in accordance with current local regulations.

Hygiene measures

When using, do not eat, drink or smoke. Provide regular cleaning of equipment, work area and clothing.

9. PHYSICAL AND CHEMICAL PROPERTIES

PHYSICAL AND CHEMICAL PROPERTIES

Physical state	liquid	Odor	Irritating
Appearance	No information available	Odor Threshold	No information available
Color	gray		
Property	Values	Remarks/ • Method	
ph		No information available	
Melting point/range:		No information available	
Boiling point/boiling range	82 °C	Estimated	
Flash Point	12.7 °C 53 °F	Estimated.	
Evaporation rate		No information available	
Flammability (solid, gas)			
upper flammability limit			
lower flammability limit			
Vapor pressure		No information available	
Vapor density		No information available	
Specific Gravity		No information available	
Water Solubility		No information available	
Solubility in other solvents		No information available	
Partition coefficient: n-octanol/water		No information available	
Autoignition temperature		No information available	
Decomposition temperature		No information available	
Viscosity, kinematic		No information available	
Viscosity, dynamic		No information available	
Explosive properties	No information available		
Oxidizing Properties	No information available		
Other information			
Softening point	No information available		
Density VALUE	No information available		
Bulk Density VALUE	No information available		

10. STABILITY AND REACTIVITY

Reactivity

not applicable

Chemical stability

Stable under normal conditions. May form explosive peroxides.

Possibility of hazardous reactions

Hazardous polymerization does not occur.

Conditions to Avoid

Keep away from open flames, hot surfaces and sources of ignition. Heat, flames and sparks.

Incompatible Materials

Strong oxidizing agents. Strong acids.

Hazardous Decomposition ProductsCarbon monoxide (CO). Carbon dioxide (CO₂). Silver oxides.**11. TOXICOLOGICAL INFORMATION****Information on likely routes of exposure****Product Information**

The toxicological properties of silver nanowires have not been fully investigated. Some studies suggest that exposure to some engineered nanoparticles can cause adverse health effects in lab animals. Silver nanoparticles may cause pulmonary inflammation and may be a weak skin sensitizer. Take precautions to prevent exposure.

Inhalation

May cause irritation of respiratory tract. May cause central nervous system depression with nausea, headache, dizziness, vomiting, and incoordination.

Eye contact

Avoid contact with eyes. Causes eye irritation.

Skin contact

Avoid contact with skin. Irritating to skin. Repeated exposure may cause skin dryness or cracking.

Ingestion

May be harmful if swallowed. Ingestion may cause gastrointestinal irritation, nausea, vomiting and diarrhea. May cause additional effects as listed under "Inhalation".

Toxicology data for the components

Chemical Name	LD50 Oral	LD50 Dermal	LC50 Inhalation
Isopropyl alcohol 67-63-0	4396 mg/kg (Rat)	12800 mg/kg (Rat) 12870 mg/kg (Rabbit)	72.6 mg/L (Rat) 4 h
Silver 7440-22-4	2000 mg/kg (Rat)		
Polyvinyl pyrrolidone 9003-39-8	100 g/kg (Rat)		

Chemical Name	Other applicable information
Isopropyl alcohol	Ingestion of large amounts of isopropyl alcohol may cause headache, dizziness, incoordination, vomiting, confusion, kidney injury, coma and death. Prolonged exposure to high vapour concentrations may cause irritation of the eyes, nose, and throat and narcosis. Can cause CNS effects.
Silver	Excessive absorption of silver compounds from chronic overexposure may result in argyria, a bluish-gray discoloration of the skin, eyes, and mucous membranes.

Information on toxicological effects**Symptoms**

Symptoms of overexposure may be headache, dizziness, tiredness, nausea and vomiting.

Delayed and immediate effects as well as chronic effects from short and long-term exposure**Sensitization**

No information available.

mutagenic effects

No information available.

Carcinogenicity

Contains no ingredient listed as a carcinogen.

Chemical Name	ACGIH	IARC	NTP	OSHA
Isopropyl alcohol 67-63-0		-		

IARC: (International Agency for Research on Cancer)

Group 1 - Carcinogenic to Humans

OSHA: (Occupational Safety & Health Administration)

X - Present

Reproductive toxicity	No information available.
STOT - single exposure	No information available
STOT - repeated exposure	No information available
Chronic toxicity	Excessive absorption of silver compounds from chronic overexposure may result in argyria, a bluish-gray discoloration of the skin, eyes, and mucous membranes. Prolonged skin contact may defat the skin and produce dermatitis. Avoid repeated exposure.
Target Organ Effects	Respiratory system, Central nervous system, Nasal Septum, Eyes, Skin.
Aspiration Hazard	No information available.

Numerical measures of toxicity - Product Information

Unknown Acute Toxicity

The following values are calculated based on chapter 3.1 of the GHS document .

ATEmix (oral)	3960 mg/kg
ATEmix (dermal)	11514 mg/kg
ATEmix (inhalation-dust/mist)	72.6 mg/L
ATEmix (inhalation-vapor)	72.6 mg/L

12. ECOLOGICAL INFORMATION

Ecotoxicity

1% of the mixture consists of components(s) of unknown hazards to the aquatic environment

Chemical Name	Toxicity to algae	Toxicity to fish	Toxicity to microorganisms	Toxicity to daphnia and other aquatic invertebrates
Isopropyl alcohol 67-63-0	1000 mg/L EC50 96 h (Desmodesmus subspicatus) 1000 mg/L EC50 72 h (Desmodesmus subspicatus)	LC50= 9640 mg/L Pimephales promelas 96 h LC50= 11130 mg/L Pimephales promelas 96 h LC50> 1400000 µg/L Lepomis macrochirus 96 h		EC50 = 13299 mg/L 48 h (Daphnia magna)
Silver 7440-22-4		LC50 0.00155 - 0.00293 mg/L Pimephales promelas 96 h LC50= 0.0062 mg/L Oncorhynchus mykiss 96 h LC50= 0.064 mg/L Lepomis macrochirus 96 h		EC50 = 0.00024 mg/L 48 h (Daphnia magna)

Persistence and degradability

No information available.

Bioaccumulation:

Not likely to bioaccumulate.

Chemical Name	log Pow
Isopropyl alcohol 67-63-0	0.05

13. DISPOSAL CONSIDERATIONS

Waste treatment methods

Waste Disposal Methods	This material, as supplied, is a hazardous waste according to federal regulations (40 CFR 261). Recover silver before disposal.
Contaminated packaging	Do not re-use empty containers. Dispose of in accordance with local regulations.
US EPA Waste Number	D001

Chemical Name	RCRA	RCRA - Basis for Listing	RCRA - D Series Wastes	RCRA - U Series Wastes
Silver 7440-22-4		Included in waste stream: F039	5.0 mg/L regulatory level	

This product contains one or more substances that are listed with the State of California as a hazardous waste.

Chemical Name	California Hazardous Waste Status
Isopropyl alcohol 67-63-0	Toxic Ignitable
Silver 7440-22-4	Toxic

14. TRANSPORT INFORMATION

The information given below is provided to assist in documentation. It may supplement the information on the package. The package in your possession may carry a different version of the label depending on the date of manufacture. Depending on inner packaging quantities and packaging instructions, it may be subject to specific regulatory exceptions. Please consult the product packaging for further details.

DOT

UN/ID No	UN1219
Proper Shipping Name	Isopropanol solution
Hazard class	3
Packing Group	II
Special Provisions	IB2, T4, TP1
Emergency Response Guide Number	129

TDG

UN/ID No	UN1219
Proper Shipping Name	Isopropanol solution
Hazard class	3
Packing Group	II

ICAO/IATA

UN/ID No	UN1219
Proper Shipping Name	Isopropanol solution
Hazard class	3
Packing Group	II
ERG Code	3L
Special Provisions	A180

IMDG/IMO

UN/ID No	UN1219
Proper Shipping Name	Isopropanol solution
Hazard class	3
Packing Group	II
EmS No.	F-E, S-D

For transportation information, go to: <http://ship.carestreamhealth.com>.

15. REGULATORY INFORMATION

"Does not comply" indicates a component is either not on the public inventory or is subject to exemption requirements. If additional information is needed contact Carestream Health.

International Inventories

TSCA	Complies
DSL/NDL	Complies
EINECS/ELINCS	Does not comply
ENCS	Does not comply
IECSC	Complies
KECL	Complies
PICCS	Complies
AICS	Complies
NZIoC	Complies

Legend

EINECS/ELINCS - European Inventory of Existing Commercial Chemical Substances/EU List of Notified Chemical Substances

TSCA - United States Toxic Substances Control Act Section 8(b) Inventory

DSL/NDL - Canadian Domestic Substances List/Non-Domestic Substances List

ENCS - Japan Existing and New Chemical Substances

IECSC - China Inventory of Existing Chemical Substances

KECL - Korean Existing and Evaluated Chemical Substances

PICCS - Philippines Inventory of Chemicals and Chemical Substances

AICS - Australian Inventory of Chemical Substances

NZIoC - New Zealand Inventory of Chemicals

U.S. Federal Regulations**SARA 313**

Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA). This product contains a chemical or chemicals which are subject to the reporting requirements of the Act and Title 40 of the Code of Federal Regulations, Part 372:

Chemical Name	SARA 313 - Threshold Values %
Isopropyl alcohol - 67-63-0	1.0
Silver - 7440-22-4	1.0

SARA 311/312 Hazard Categories

Acute Health Hazard	Yes
Chronic Health Hazard	Yes
Fire Hazard	Yes
Sudden Release of Pressure Hazard	No
Reactive Hazard	No

Clean Water Act

This product contains the following substances which are regulated pollutants pursuant to the Clean Water Act (40 CFR 122.21 and 40 CFR 122.42):

Chemical Name	CWA - Reportable Quantities	CWA - Toxic Pollutants	CWA - Priority Pollutants	CWA - Hazardous Substances
Silver		X	X	

Clean Air Act, Section 112 Hazardous Air Pollutants (HAPs) (see 40 CFR 61)

This product does not contain any substances regulated as hazardous air pollutants (HAPS) under Section 112 of the Clean Air Act Amendments of 1990.

CERCLA

This material, as supplied, contains one or more substances regulated as a hazardous substance under the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) (40 CFR 302):

Chemical Name	Hazardous Substances RQs	Extremely Hazardous Substances RQs	SARA Product RQ
Silver	1000 lb		

TSCA

Chemical Name	U.S. - TSCA (Toxic Substances Control Act) - Section 4 - Chemical Test Rules (40 CFR 799)	U.S. - TSCA (Toxic Substances Control Act) - Section 5(a)(2) - Chemicals with Significant New Use Rules (SNURs)
Isopropyl alcohol	40 CFR 799.2325	
Chemical Name	U.S. - TSCA (Toxic Substances Control Act) - Section 8(d) - 716.120(a) - Health and Safety Reporting - List of Substances	
Isopropyl alcohol	12/15/1986	

U.S. State Regulations**California Proposition 65**

This product does not contain any Proposition 65 chemicals.

U.S. State Right-to-Know Regulations

Chemical Name	Massachusetts	New Jersey	Pennsylvania	Illinois	Rhode Island
Isopropyl alcohol	X	X	X		X
Silver	X	X	X		X

International Regulations**Mexico - Grade** Serious risk, Grade 3

Chemical Name	Carcinogen Status	Exposure Limits
Isopropyl alcohol		Mexico: TWA 400 ppm Mexico: TWA 980 mg/m ³ Mexico: STEL 500 ppm Mexico: STEL 1225 mg/m ³
Silver		Mexico: TWA 0.1 mg/m ³

16. OTHER INFORMATION

NFPA
HMIS

Health Hazard 1
Health Hazard 2*

Flammability 3
Flammability 3

Instability 0
Physical Hazard 0

Revision Date 2013-08-26
Revision Note 1 Name change
Disclaimer

The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text.

End of Material Safety Data Sheet