

Version 1.3

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# MATERIAL SAFETY DATA SHEET

## SECTION 1 - PRODUCT AND COMPANY IDENTIFICATION

**PRODUCT NAME:** Chalcogenide Infra-Red Fiber

**PRODUCT DESCRIPTION:** infrared transmitting glass fiber

**INGREDIENTS:** Arsenic(III) sulfide, 99.99%

**CAS No.:** 1303-33-9

**EINECS/ELINCS No.:** 215-117-4

**PRODUCT CLASSIFIED AS:** hazardous

**DOT WARNING STATEMENT:** none considered necessary

**IDENTIFIED USES:** main component of IR-transmitting fiber optic cables, bundles, probes.

**PROHIBITED USES:** applications involving permanent implantation into the body; Life-sustaining medical applications

**DETAILS OF THE SUPPLIER OF THE SAFETY DATA SHEET:**

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## SECTION 2 - PHYSICAL DATA

**MELTING POINT:** 300°C

**BOILING POINT:** 707°C

**DENSITY:** 3.2 g/cm<sup>3</sup>

**VAP. PRESSURE:** 0 at room temperature

**VAP. DENSITY (AIR=1):** 0 at room temperature

**SOLUBILITY:** Insoluble in water and acids. Accelerated testing showed no changes after 7-day exposure to water (Ref. 1). Concentrated hydrochloric acid shows no effect after 12 hours. The glass maybe attacked by alkaline solutions.

**APPEARANCE:** Slightly transparent dark-red glassy looking fiber, soft, brittle, somewhat fragile, non-odorous. Usually is protected with black polyvinyl-chloride jacket.

**SPECIAL NOTE:** The physical characteristics of naturally occurring arsenic trisulfide (called orpiment, auri pigment, arsenic yellow, king's yellow, king's gold) (Ref. 3) are considerably different from Arsenic Trisulfide Glass, a manufactured product. Mineral arsenic trisulfide is a crystalline material while Arsenic Trisulfide Glass is amorphous. Amorphous forms of materials generally are more inert than crystalline forms. All hazards listed below are considered as a result of the contact with a significant amount of dust or fume.

## SECTION 3 - FIRE AND EXPLOSION HAZARD DATA

**FLASH POINT:** None

**FLAMMABLE LIMITS:** Non-flammable.

**LEL:** None; **UEL:** None.

**EXTINGUISHING MEDIA:** None required.

**SPECIAL FIRE FIGHTING PROCEDURES:** No special techniques required.

Use extinguisher type suitable for surrounding fire.

**SPECIAL NOTE:** Fire, explosion and reactivity hazard information found in the literature for the mineral arsenic trisulfide (orpiment), does not apply to Arsenic Trisulfide Glass, which is a stable product exhibiting no flammable properties. It is not easily oxidized as is naturally occurring arsenic trisulfide. Therefore, no special handling, storage or transportation precautions for fire prevention or extinguishment is required for Arsenic Trisulfide Glass.

**UNUSUAL FIRE AND EXPLOSION HAZARDS:** None.

## SECTION 4 - REACTIVITY DATA

**STABILITY:** Stable compound.

**INCOMPATIBILITY (MATERIALS TO AVOID):** None known.

**CONDITIONS TO AVOID:** None known.

**HAZARDOUS POLYMERIZATION:** Will not occur.

**HAZARDOUS DECOMPOSITION OR BY-PRODUCTS:** None known.

**SPECIAL NOTE:** Reactivity information found in the literature pertaining to the mineral form of arsenic trisulfide does not apply to Arsenic Trisulfide Glass. The arsenic and sulfur in the amorphous glass product is tightly bound and will not combine with the several chemical materials said to have adverse reactions with the naturally occurring form of arsenic trisulfide. Arsenic Trisulfide Glass is a stable, non-deteriorating, homogeneous glass (Ref. 4). Stability and optical characteristics of Arsenic Trisulfide Glass is also discussed in University of Michigan Research Report No. 2389-11-S and 2389-11-S1 (Ref. 5; Ref. 6).

## SECTION 5 - HEALTH HAZARD DATA

A Threshold Limit Value (TLV) has not been established for Arsenic Trisulfide Glass. Nor, has the Occupational Safety and Health Administration (OSHA) set a Permissible Exposure Limit (PEL). Separation of the individual components of CHALCOGENIDE GLASS INFRARED FIBER is not expected to occur. Recommended human exposure levels for the individual components of Arsenic Trisulfide Glass are as follows:

**ARSENIC COMPOUNDS.** 10 micrograms per cubic meter of air ( $\mu\text{g}/\text{m}^3$ ) determined as a time-weighted average (TWA) exposure for up to eight hours of exposure. (Source: OSHA 29 CFR 1900.1018).

**SULFUR COMPOUNDS.** No TLV or PEL has been established. Personal exposure should be limited to that of a nuisance dust ( $5 \mu\text{g}/\text{m}^3$  determined as a TWA exposure of up to eight hours (Source: OSHA 29 CFR 1910.1000, Subpart Z, Table Z-1, revised).

**ROUTE(S) OF ENTRY:** contact with dust, fumes or slurry.

**HEALTH HAZARDS (ACUTE AND CHRONIC):**

**Eye:** Causes eye irritation. May cause conjunctivitis.

**Skin:** Exposure to arsenic compounds may produce hyperpigmentation of the skin and hyperkeratosis of plantar and palmar surfaces as well as both primary irritation and sensitization types.

**Ingestion:** Harmful if swallowed as a fine powder. Causes gastrointestinal irritation with nausea, vomiting and diarrhea. Ingestion of large amounts may cause CNS depression. May cause garlic smell on the breath and body.

**Inhalation:** Dust and fume causes respiratory tract irritation. Exposure produces central nervous system depression. Inhalation of arsenic compounds may lead to irritation of the respiratory tract and to possible nasal perforation. Long-term exposure to arsenic compounds may produce impairment of peripheral circulation.

**Chronic:** Arsenic trioxide can cause cancer in humans. Other long term effects include: anemia, liver and kidney damage. Chronic exposure to arsenical dust may cause shortness of breath, nausea, chest pains, and garlic odor.

**SIGNS AND SYMPTOMS OF EXPOSURE:** Eye, skin, respiratory tract irritation, burning of the lips, throat constriction, swallowing difficulties, severe abdominal pain, severe nausea, projectile vomiting, and profuse diarrhea. May cause garlic smell on the breath and body.

**MEDICAL CONDITIONS GENERALLY AGGRAVATED BY EXPOSURE:** Treat symptomatically and supportively.

#### **EMERGENCY AND FIRST AID PROCEDURES:**

**Eyes** - Flush with plenty of water for 15 minutes after the contact with dust, fumes or slurry. Seek medical attention as for any eye injury.

**Skin** – Flush skin with plenty of water for 15 min while removing contaminated clothing and shoes. Wash clothing before reuse.

**Inhalation** - If ill effects develop, remove exposed person to fresh air. Keep person warm and quiet. Seek medical attention as for any severe respiratory exposure.

**Ingestion** - Seek medical assistance. Rinse mouth and drink 2-4 cupfuls of milk or water.

**POSSIBLE EFFECTS OF OVEREXPOSURE:** No adverse health effects should occur from exposure to Arsenic Trisulfide Glass. Under extreme conditions, individual components of Arsenic Trisulfide.

Glass material could possibly (although not likely) cause nonspecific symptoms. If heated to temperatures greater than 500 C°, decomposition of the product may allow the sulfur to react slowly with the atmosphere to form SO<sub>2</sub>. This is not a violent reaction. For this reason, prudence suggests that good general ventilation should be used with local exhaust ventilation added as may become necessary. No adverse health effects should occur from exposure to CHALCOGENIDE GLASS INFRARED FIBER. Arsenic Sulfide Glass is not absorbed through the skin. Contact of the skin with fiber end faces is not expected. Contact area would be 0,25mm<sup>2</sup> in the case of largest fiber diameter. Fiber side surface is protected with robust polymer and/or metal tubing.

## **SECTION 6 - SPILL, LEAK AND DISPOSAL PROCEDURES**

**WASTE DISPOSAL METHOD:** Due to content of inorganic arsenic the waste should be collected and disposed of in accordance with appropriate local, state or federal regulations.

## SECTION 7 - SPECIAL HANDLING INFORMATION

The handling with fiber optic cables, bundles and probes does not require special protection in addition to the usual one in laboratories.

All special measures are **only applicable to the areas for treatment or processing** of the CHALCOGENIDE INFRA-RED GLASS:

**VENTILATION:** Local ventilation should be provided that is sufficient to remove any dusts, mists or odors that may evolve during processing. Forced exhaust air of 100 lineal feet per minute (lfm) face velocity should be adequate. Avoid breathing any fumes or dusts that may be generated because of arsenic content of finished product.

**RESPIRATORY PROTECTION:** Not required under ordinary circumstances if adequate ventilation is provided. In unventilated areas a high efficiency respirator approved for toxic dusts should be used.

**PERSONAL PROTECTIVE EQUIPMENT (PPE):** Rubber gloves and plastic aprons should be provided during abrasive polishing operations. PPE is recommended to avoid contact with grinding sludge which may contain other contaminants that could cause adverse skin or health effects.

**EYE PROTECTION:** Chemical workers goggles or plastic face shields should be used to provide eye protection from dusts, fumes, mists or flying particles should product break or fragment during processing.

## SECTION 8 - SPECIAL PRECAUTIONS & ADDITIONAL INFORMATION

Special safety precautions are required in handling and storage of CHALCOGENIDE INFRARED CIR-FIBER:

- In general case chalcogenide fiber is not intended for laser power delivery at any wavelength! Burning could occur at micro-particles in fiber volume escaping hazardous products of decomposition. See Section 5.  
In particular case, the fiber can be used for low intensity laser radiation delivery. Total amount of burnt material at the fiber end does not exceed 40µg for the largest fiber diameter. Burning in the fiber volume does not lead to the release of gaseous products into atmosphere.
- Prevent any contact of the fibre with alkalis.
- Prevent the heating of the fiber over 80°C as it results in its irreversible damage.
- Protect the fibre tips by non-transparent caps against any contamination and mechanical damage. Remove the caps only for necessary operations. Manufacturer reports about slight sensitivity of chalcogenide glass to UV and visible irradiation.
- If some contamination is on the fibre surface, then wipe it carefully with isopropanol or acetone.

Polymer coating materials used to provide flexibility and protection from mechanical damage, may decompose at elevated temperatures and emit ammonia-like odors. This does not cause a significant exposure or represent a health hazard. Increasing the local exhaust ventilation will remove any odor problem.

## SECTION 9 - SECTION 313 SUPPLIER NOTIFICATION

This product contains the following listed chemical subject to the reporting requirements of Section 313 of the Emergency Planning and Community Right-To-Know Act of 1986 and of 40CFR372: CAS # 744-38-2 Chemical name: Arsenic; Percent by weight: 60.9%

## SECTION 10 – REFERENCES

1. *IR TRANSMITTING OPTICAL GLASS TRG1*, Information No. 61-1968, Jenaer Glaswerk Schott & Gen., West Germany, April 1968.
2. IRG1 Arsenic Trisulfide Glass, *Infrared Transmitting Optical Materials*, Schott Optical Glass, Inc., Duryea, Pennsylvania, 1971.
3. *The Merck Index*, 11<sup>th</sup> Ed., Merck & Co., Inc., Rahway, New Jersey, 1989 (p. 837).
4. Servofrax Arsenic Trisulfide Glass, *Brochure TDS-R-4*, Servo Corporation of America, Hicksville, New York, 1986.
5. Arsenic Trisulfide Glass, *Optical Materials for Infra-red Instrumentation*, Report No. 2389-11 S, Stanley S. Ballard and Kathryn A. McCarthy and William L. Wolfe, Institute of Science & Technology, University of Michigan, Ann Arbor, Michigan, 1959 (p. 32).
6. *Optical Materials for Infra-red Instrumentation*, Supplement 1, Report No. 2389-11-S1, Institute of Science & Technology, University of Michigan, Ann Arbor, Michigan, 1961.
7. *Occupational Safety and Health Standards for General Industry, 29CFR1910.1018(c)*, Occupational Safety and Health Administration, U.S. Department of Labor, Washington, D.C., 1989.
8. *Hazardous Chemicals Desk Reference*, N. Irving Sax and Richard J Lewis, Sr., Van Nostrand Reinhold Company, New York, 1987 (p. 795).
9. *Air Contaminants - Permissible Exposure Limits, Table Z-3, OSHA 3112*, Occupational Safety and Health Administration, U.S. Department of Labor, Washington, D.C., 1989.

### NOTES:

- a. n.a. means "Not Applicable."
- b. This data is furnished gratuitously, independent of any sale of the product only for your investigation and independent verification. While the information is believed to be correct, art photonics GmbH makes no representation as to the accuracy of the information contained herein.