



**INDIUM CORPORATION OF AMERICA®/ EUROPE®/ ASIA PACIFIC®
INDIUM CORPORATION (SUZHOU)®**

SAFETY DATA SHEET

1. PRODUCT AND COMPANY IDENTIFICATION

Product Identifier: INDIUM TIN OXIDE (also referred to as ITO)

SDS Number: SDS-IB011

Revised Date: 21 APRIL 2017

Product : Industrial Use - Indium Tin Oxide, $\text{In}_2\text{O}_3 - \text{SnO}_2$ (tin doped indium oxide) (mixture). Potential uses include: thin film coating

MANUFACTURER:

In America:

The Indium Corporation of America
1676 Lincoln Ave., Utica NY 13502
Information: (315) 853-4900
nswarts@indium.com

EMERGENCY PHONE:

CHEMTREC 24 hrs.
USA: 1 (800) 424-9300
Outside USA: +1 (703) 527-3887

In Europe:

Indium Corporation of Europe
7 Newmarket Ct.
Kingston, Milton Keynes, UK, Mk 10 OAG
Information: +44 [0] 1908 580400

In China:

Indium Corporation (Suzhou), Co., Ltd.
No. 428 Xinglong Street
Suzhou Industrial Park
Suchun Industrial Square
Unit No. 14-C
Jiangsu Province, China 215126
Information: (86) 512-6283-4900

In Asia:

Indium Corporation of America
Asia-Pacific Operations-Singapore
29 Kian Teck Avenue
Singapore 628908
Information: +65 6268-8678

2. HAZARDS IDENTIFICATION**PRIMARY ROUTES OF ENTRY:**

√ Eye √ Inhalation √ Skin √ Ingestion NTP

CARCINOGEN LISTED IN:

*IARC OSHA √ Not Listed
Review Section 11

GHS:



Symbol: Warning

Hazard statements(s)

H315 Causes skin irritation
H319 Causes serious eye irritation
H335 May cause respiratory irritation

Precautionary statement(s)

P233 Keep container tightly closed
P261 Avoid breathing dust/fume/gas/mist/vapors/spray
P270 Do not eat, drink or smoke when using this product
P280 Wear protective gloves/protective clothing/eye protection/face protection
P362 Take off contaminated clothing and wash before reuse
P301 + P314 IF SWALLOWED: Get Medical advice/attention if you feel unwell
P302 + P352 IF ON SKIN: Wash with plenty of soap and water
P304 + 341 IF INHALED: If breathing is difficult, remove victim to fresh air and keep at rest in a position comfortable for breathing
P305 + 351 IF IN EYES: Rinse continuously with water for several minutes (15 mins)

Skin irritation (Category 2)

Eye irritation (Category 2A)

Specific target organ toxicity – single exposure (Category 3)

POTENTIAL HEALTH EFFECTS:

- Eye Contact:** May cause irritation to severe irritation in dust form.
- Ingestion:** May be harmful if swallowed. Kidney and liver damage from injected indium compounds has been reported based on limited animal testing.
- Inhalation:** May cause respiratory irritation. May be harmful if inhaled.
- Skin Contact:** May cause skin irritation. May be harmful if absorbed through the skin.
- Chronic:** Kidney and liver damage from injecting indium compounds has been reported based on limited animal testing but no systematic effects from human exposure has been reported.

Target organs: lungs
- Note:** **The Indium Corporation does not recommend, manufacture, market or endorse any of its products for human consumption.**
- Warning:** **California only -This product contains a chemical known to the State of California to cause cancer and/or birth defects (or other reproductive harm). (Trace levels of lead).**

Review SDS completely before using material.

3. COMPOSITION / INFORMATION ON INGREDIENTS

Components	% wt	CAS Registry #	PEL mg/m ³	TLV-TWA mg/m ³	TLV-STEL mg/m ³
*INDIUM TIN OXIDE	100	50926-11-9++			
INDIUM OXIDE	-	1312-43-2(US)	0.1 (as Indium**)	0.1	N.E.
		(EU)	-	0.1 (as Indium)	0.3
		(Canada)	-	0.1 (as Indium)	0.3
		(Singapore)	0.1(as indium)	-	-
		(Mexico)	-	0.1(as indium)	0.3
		(China)	-	0.1(as indium)	0.3
TIN OXIDE	-	18282-10-5(US)	2(as tin)	2(as tin)	-
		(EU)	-	2(as tin)	4
		(Canada)	-	2(as tin)	4
		(Singapore)	2(as tin)	-	-

++ This is a generic CAS RN.

No exposure limits for ITO are established.

*(Mix of Indium Oxide CAS# 1312-43-2 and Tin Oxide CAS# 18282-10-5)

N.E. = Not established

** Indium CAS# 7440-74-6

4. FIRST AID MEASURES

- Eye Contact:** Hold eyelids apart and flush eyes with plenty of tepid water for at least 15 minutes. Seek medical attention if irritation persists.
- Ingestion:** If patient is conscious, ONLY induce vomiting as directed by trained personnel. NEVER give anything by mouth to an unconscious person. Seek medical attention immediately.
- Inhalation:** Remove to fresh air. If not breathing, give artificial respiration or oxygen by trained personnel. Seek immediate medical attention. Inhalation of particulate may require medical review.
- Skin Contact:** Remove contaminated clothing. Wash affected area with soap and water. Wash clothing before reuse. If irritation persists, obtain medical attention.

5. FIRE FIGHTING MEASURES

Flash Point:	Not established.	Method:	Not established.
Auto-ignition Temperature:	Not established.		
Flammable Limits:	Limits not established. Not flammable. Will not burn.		
Extinguishing Media:	Use extinguishers appropriate for the surrounding fire conditions.		
Special Fire Fighting Procedures:	Firefighters must wear NIOSH approved or equivalent self-contained breathing apparatus and full protective clothing.		

6. ACCIDENTAL RELEASE MEASURES

Spill or Leak Procedures:	Isolate spill and clean up with vacuum. Avoid conditions, which create fumes or fine dust. DO NOT SWEEP SOLIDS. Do not raise dust levels. Place material in proper waste container. An approved air purifying respirator with particulate cartridge and other personal protective equipment such as gloves is <u>required</u> . Do not use a dust mask for clean - up. Dispose of in accordance with Federal, State and Local regulations. Recycling is recommended for indium containing materials. Indium metal has reclaim value. Depending on exposure a shower and washing of the hair may be necessary.
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7. HANDLING AND STORAGE

Handling:	Keep containers tightly closed when not in use. Use care to avoid spills. Wear appropriate personal protective equipment (PPE) including recommended respiratory protection. Always thoroughly wash your hands after handling this product. DO NOT touch or rub eyes until hands are washed.
Storage Precautions:	Store product in tightly capped original containers in a cool, well ventilated and dry area.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Engineering Controls: Local and/or Mechanical exhaust ventilation or point source exhaust is required to control any airborne contaminants and to reduce potential exposures to workers. Avoid inhalation of particulate/dust/spray. Use exhaust when there is any doubt in whether the operator/user is getting any exposure. Measurement of exposure may be required. Additional activities such as sintering of product require ventilation for handling and worker protection. It has been observed that sintered particulates may cause inflammation or other damage to the respiratory system.

Personal protection:

Eyes: Wear chemical safety glasses/goggles. Face shield for splash/grinding hazards.

Respirator: An approved air-purifying respirator (half or full face) with a HEPA rated particulate filter or HEPA quality dust mask is required under certain circumstances where airborne concentrations are expected to be elevated. Avoid breathing dust. Keep exposures to as low as possible. Grinding and cutting applications require a full-face respirator for adequate protection. Dust mask is not recommended in high exposure applications or when measurements or concentration levels are unknown. Additional respiratory protection of a high level may be required depending on the use, area where work is performed or application of indium tin oxide. Data shows that this product may cause pulmonary toxicity during certain job tasks and applications. When levels are unknown and dust is evident additional respiratory protection may be required especially in confined areas. Unknown exposure should be measured to determine the proper protection.

Skin: Gloves are recommended when handling solids. Avoid skin contact with powders.

Other:	Lab coat, apron, eyewash fountain in work area. Avoid the use of contact lenses in high fume or dusty areas. Coverage of hair may be required in dusty applications.
Work/Hygienic	Maintain good housekeeping. Clean up spills immediately. Good personal hygiene is essential. Avoid eating, smoking or drinking in the work area. Wash hands thoroughly with soap and water immediately upon leaving the work area. Do not wear work contaminated clothing into lunchrooms.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance:	Yellow-green powder	Boiling Point:	Sublimes @982 C (1800 F)
Odor:	Odorless	Melting Point:	1910 C + 10 C (3470 F + 50 F)
Specific Gravity:	7.16 (H ₂ O=1)	pH:	Not applicable
Vapor Pressure:	Not applicable	Solubility in Water:	Insoluble
Vapor Density:	Not applicable	MW:	264.94

10. STABILITY AND REACTIVITY

General:	Stable.
Conditions to Avoid:	Not established.
Incompatible Materials:	Strong oxidizing agents, strong acids, aluminum, potassium, magnesium, sodium/sodium oxides
Hazardous Decomposition / Combustion:	Toxic fumes may form at elevated temperatures. Tin/tin oxide/indium/indium oxides.
Hazardous Polymerization:	Will not occur.

11. TOXICOLOGICAL INFORMATION

Carcinogenicity:	National Toxicology Program (NTP):	No
	Occupational Safety & Health Administration (OSHA):	No
	U.N. International Agency for Research on Cancer (IARC):	Yes*

Based on April 10, 2017 article "Carcinogenicity of welding molybdenum trioxide and indium tin oxide"- IARC will be publishing in Volume 118 of IARC Monographs a disclosure that indium tin oxide is classified as a "possibly carcinogenic to humans" – Group 2B, based on sufficient evidence in experimental animals.

LD50:	Not established.	LC50:	Not established.
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Journal of Occupational Health – Japan report on processing of ITO sputtering targets, indicated that inhalation of ITO in some form and use, such as grinding and spraying may result in pulmonary toxicity. Additional information can be found by searching the Division of Respiratory Disease Studies, National Institute for Occupational Safety and Health (NIOSH) and information can be found in the publication, *Chemical Information Profile for Indium Tin Oxide*, issued by the National Toxicology Program (NTP), June 2009.

The Indium Corporation has no toxicity testing data for this product.

Inorganic tin salts are poorly absorbed into the body.

12. ECOLOGICAL INFORMATION

. No testing data available.

13. DISPOSAL CONSIDERATION

Waste Disposal Method: Scrap indium metal has reclaim value. Contact a commercial reclaimer for recycling. Otherwise, dispose of in accordance with all Federal, State and Local environmental regulations. In Europe follow the Special Waste Regulations.

14. TRANSPORT INFORMATION

Transport in accordance with applicable regulations and requirements.

Not regulated under the US Department of Transportation.

Not regulated under IATA Dangerous Goods air transport guidelines.

Classified as non - hazardous material for shipping under all modes of transport.

North America Emergency Guide Book – Not applicable

UN – none

Marine Pollutant: No

15. REGULATORY INFORMATION

The information in this Safety Data Sheet meets the requirements of the United States Occupational Safety and Health Act and regulations promulgated hereunder (29 CFR 1910.1200 ET. SEQ.).

State of California (only):

California Prop 65 (Safe Drinking Water Standard): Warning: This product contains a chemical known to the State of California to cause cancer and/or birth defects (or other reproductive harm). (Trace levels lead is possible).

SARA 313 listing - 40 CFR 372.65: None

All ingredients are listed on the EPA TSCA Inventory.

This product has been classified in accordance with the hazard criteria of the Canadian Controlled Products Regulation (CPR).



WHMIS: Class D2B

Materials Causing Other Toxic Effects (irritant)

ITO is not listed on the Canadian Domestic Substance List (DSL) or Non Domestic Substances List (NDSL). However both indium oxide and tin oxide are both listed on the DSL.

This product has been classified in accordance with the guidelines set by the Dept. of Industrial Health of the Republic of Singapore.

Malaysia:

This product has been classified in accordance with: Malaysian – OCCUPATIONAL SAFETY AND HEALTH (CLASSIFICATION, LABELING AND SAFETY DATA SHEET OF HAZARDOUS CHEMICALS) REGULATION OCTOBER 2013 – (CLASS). (GHS)

In China:

Decree No. 591: Regulations on the Control over Safety of Hazardous Chemicals
GB 30000.2-29-2013, Rules for classification and labeling of chemicals. (GHS)
GB/T 16483-2008, GB/T 17517-2013

This product has been classified using the Chinese Occupational Exposure Limit of Hazardous Agents in the Workplace, GBZ2-2007.

This product has been classified in accordance with Mexican regulations NOM-018-STPS-2015 and NOM-010-STPS-2014.

This product complies with EU Directive 2011/65/EU, Restriction of Hazardous Substances (RoHS 2).

16. OTHER INFORMATION

HMIS Hazard Rating:	Health:	2
	Fire:	0
	Reactivity:	0

Revised Date: 21 APRIL 2017

Prepared by: Nancy Swarts, Indium Corporation of America

Approved by: Nancy Swarts, Indium Corporation of America

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