

SILVER NITRATE

GHS Safety Data Sheet

Version No:3

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Section 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME

SILVER NITRATE

OTHER NAMES

N-O3-Ag, N-O3-Ag, AgNO₃, "silver (I) nitrate", "silver (I) nitrate", "lunar caustic", "nitric acid, silver (1+) salt", "Argenti Nitras", "Nitrato de Plata", "J.T. Baker", "3426, 3429", Mallinckrodt, "2160, 2169, 7992"

PROPER SHIPPING NAME

SILVER NITRATE

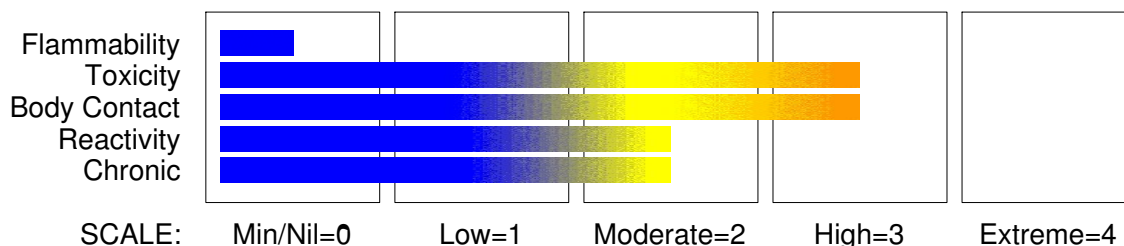
PRODUCT USE

In photography; manufacture of mirrors; silver plating; sympathetic and indelible inks; dyeing hair; colouring porcelain.
Extensively used in analytical chemistry.
In medicine, sterile 0.2-0.6% solutions are used for eye drops.

SUPPLIER

Company: S D FINE- CHEM LIMITED
Address:
315- 317, T.V. INDUSTRIAL ESTATE,
248, WORLI,
MUMBAI- 400030.INDIA.
technical@sdfine.com
Telephone: 91- 22- 24959898
Telephone: 91- 22- 24959899
Fax: 91- 22- 24937232

HAZARD RATINGS



Section 2 - HAZARDS IDENTIFICATION

GHS Classification

Acute Toxicity (Inhalation) Category 4
Acute Toxicity (Oral) Category 2

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Section 2 - HAZARDS IDENTIFICATION

Chronic Aquatic Hazard Category 1
Oxidizing Solid Category 2
Skin Corrosion/Irritation Category 1C



EMERGENCY OVERVIEW

HAZARD

DANGER

Determined by using GHS criteria:

H272 H300 H332 H314 H410

May intensify fire; oxidizer

Fatal if swallowed

Harmful if inhaled

Causes severe skin burns and eye damage

Very toxic to aquatic life with long lasting effects

PRECAUTIONARY STATEMENTS

Prevention

Do not eat, drink or smoke when using this product.

Do not breathe dust or mist.

Wash hands thoroughly after handling.

Wear protective gloves/clothing and eye/face protection.

Wash thoroughly after handling.

Take any precaution to avoid mixing with combustible or incompatible materials.

Avoid breathing dust/fume/gas/mist/vapours/spray.

Use only outdoors or in a well ventilated area.

Keep away from heat.

Response

IF INHALED: Remove to fresh air and keep at rest in a position comfortable for breathing.

Call a POISON CENTER or doctor/physician if you feel unwell.

Immediately call a POISON CENTER or doctor/physician.

Wash contaminated clothing before reuse.

IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.

IF SWALLOWED: Rinse mouth. Do NOT induce vomiting.

Specific treatment: refer to Label or MSDS.

IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician.

If on skin or hair: remove/take off immediately all contaminated clothing. Rinse with water/shower.

Storage

Store away from combustibles and incompatible materials

Store locked up.

Disposal

Dispose of contents and container in accordance with relevant legislation.

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Section 3 - COMPOSITION / INFORMATION ON INGREDIENTS

NAME	CAS RN	%
silver nitrate	7761-88-8	> 99

Section 4 - FIRST AID MEASURES

SWALLOWED

Rinse mouth out with plenty of water.

For advice, contact a Poisons Information Centre or a doctor.

· IF SWALLOWED, REFER FOR MEDICAL ATTENTION, WHERE POSSIBLE, WITHOUT DELAY.

· For advice, contact a Poisons Information Centre or a doctor.

Where Medical attention is not immediately available or where the patient is more than 15 minutes from a hospital or unless instructed otherwise:

· Induce vomiting with fingers down the back of the of the throat, ONLY IF CONSCIOUS.

· Lean patient forward or place on left side (head-down position if possible) to maintain open airway and prevent aspiration.

NOTE: Wear a protective glove when inducing vomiting by mechanical means.

· In the mean time, qualified first-aid personnel should treat the patient following observation and employing supportive measures as indicated by the patient's condition.

· If the services of a medical officer or medical doctor are readily available, the patient should be placed in his/her care and a copy of the MSDS should be provided. Further action will be the responsibility of the medical specialist.

· If medical attention is not available on the worksite or surroundings send the patient to a hospital together with a copy of the MSDS.

EYE

If this product comes in contact with the eyes:

· Immediately hold eyelids apart and flush the eye continuously with running water.

· Ensure complete irrigation of the eye by keeping eyelids apart and away from eye and moving the eyelids by occasionally lifting the upper and lower lids.

· Continue flushing until advised to stop by the Poisons Information Centre or a doctor, or for at least 15 minutes.

· Transport to hospital or doctor without delay.

· Removal of contact lenses after an eye injury should only be undertaken by skilled personnel.

SKIN

If skin or hair contact occurs:

· Immediately flush body and clothes with large amounts of water, using safety shower if available.

· Quickly remove all contaminated clothing, including footwear.

· Wash skin and hair with running water. Continue flushing with water until advised to stop by the Poisons Information Centre.

· Transport to hospital, or doctor.

INHALED

· If fumes or combustion products are inhaled remove from contaminated area.

· Lay patient down. Keep warm and rested.

· Prosthesis such as false teeth, which may block airway, should be removed, where possible, prior to initiating first aid procedures.

· Apply artificial respiration if not breathing, preferably with a demand valve resuscitator, bag-valve mask device, or pocket mask as trained. Perform CPR if necessary.

· Transport to hospital, or doctor.

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SILVER NITRATE

NOTES TO PHYSICIAN

The toxicity of nitrates and nitrites result from their vasodilating properties and their propensity to form methaemoglobin.

- Most produce a peak effect within 30 minutes.
- Clinical signs of cyanosis appear before other symptoms because of the dark pigmentation of methaemoglobin.
- Initial attention should be directed towards improving oxygen delivery, with assisted ventilation, if necessary. Hyperbaric oxygen has not demonstrated conclusive benefits.
- Institute cardiac monitoring, especially in patients with coronary artery or pulmonary disease.
- Hypotension should respond to Trendelenburg's position and intravenous fluids; otherwise dopamine may be needed.
- Naloxone, glucose and thiamine should be given if a multiple ingestion is suspected.
- Decontaminate using Ipecac Syrup for alert patients or lavage for obtunded patients who present within 2-4 hours of ingestion.
- Symptomatic patients with methaemoglobin levels over 30% should receive methylene blue. (Cyanosis alone, is not an indication for treatment). The usual dose is 1-2 mg/kg of a 1% solution (10 mg/ml) IV over 5 minutes; repeat, using the same dose if symptoms of hypoxia fail to subside within 1 hour.

[Ellenhorn and Barceloux: Medical Toxicology]

BIOLOGICAL EXPOSURE INDEX - BEI

These represent the determinants observed in specimens collected from a healthy worker who has been exposed at the Exposure Standard (ES or TLV):

Determinant	Index	Sampling Time	Comments
1. Methaemoglobin in blood	1.5% of haemoglobin	During or end of shift	B, NS, SQ

B: Background levels occur in specimens collected from subjects NOT exposed

NS: Non-specific determinant; also observed after exposure to other materials

SQ: Semi-quantitative determinant - Interpretation may be ambiguous; should be used as a screening test or confirmatory test.

Section 5 - FIRE FIGHTING MEASURES

EXTINGUISHING MEDIA

- Jets of water.
- Water spray or fog.
- Foam.
- Dry chemical powder.
- BCF (where regulations permit).
- Carbon dioxide.

FIRE FIGHTING

- Alert Fire Brigade and tell them location and nature of hazard.
- May be violently or explosively reactive.
- Wear full body protective clothing with breathing apparatus.
- Prevent, by any means available, spillage from entering drains or water courses.
- Fight fire from a safe distance, with adequate cover.
- Extinguishers should be used only by trained personnel.
- Use water delivered as a fine spray to control fire and cool adjacent area.
- DO NOT approach containers suspected to be hot.
- Cool fire exposed containers with water spray from a protected location.
- If safe to do so, remove containers from path of fire.
- If fire gets out of control withdraw personnel and warn against entry.
- Equipment should be thoroughly decontaminated after use.

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Section 5 - FIRE FIGHTING MEASURES

FIRE/EXPLOSION HAZARD

Non flammable.

Will not burn but increases intensity of fire.

Decomposes on heating and produces toxic fumes of nitrogen oxides (NO_x), metal oxides.

Personal Protective Equipment

Gas tight chemical resistant suit.

Section 6 - ACCIDENTAL RELEASE MEASURES

EMERGENCY PROCEDURES

MINOR SPILLS

- Clean up all spills immediately.
- No smoking, naked lights, ignition sources.
- Avoid all contact with any organic matter including fuel, solvents, sawdust, paper or cloth and other incompatible materials, as ignition may result.
- Avoid breathing dust or vapours and all contact with skin and eyes.
- Control personal contact by using protective equipment.
- Contain and absorb spill with dry sand, earth, inert material or vermiculite.
- DO NOT use sawdust as fire may result.
- Scoop up solid residues and seal in labelled drums for disposal.
- Neutralise/decontaminate area.

MAJOR SPILLS

- Clear area of personnel and move upwind.
- Alert Fire Brigade and tell them location and nature of hazard.
- May be violently or explosively reactive.
- Wear full body protective clothing with breathing apparatus.
- Prevent, by any means available, spillage from entering drains or water course.
- Consider evacuation (or protect in place).
- No smoking, flames or ignition sources.
- Increase ventilation.
- Contain spill with sand, earth or other clean, inert materials.
- NEVER use organic absorbents such as sawdust, paper, cloth; as fire may result.
- Avoid any contamination by organic matter.
- Use spark-free and explosion-proof equipment.
- Collect any recoverable product into labelled containers for possible recycling.
- DO NOT mix fresh with recovered material.
- Collect residues and seal in labelled drums for disposal.
- Wash area and prevent runoff into drains.
- Decontaminate equipment and launder all protective clothing before storage and re-use.
- If contamination of drains or waterways occurs advise emergency services.

EMERGENCY RESPONSE PLANNING GUIDELINES (ERPG)

The maximum airborne concentration below which it is believed that nearly all individuals could be exposed for up to one hour WITHOUT experiencing or developing

life-threatening health effects is:

silver nitrate 15 mg/m³

irreversible or other serious effects or symptoms which could impair an individual's ability to take protective action is:

silver nitrate 0.075 mg/m³

other than mild, transient adverse effects without perceiving a clearly defined odour is:

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Section 6 - ACCIDENTAL RELEASE MEASURES

silver nitrate 0.045 mg/m³

The threshold concentration below which most people will experience no appreciable risk of health effects:

silver nitrate 0.015 mg/m³

American Industrial Hygiene Association (AIHA)

Ingredients considered according to the following cutoffs

Very Toxic (T+)	$\geq 0.1\%$	Toxic (T)	$\geq 3.0\%$
R50	$\geq 0.25\%$	Corrosive (C)	$\geq 5.0\%$
R51	$\geq 2.5\%$		
else	$\geq 10\%$		

where percentage is percentage of ingredient found in the mixture

Personal Protective Equipment advice is contained in Section 8 of the MSDS.

Section 7 - HANDLING AND STORAGE

PROCEDURE FOR HANDLING

- Avoid personal contact and inhalation of dust, mist or vapours.
- Provide adequate ventilation.
- Always wear protective equipment and wash off any spillage from clothing.
- Keep material away from light, heat, flammables or combustibles.
- Keep cool, dry and away from incompatible materials.
- Avoid physical damage to containers.
- DO NOT repack or return unused portions to original containers. Withdraw only sufficient amounts for immediate use.
- Contamination can lead to decomposition leading to possible intense heat and fire.
- When handling NEVER smoke, eat or drink.
- Always wash hands with soap and water after handling.
- Use only good occupational work practice.
- Observe manufacturer's storing and handling directions.

SUITABLE CONTAINER

- Check that containers are clearly labelled.
- Packaging as recommended by manufacturer.
Dark amber or black glass bottles.

STORAGE INCOMPATIBILITY

Segregate from organic materials / compounds, combustible materials particularly finely divided combustible materials.
Silver or silver salts readily form explosive silver fulminate in the presence of both nitric acid and ethanol. The resulting fulminate is much more sensitive and a more powerful detonator than mercuric fulminate. Silver and its compounds and salts may also form explosive compounds in the presence of acetylene and nitromethane.

STORAGE REQUIREMENTS

Observe manufacturer's storing and handling recommendations.
Store in original containers. and Protect from light.
Store in a cool, dry and well-ventilated area.
Store in an isolated area away from other materials.
Keep storage area free of debris, waste and combustibles.
Protect containers against physical damage.
Keep containers securely sealed.
Check regularly for spills and leaks.

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Section 7 - HANDLING AND STORAGE

SAFE STORAGE WITH OTHER CLASSIFIED CHEMICALS



+: May be stored together

O: May be stored together with specific precautions

X: Must not be stored together

Section 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION

EXPOSURE CONTROLS

The following materials had no OELs on our records

- silver nitrate: CAS:7761- 88- 8

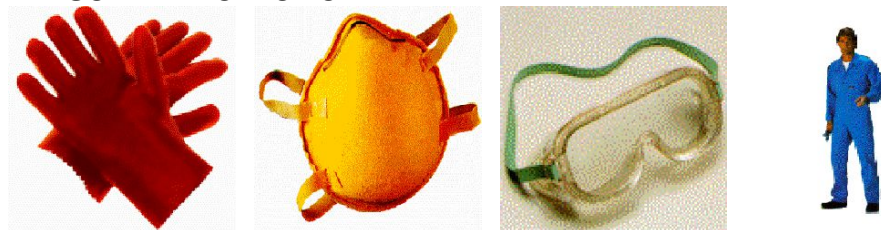
EMERGENCY EXPOSURE LIMITS

Material	Revised IDLH Value (mg/m3)	Revised IDLH Value (ppm)
silver nitrate	10	

MATERIAL DATA

The adopted TLV-TWA for silver dust and fumes is 0.1 mg/m³ and for the more toxic soluble silver compounds the adopted value is 0.01 mg/m³. Cases of argyria (a slate to blue-grey discolouration of epithelial tissues) have been recorded when workers were exposed to silver nitrate at concentrations of 0.1 mg/m³ (as silver). Exposure to very high concentrations of silver fume has caused diffuse pulmonary fibrosis. Percutaneous absorption of silver compounds is reported to have resulted in allergy. Based on a 25% retention upon inhalation and a 10 m³/day respiratory volume, exposure to 0.1 mg/m³ (TWA) would result in total deposition of no more than 1.5 gms in 25 years.

PERSONAL PROTECTION



EYE

- Safety glasses with side shields; or as required,
- Chemical goggles.
- Contact lenses may pose a special hazard; soft contact lenses may absorb and concentrate irritants. A written policy document, describing the wearing of lens or restrictions on use, should be created for each workplace or task. This should include a review of lens absorption and adsorption for the class of chemicals in use and an account of injury experience. Medical and first-aid personnel should be trained in their removal and suitable equipment should be readily available. In the event of chemical exposure, begin eye irrigation immediately and remove contact lens as soon as practicable. Lens should be removed at the first signs of eye redness or irritation - lens should be removed in a clean environment only after workers have washed hands thoroughly. [CDC NIOSH Current Intelligence Bulletin 59].

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Section 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION

HANDS/FEET

Rubber gloves.

OTHER

- Overalls.
- Eyewash unit.

RESPIRATOR

Protection Factor	Half- Face Respirator	Full- Face Respirator	Powered Air Respirator
10 x ES	P1 Air- line*	- -	PAPR- P1 -
50 x ES	Air- line**	P2	PAPR- P2
100 x ES	-	P3	-
		Air- line*	-
100+ x ES	-	Air- line**	PAPR- P3

* - Negative pressure demand ** - Continuous flow.

The local concentration of material, quantity and conditions of use determine the type of personal protective equipment required.

For further information consult
your

Occupational Health and Safety Advisor.

ENGINEERING CONTROLS

General exhaust is adequate under normal operating conditions. If risk of overexposure exists, wear SAA approved respirator. Correct fit is essential to obtain adequate protection. Provide adequate ventilation in warehouse or closed storage areas. Air contaminants generated in the workplace possess varying "escape" velocities which, in turn, determine the "capture velocities" of fresh circulating air required to effectively remove the contaminant.

Type of Contaminant:

solvent, vapours, degreasing etc., evaporating from tank (in still air)
aerosols, fumes from pouring operations, intermittent container filling, low speed conveyer transfers, welding, spray drift, plating acid fumes, pickling (released at low velocity into zone of active generation)
direct spray, spray painting in shallow booths, drum filling, conveyer loading, crusher dusts, gas discharge (active generation into zone of rapid air motion)
grinding, abrasive blasting, tumbling, high speed wheel generated dusts (released at high initial velocity into zone of very high rapid air motion).

Air Speed:

0.25- 0.5 m/s (50- 100 f/min)

0.5- 1 m/s (100- 200 f/min.)

1- 2.5 m/s (200- 500 f/min)

2.5- 10 m/s (500- 2000 f/min.)

Within each range the appropriate value depends on:

Lower end of the range

- 1: Room air currents minimal or favourable to capture
- 2: Contaminants of low toxicity or of nuisance value only
- 3: Intermittent, low production.
- 4: Large hood or large air mass in motion

Upper end of the range

- 1: Disturbing room air currents
- 2: Contaminants of high toxicity
- 3: High production, heavy use
- 4: Small hood - local control only

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Section 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION

Simple theory shows that air velocity falls rapidly with distance away from the opening of a simple extraction pipe. Velocity generally decreases with the square of distance from the extraction point (in simple cases). Therefore the air speed at the extraction point should be adjusted, accordingly, after reference to distance from the contaminating source. The air velocity at the extraction fan, for example, should be a minimum of 1-2 m/s (200-400 f/min.) for extraction of solvents generated in a tank 2 meters distant from the extraction point. Other mechanical considerations, producing performance deficits within the extraction apparatus, make it essential that theoretical air velocities are multiplied by factors of 10 or more when extraction systems are installed or used.

Section 9 - PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE

Colourless transparent crystals or a white powder; slight nitric acid odour; mixes with water and ammonia solution. Hygroscopic.
Protect from light; turns grey / black on exposure to light. Traces of organic matter promote this photoreduction. Not photosensitive when pure.
Available as photographic, technical and BP grades.
When tested to UNDG 34.4.2 Test 0.2 Test for oxidising liquids, a (54% w/w) saturated aqueous solution is not a Class 5.1 oxidiser. UN Code 34.4.2.5

PHYSICAL PROPERTIES

Solid.

Mixes with water.

Molecular Weight: 169.8

Melting Range (°C): 212

Solubility in water (g/L): Miscible

pH (1% solution): 6

Volatile Component (%vol): Not applicable

Relative Vapour Density (air=1): Not applicable

Lower Explosive Limit (%): Not applicable

Autoignition Temp (°C): Not available.

State: Divided solid

Boiling Range (°C): 444 (decomposes)

Specific Gravity (water=1): 4.35 @ 19 C.

pH (as supplied): Not applicable

Vapour Pressure (kPa): Negligible.

Evaporation Rate: Non Volatile

Flash Point (°C): Non flammable.

Upper Explosive Limit (%): Not applicable

Decomposition Temp (°C): Not available

Viscosity: Not available

Section 10 - CHEMICAL STABILITY AND REACTIVITY INFORMATION

CONDITIONS CONTRIBUTING TO INSTABILITY

- Presence of incompatible materials.
- Product is considered stable.
- Hazardous polymerisation will not occur.

Section 11 - TOXICOLOGICAL INFORMATION

POTENTIAL HEALTH EFFECTS

ACUTE HEALTH EFFECTS

SWALLOWED

Toxic effects may result from the accidental ingestion of the material; animal experiments indicate that ingestion of less than 40 gram may be fatal or may produce serious damage to the health of the individual.

The material can produce chemical burns within the oral cavity and gastrointestinal tract

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SILVER NITRATE

Section 11 - TOXICOLOGICAL INFORMATION

following ingestion.

Considered an unlikely route of entry in commercial/industrial environments.

Ingestion may result in nausea, abdominal irritation, pain and vomiting.

EYE

The material can produce chemical burns to the eye following direct contact. Vapours or mists may be extremely irritating.

When applied to the eye(s) of animals, the material produces severe ocular lesions which are present twenty-four hours or more after instillation.

The material may produce severe irritation to the eye causing pronounced inflammation.

Repeated or prolonged exposure to irritants may produce conjunctivitis.

SKIN

The material can produce chemical burns following direct contact with the skin.

Open cuts, abraded or irritated skin should not be exposed to this material.

The material may accentuate any pre-existing skin condition.

INHALED

Evidence shows, or practical experience predicts, that the material produces irritation of the respiratory system in a substantial number of individuals following inhalation.

Not normally a hazard due to non-volatile nature of product.

CHRONIC HEALTH EFFECTS

Principal routes of exposure are by accidental skin and eye contact and inhalation of generated dusts.

Silver is one of the most physically and physiologically cumulative of the elements.

Chronic exposure to silver salts may cause argyria, a permanent ashen-grey discolouration of the skin, conjunctiva and internal organs (due to the deposit of an insoluble albuminate of silver).

The respiratory tract may also be a site of local argyria (following chronic inhalation exposures) with a mild chronic bronchitis being the only obvious symptom.

Chronic dust deposits in lungs may resemble a form of pneumoconiosis, although it carries no form of fibrosis.

TOXICITY AND IRRITATION

unless otherwise specified data extracted from RTECS - Register of Toxic Effects of Chemical Substances.

TOXICITY

Unreported (man) LDLo: 29 mg/kg

Oral (rat) LD50: 50 mg/kg

Reproductive effector in rats

Human lymphocyte mutagen

Equivocal tumorigen by RTECS criteria

IRRITATION

Eye (rabbit): 1 mg - SEVERE

Eye (rabbit): 10 mg - Moderate

Section 12 - ECOLOGICAL INFORMATION

Fish LC50 (96hr.) (mg/l): 0.51

Daphnia magna EC50 (48hr.) (mg/l): 0.043

The material is classified as an ecotoxin* because the Fish LC50 (96 hours) is less than or equal to 0.1 mg/l

* Classification of Substances as Ecotoxic (Dangerous to the Environment)

Appendix 8, Table 1

Compiler's Guide for the Preparation of International Chemical Safety Cards: 1993

Commission of the European Communities.

Toxicity Fish: LC50(96)1.6-30mg/L

Toxicity invertebrate: LC50(3)1.5mg/L

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Section 12 - ECOLOGICAL INFORMATION

Section 13 - DISPOSAL CONSIDERATIONS

Recycle wherever possible. and Consult manufacturer for recycling options.
Investigate possible silver reclamation - refer to Silver reprocessors.

Section 14 - TRANSPORTATION INFORMATION



Labels Required: OXIDIZING AGENT
HAZCHEM: 2X

UNDG:

Dangerous Goods Class: 5.1
UN Number: 1493
Shipping Name: SILVER NITRATE

Subrisk: None
Packing Group: II

Air Transport IATA:

ICAO/IATA Class: 5.1
UN/ID Number: 1493
Special provisions: None
Shipping Name: SILVER NITRATE

ICAO/IATA Subrisk: None
Packing Group: II

Maritime Transport IMDG:

IMDG Class: 5.1
UN Number: 1493
EMS Number: F- A, S- Q
Shipping Name: SILVER NITRATE

IMDG Subrisk: None
Packing Group: II
Special provisions: None

Section 15 - REGULATORY INFORMATION

REGULATIONS

silver nitrate (CAS: 7761-88-8) is found on the following regulatory lists;
International Council of Chemical Associations (ICCA) - High Production Volume List
OECD Representative List of High Production Volume (HPV) Chemicals

Section 16 - OTHER INFORMATION

The above information is believed to be accurate and represent the best information

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Section 16 - OTHER INFORMATION

currently available to us, but does not represent any warranty expressed or implied of the properties of the product. User should make their own investigation to determine the suitability of the information for their particular purpose.

Issue Date: 22-Jan-2018