1. PRODUCT AND COMPANY IDENTIFICATION

Trade Name: Copper Indium Gallium Selenide

Chemical Formula: $CuIn_xGa_{(1-x)}Se_2$

Manufacturer Item Number: CO-1641

Manufacturer:
Lorad Chemical Corporation
1200 19th Street North
Saint Petersburg, Florida, 33713
United States of America

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Emergency Contact:
(800) 255–3924 (US & Canada)
+1 (813) 248–0573 (International)

2. HAZARD IDENTIFICATION

Hazard Classification
Acute toxicity, oral (Category 3)
Acute toxicity, inhalation (Category 3)
Skin corrosion / irritation (Category 3)
Serious eye damage / eye irritation (Category 2B)
Specific target organ toxicity, single exposure / respiratory tract irritation (Category 3)

Signal Word: Danger

Pictograms:



Hazard Statements:

H301+331	Toxic if swallowed or inhaled.
H316	Causes mild skin irritation.
H320	Causes eye irritation.
H335	May cause respiratory irritation.

Precautionary Statements:

Prevention

P261	Avoid breathing dust, fumes, gas, mist, vapors, spray.
P264+265	Wash hands thoroughly after handling. Do not touch eyes.
P270	Do not eat, drink, or smoke when using this product.
P271	Use only outdoors or in a well-ventilated area.
P280	Wear protective gloves, protective clothing, eye protection, face protection.

Response

P301+316	IF SWALLOWED: Get emergency medical help immediately.
P304+340	IF INHALED: Remove person to fresh air and keep comfortable for breathing.
P305+351+338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses if present and easy to do. Continue rinsing.
P319	Get medical help if you feel unwell.
P330	Rinse mouth.
P332+317	If skin irritation occurs: Get medical help.
P337+317	If eye irritation persists: Get medical help.

Storage

P403+233 Store in a well-ventilated place. Keep container tightly closed.
P405 Store locked up.

Disposal

P501 Dispose of contents / container in accordance with local, national, international regulations.

Other Hazards No Data Available.

3. COMPOSITION

Additional Names: CIGS

Percentage:	**Component**	**Classification**	**Concentration**
	Copper Indium Gallium Selenide	Acute Tox. 3, oral; Acute Tox. 3, inhalation; Skin Irrit. 3; Eye Irrit. 2B; STOT-SE 3	100 wt%

CAS #: 12018-95-0

EC #: No Data Available.

4. FIRST AID PROCEDURES

General Treatment Consult a physician. Show this SDS to the doctor in attendance. Move out of dangerous area.

Special Treatment: No Data Available.

Important Symptoms: No Data Available.

Inhalation: If breathed in, move person to fresh air. If not breathing, give artificial respiration. Consult a physician.

Ingestion: Never give anything by mouth to an unconscious person. Rinse mouth with water. Avoid vomiting. Consult a physician if feeling unwell.

Skin: Wash with soap and water. Consult a physician if feeling unwell.

Eyes: Immediately flush eyes with fresh water for at least 15 minutes while holding the eyelids open. Remove contact lenses if worn. Consult a physician if feeling unwell.

5. FIREFIGHTING MEASURES

Special Hazards from Substance: Copper oxides, Indium oxides, Gallium oxides, Selenium oxides

Extinguishing Media: Use water spray, alcohol-resistant foam, dry chemical, or carbon dioxide.

Special Fire Fighting Procedures: Wear self-contained breathing apparatus for firefighting if necessary.

6. ACCIDENTAL RELEASE MEASURES

If Material is Released / Spilled: Use appropriate personal protective equipment. Avoid dust formation. Avoid breathing dust, vapors, mist, or gas. Isolate spill area and provide ventilation. Pick up and arrange dispose without creating dust. Sweep up and shovel. Keep in suitable, closed containers for disposal.

Environmental Precautions: Prevent further leakage or spills if safe to do so. Do not allow to enter drains, sewers, or watercourses.

7. HANDLING AND STORAGE

Handling Conditions: Provide appropriate exhaust ventilation at places where dust is formed.

Storage Conditions: Keep in a dry place.

Work / Hygienic Maintenance: Do not use tobacco or food in the work area. Wash thoroughly before eating and smoking. Do not blow dust off clothing or skin with compressed air.

Ventilation: Provide appropriate exhaust ventilation at places where dust is formed.

8. EXPOSURE CONTROLS AND PERSONAL PROTECTION

Permissible Exposure Limits:

Authority	Basis	Limit	Remarks
OSHA	PEL	1.0 mg/m³	Copper dusts and mists (as Cu) Table Z-1 Limits for Air Contaminants (airborne limit)
OSHA	PEL	0.2 mg/m³	Selenium compounds (as Se) Table Z-1 Limits for Air Contaminants (airborne limit)
California	PEL	0.2 mg/m³	Selenium compounds (8-hour time-weighted average), California permissible exposure limit for chemical contaminants (Title 8, Article 107)
California	PEL	0.1 mg/m³	Indium compounds (8-hour time-weighted average), California permissible exposure limit for chemical contaminants (Title 8, Article 107)
California	PEL	1.0 mg/m³	Copper salts, dusts, and mists (8-hour time-weighted average), California permissible exposure limit for chemical contaminants (Title 8, Article 107)

Threshold Limit Values:

Authority	Basis	Limit	Remarks
NOISH	REL	1.0 mg/m³	Copper dusts and mists (as Cu) (except fume) (up to 10-hour time-weighted average)
ACGIH	TLV	1.0 mg/m³	Copper dusts and mists (as Cu) (8-hour time-weighted average)
NOISH	REL	0.2 mg/m³	Selenium compounds (up to 10-hour time-weighted average)
ACGIH	TLV	0.2 mg/m³	Selenium compounds (8-hour time-weighted average)
NOISH	REL	0.1 mg/m³	Indium compounds (up to 10-hour time-weighted average)
ACGIH	TLV	0.1 mg/m³	Indium compounds (8-hour time-weighted average)

References:	PEL	Permissible Exposure Limit
	REL	Recommended Exposure Limit
	TWA	Time Weighted Average
	IDLH	Immediately Dangerous to Life or Health
	TLV	Threshold Limit Value

Special Equipment: Handle in accordance with good industrial hygiene and safety practices.

Respiratory Protection: Where protective from nuisance levels of dust are desired, use type N95 / P95 (US) or type P1 (EN 143) dust masks. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Protective Gloves: Handle with gloves. Gloves must be inspected prior to use. use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Eye Protection: Safety glasses. Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Body Protection: The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

9. PHYSICAL AND CHEMICAL CHARACTERISTICS

Color:	Dark gray / black	**Molecular Weight:**	Variable
Forms:	Powder	**Theoretical Density:**	5.7 g/cm^3
Odor:	Odorless	**pH:**	No Data Available.
Water Solubility:	Insoluble in water.	**Auto-Ignition Temperature:**	No Data Available.
Boiling Point:	No Data Available.	**Evaporation Rate:**	No Data Available.
Melting Point / Freezing Point:	>1,000ºC (1,832ºF) (approx.)	**Flammability or Explosive Limits:**	No Data Available.
Vapor Pressure:	No Data Available.	**Partition Coefficient: n-octanol/ water**	No Data Available.
Vapor Density:	No Data Available.	**Decomposition Temperature:**	No Data Available.
Flash Point:	No Data Available.	**Viscosity:**	No Data Available.

10. REACTIVITY

Stability: Stable under recommended storage conditions.

Reacts with: Strong oxidizing agents, strong acids.

Incompatible Conditions: No Data Available.

Hazardous Decomposition Products: Under fire conditions may form Lanthanum oxides or Manganese oxides

11. TOXICOLOGICAL INFORMATION

Acute Toxicity

Eyes: Dust may cause mechanical irritation of eyes.

Skin: Dust may cause mechanical irritation of skin.

Ingestion: No Data Available.

	Inhalation:	Dust may cause mechanical irritation of respiratory tract.
Chronic Toxicity	Skin Corrosion / Irritation:	No Data Available.
	Serious Eye Damage / Irritation:	No Data Available.
	Respiratory / Skin Sensitization:	No Data Available.
	Mutagenic Effects:	No Data Available.
	Reproductive / Teratogenic Effects:	No Data Available.
	Specific Target Organ Toxicity: (single exposure)	No Data Available.
	Specific Target Organ Toxicity: (repeated exposure)	No Data Available.
	Aspiration Hazard:	No Data Available.
	Other Adverse Effects:	To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.
Carcinogenicity:	IARC:	No component of this product present at levels greater than or equal to 0.1% is identified as probable or confirmed human carcinogen by IARC.
	ACGIH:	No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by ACGIH.
	NTP:	No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.
	OSHA:	No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

Additional Information:

12. ECOLOGICAL INFORMATION

Aquatic Toxicity:	No Data Available.
Persistence and degradability:	No applicable to inorganic substances.
Bioaccumulative potential:	Not expected to bioaccumulate.
Notes:	No Data Available.

13. DISPOSAL CONSIDERATIONS

Disposal:	Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material. Empty containers should be taken to an appropriate waste handling site for recycling or disposal. Dispose of in accordance with local, state, or national regulations.

14. TRANSPORTATION DATA

Hazardous:	**DoT:**	Hazardous for Transportation
	IMDG:	Hazardous for Transportation
	IATA:	Hazardous for Transportation

Pictogram:



Hazard Class:		6.1 Toxic
Packing Group:		II
UN Number:		UN3288
US DoT	**Proper Name:**	Toxic solid, inorganic, N.O.S. (Copper Indium Gallium Selenide)
	Marine Pollutant:	Yes
IMDG	**Proper Name:**	Toxic solid, inorganic, N.O.S. (Copper Indium Gallium Selenide)
	EMS-Code:	F-A, S-A
	Marine Pollutant:	Yes
IATA	**Proper Name:**	Toxic solid, inorganic, N.O.S. (Copper Indium Gallium Selenide)

15. REGULATORY INFORMATION

Toxic Substance Control Act	Not Listed.
SARA 302 Components	No chemicals in this material are subject to the reporting requirements of SARA title III, Section 302.
SARA 313 Components	The following components are subject to the reporting levels established by SARA Title III, Section 313: - Copper Compounds - Selenium Compounds - Indium Compounds
SARA 311/312 Hazards	Acute Health Hazard
Massachusetts Right to Know Components	The following components are subject to the Massachusetts Right to Know Act: - Copper Compounds - Selenium Compounds - Indium Compounds
Pennsylvania Right to Know Components	The following components are listed in Appendix A of the Pennsylvania Worker and Community Right to Know Act: - Copper Compounds, environmental hazard - Selenium Compounds, environmental hazard - Indium Compounds
New Jersey Right to Know Components	The following components are listed on the New Jersey Right to Know Hazardous Substance List: - Manganese Compounds
California Prop. 65 Components	This product does not contain any chemicals known to the State of California to cause cancer, birth defects, or any other reproductive harm.

16. OTHER INFORMATION

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