

CANON OPTRON INC.

SDS Number: EI02

Product Name: ITO

## SAFETY DATA SHEET

rev. 8.0 Date of Issue 2013/4/23

Revised Date 2024/3/15

## SECTION 1 Chemicals and company identification

Product name	ITO
Product code	EI02
Company name	CANON OPTRON INC.
Address	1744-1, Kanakubo, Yuki-shi, Ibaraki-ken, 307-0015 Japan
Section name	Sales Department
Telephone number	+81-296-21-3700
Fax number	+81-296-21-3770
Emergency telephone number	+81-296-21-3700
Use	Vacuum deposition material

## SECTION 2 Hazards identification

GHS Classification (A classification by JIS Z 7252 "classification methods such as chemical substances based on GHS")

Physical hazards	Explosives	Classification not possible
	Flammable gases	Not applicable
	Aerosols	Not applicable
	Oxidizing gases	Not applicable
	Gas under pressure	Not applicable
	Flammable liquids	Not applicable
	Flammable solids	Classification not possible
	Self-reactive substances and mixtures	Classification not possible
	Pyrophoric liquids	Not applicable
	Pyrophoric solids	Classification not possible
	Self-heating substances and mixtures	Classification not possible
	Substances and mixtures which, in contact with water, emit flammable gases	Classification not possible
	Oxidizing liquids	Not applicable
	Oxidizing solids	Classification not possible
Organic peroxides	Classification not possible	
Corrosive to metals	Classification not possible	
Health hazards	Desensitize explosives	Classification not possible
	Acute toxicity(oral)	Not classified
	Acute toxicity(dermal)	Classification not possible
	Acute toxicity (Inhalation: Gases)	Not applicable
	Acute toxicity (Inhalation: Vapors)	Classification not possible

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	Acute toxicity (Inhalation: Dusts and mists)	Classification not possible
	Skin corrosion/irritation	Classification not possible
	Serious eye damage/eye irritation	Category 2B
	Respiratory sensitization	Classification not possible
	Skin sensitization	Classification not possible
	Germ cell mutagenicity	Classification not possible
	Carcinogenicity	Category 1B
	Reproductive toxicity	Classification not possible
	Reproductive toxicity, effects on or via lactation	Classification not possible
	Specific target organ toxicity(single exposure)	Classification not possible
	Specific target organ toxicity(repeated exposure)	Category 1
	Aspiration hazard	Classification not possible
Environmental hazards	Hazardous to the aquatic environment Short-term(acute)	Classification not possible
	Hazardous to the aquatic environment Long-term(chronic)	Classification not possible
	Hazardous to the ozone layer	Classification not possible
Label elements		
hazard Pictograms	Health Hazard	
		
Signal word	Danger	
Dangerous goods hazard information	Causes eye irritation. May cause cancer. Causes damage to organs through prolonged or repeated exposure Respiratory	
Precautionary statements		
【Safety measures】	Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Do not breathe dust/fume/gas/mist/vapours/spray. Wash hands thoroughly after handling. Do not eat, drink or smoke when using this product. Wear Protective glovess/protective clothing/eye protection/face protection.	

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【First-aid measures】	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. IF exposed or concerned: Get medical advice/attention. Get medical advice/attention if you feel unwell. If eye irritation persists: Get medical advice/attention.
【Storage】	Store locked up.
【Disposal】	Dispose of contents/container in accordance with national regulations.
【Other hazards】	-

## SECTION 3 Composition/information on ingredients

Substance/Mixture	Mixture	
Chemical name	Indium oxide	Tin oxide
Chemical formula	In <sub>2</sub> O <sub>3</sub>	SnO <sub>2</sub>
Concentration or concentration range	In <sub>2</sub> O <sub>3</sub> : 88- 99% SnO <sub>2</sub> : 1- 12% Total = 100%	
CAS No.	1312-43-2	18282-10-5
TSCA Inventory	Indium oxide (In <sub>2</sub> O <sub>3</sub> )	Tin oxide (SnO <sub>2</sub> )
EINECS number	215-193-9	242-159-0
Radioactive information	Radioactive substances are not used as the material. Therefore, there is no reason that ionizing radiation would be generated.	

## SECTION 4 First aid measures

Inhalation	Remove person to fresh air and keep comfortable for breathing. Get medical advice/attention if you feel unwell.
Skin contact	Take off immediately all contaminated clothing. Rinse affected areas with water/shower. IF ON SKIN: Wash with plenty of soap and water. If skin irritation or rash occurs: : Get medical advice/attention.
Eye contact	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.
Ingestion	Rinse mouth. Get medical advice/attention.
Most important symptoms and effects, both acute and delayed	No data available
Protection of first aiders	Rescuers, wear suitable protective equipment as the situation demands.
Special precautions for physicians	No data available

## SECTION 5 Firefighting measures

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Suitable extinguishing media	It uses a water mist, dry chemicals, fire foam, carbon dioxide depending on the neighboring situation and the situation of the fire.
Unsuitable extinguishing media	Because a fire might spread through the outskirts, It avoid direct stick irrigation.
Specific hazards	In the case of fires, a toxic decomposition product may occur.
Specific extinguishing methods	It performs the fire fighting from windward. Restrict access to the area around the fire location to persons other than those involved with the fire. It moves a container from the fire area if not dangerous.
Special protective equipment for firefighters	On the occasion of fire extinguishing work, it wears appropriate personal protective equipment and rescue suit.

## SECTION 6 Accidental release measures

Personal precautions, protective equipment, and emergency procedures	It prohibits the entrance except the person concerned. The worker wears appropriate personal protective equipment (in item of "8.revelation prevention and protection measures" reference) and avoids eyes, contact and inhalation to skin.
Environmental precautions	It avoids an outflow to the environmental average of the product to have possibilities to influence neighboring environment.
Methods and material for containment and cleaning up	It collects it in sky containers as if sweeping the scattered thing, and gathering you, or being able to absorb it with a vacuum sweeper, and from scattering not pitching a camp. The prohibition of handling and eating and drinking in neighboring of the storage area. It prevents the inflow to a drainage, a sewer, a basement or the closedown place.
Secondary disaster prevention measures	No data available

## SECTION 7 Handling and storage

Precautions for safe handling	
Technical measures	Take measures for equipment as described in "8. Exposure controls/personal protection" and wear protective equipment.
Safety handling precautions	It prevents you from producing dust.
Avoidance of contact	Refer to "10. Stability and reactivity."
Hygiene measures	Wash hands thoroughly after handling. Do not eat, drink or smoke when using this product.
Conditions for safe storage, including any incompatibilities	
Safe storage conditions	It avoids direct rays of the sun and keeps it in the cool and dark space. Store locked up.
Safety packaging material	It uses the container which it can seal up without damage and the leak.

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## SECTION 8 Exposure controls/personal protection

	<u>In2O3</u>	<u>SnO2</u>
Permissible concentration		
ACGIH	TLV-TWA: 0.1 mg/m <sup>3</sup> (as indium) (indium and the compound) (2016 version)	TLV-TWA: 2 mg/m <sup>3</sup> (Inhalable fraction of the aerosol) (Tin, and inorganic compounds, excluding Tin hydride, as Sn) (2019 version)
Appropriate engineering controls	In the work shop which dust produces, it uses a device, an apparatus sealed up by all means or a local ventilator. The capture velocity of the local exhaust ventilation is prescribed to 1.0m per second.	
Individual protection measures, such as personal protective equipment		
Respiratory protection	Dustproof mask	
Hand protection	Protective gloves	
Eye/face protection	Dust-proof glasses	
Skin protection	Protective clothing	

## SECTION 9 Physical and chemical properties

### Appearance

Physical state	Solid
Form	Pellets, granules
Colour	Pale yellow
Odour	None

	<u>In2O3</u>	<u>SnO2</u>
Melting point/freezing point	1,912 degrees Celsius – 2,000 degrees Celsius	1127°C
Boiling point or initial boiling point and boiling range	No data available	1800~1900°C
Flammability	No data available	No data available
Upper/lower flammability or explosive limits	No data available	Not applicable
Flash point	No data available	Not applicable
Auto-ignition temperature	No data available	Not applicable
Decomposition temperature	850°C	No data available

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pH	No data available	4~5 (20°C) (GESTIS (Access on August 2019))
Kinematic viscosity	No data available	Not applicable
Solubility		
Water	Insoluble	Insoluble
Other solvents	No data available	No data available
Partition coefficient: n-octanol/water	No data available	No data available
Vapour pressure	0.01 hPa (Sigma-aldrich)	No data available
Density and/or relative density (Density)	7.18 ※ 3.9 ~ 4.8 (pellet) as ITO	6.95 g/cm <sup>3</sup> (ICSC (2004))
Relative vapor density	No data available	Not applicable
Particle characteristics	No data available	No data available
Other information	No data available	No data available

## SECTION 10 Stability and reactivity

In2O3SnO2

Reactivity	It is stable in the normal handling.	See "Possibility of hazardous reaction."
Chemical stability	It is stable in normal handling.	No data available
Possibility of hazardous reactions	Dangerous adverse reaction is not caused under the normal handling condition.	Reacts strongly with strong reducing agents.
Conditions to avoid	It avoid direct rays of the sun and keep it in the cool and dark space.	Contact with incompatible materials
Incompatible materials	Oxidizer, reducer	Strong reducing agents
Hazardous decomposition products	In the case of fires, a toxic decomposition product may occur.	No data available

## SECTION 11 Toxicological information

In2O3SnO2

Acute toxicity(oral)	For a rat LD50 price, > 10,000 mg/kg (PATY, (6th, 2012))	LD50 for rats: > 2,000 mg/kg (REACH registration dossier (Access on August 2019))
Acute toxicity(dermal)	No data available	No data available
Acute toxicity (Inhalation: Gases)	Solid (GHS definition)	Solid (GHS definition)
Acute toxicity (Inhalation: Vapours)	Solid (GHS definition)	No data available

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Acute toxicity (Inhalation: Dusts and mists)	No data available	(1) LC50 (aerosol, 4 hours) for rats: > 2.04 mg/L (REACH registration dossier (Access on August 2019)). (2) As for (1), it is described that 2.04 mg/L was the highest chamber concentration achieved (REACH registration dossier (Access on August 2019)).
Skin corrosion/irritation	Classification not possible due to lack of data. Besides, it is described that indium and indium compounds are irritating to the skin (HSDB (Access on June 2016)). Since the information source is listed in List 3, and the original literature cannot be confirmed, this information was not adopted.	In an in vitro skin corrosion test according to OECD TG 431 using an artificial human skin model (EpiDerm), survival rates were > 50% and > 15% after 3-minute and 60-minute exposures, respectively (REACH registration dossier (Access on August 2019)).
Serious eye damage/irritation	It is described that indium irritates the eyes and the respiratory tract, and causes coughs and shortness of breath by inhalation (Environmental Risk Assessment for Chemical Substances Vol.11 (Ministry of the Environment, 2013)). Therefore, this substance was classified in Category 2B.	In an eye irritation test according to OECD TG 405 with rabbits, slight conjunctival redness and edema were observed one hour after application, however, these changes were fully reversible after 24 hours (REACH registration dossier (Access on August 2019)).
Respiratory or skin sensitization	No data available	The EC3 value could not be calculated as the stimulation indices of all concentrations were below 3 in a mouse local lymph node test (LLNA) according to OECD TG 429, and it was judged as negative (REACH registration dossier (Access on August 2019)).
Germ cell mutagenicity	Classification not possible due to lack of data. No in vivo data is available. As for in vitro data, it was reported a bacterial reversion mutation test was negative (Environmental Risk Assessment for Chemical Substances Vol.11 (Ministry of the Environment, 2013)).	No data available

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## Carcinogenicity

No data is available regarding carcinogenicity in humans. As for experimental animals, in an inhalation exposure carcinogenicity test in which both rats or mice were exposed to indium tin oxide (ITO), containing 90.06% of indium oxide and 9.74% of tin oxide, at concentrations of 0.01 – 0.1 mg/m<sup>3</sup> for 2 years (26 weeks only for rats in a high concentration group due to lung injury), in mice, no carcinogenic response occurred. As for rats, however, increases in the incidences of lung tumors such as bronchiolar-alveolar adenomas and carcinomas were observed in both males and females (OEL Documentations (Japan Society For Occupational Health (JSOH), 2013), Environmental Risk Assessment for Chemical Substances Vol.11 (Ministry of the Environment, 2013)). Also, in a test in which rats or mice were exposed to indium phosphide by inhalation at concentrations of 0.03 – 0.3 mg/m<sup>3</sup>, for 2 years for the low-concentration groups and for 21 – 22 weeks for the medium- and high-concentration groups (shortened due to lung injury), bronchiolar-alveolar adenoma and carcinomas were observed in both rats and mice. In addition, increases in the incidences of pheochromocytomas of the adrenal gland, mononuclear cell leukemia, tumors of the skin and the mammary gland were observed in rats; and the incidences of liver tumors were significantly increased in mice (OEL Documentations (Japan Society For Occupational Health (JSOH), 2013)), NTP TR499 (2001), Environmental Risk Assessment for Chemical Substances Vol. 11 (Ministry of the Environment, 2013)).

As the classifications by other organizations, IARC classified indium phosphide in Group 2A (IARC 86 (2006)), and the Japan Society For Occupational Health classified hardly soluble inorganic indium compounds in Group 2A (Recommendation of Occupational Exposure Limits (Japan Society For Occupational Health (JSOH), 2015)). Therefore, this substance was classified in Category 1B for this hazard class.

Besides, because the classifications by other organizations were published after the previous classification, the classification result changed this time.

No data available

## Reproductive toxicity

No data available

No data available



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Specific target organ toxicity(single exposure)

Classification not possible due to lack of data. Besides, although in the Environmental Risk Assessment for Chemical Substances Vol.11 (Ministry of the Environment, 2013), indium is described as irritant to the respiratory tract, it was quoted from ICSC, and the original literature could not be confirmed. Also it is not clear whether this is a description concerning only metallic indium or a description concerning indium compounds in general.

No data available

Specific target organ toxicity(repeated exposure)

As for humans, in Japan, there are case reports of interstitial pneumonitis and fibrosis and investigation reports showing increases in KL-6, SP-D and SP-A values, which are indicators of interstitial pneumonitis, in workers at the manufacturing and processing plants of indium tin compounds (ITO), recycling plants of indium and indium oxide manufacturing plants; and it has been clarified that lung diseases, mostly interstitial pneumonitis, occur due to exposure to ITO or indium oxide (OEL Documentations (Japan Society For Occupational Health (JSOH), 2013)).

As for experimental animals, in a 13-week inhalation exposure test using rats, effects in the lungs (infiltration of alveolar macrophages, alveolar proteinosis, hyperplasia of alveolar epithelium, etc.) were observed at 1 mg/m<sup>3</sup> (converted guidance value: 0.00072 mg/L), which is equivalent to Category 1. However, for the oral route, in a 3-month administration toxicity study using rats dosed by feeding, no toxic effects were observed even at a dose equivalent to 4,000 mg/kg/day (Environmental Risk Assessment for Chemical Substances Vol.11 (Ministry of the Environment, 2013)).

Besides, in the previous classification, in addition to respiratory organs, the skeleton and digestive system were determined as target organs, based on the information that the TLV-TWA for indium and its compounds was set based on the skeletal and gastrointestinal effects, and particularly pulmonary toxicity by inhalation into the lungs in ACGIH (7th, 2001). However, this was based on a "Preliminary Investigation" on exposure to indium compounds by the EPA. As it was a preliminary investigation and is also considered to have low reliability due to no information other than the symptom names based on complaints, etc., it was not adopted as the evidence for the classification.

Therefore, this substance was classified in Category 1 (respiratory organs).

(1) Inhalation exposure to the dust and fume of tin (oxide) is recognized to result in stannosis, mild pneumoconiosis (ACGIH (7th, 2019)).

[Reference Data, etc.]

(2) In a study in which this substance was administered by feeding to rats for 13 weeks, no effect was observed at up to 440 mg/kg/day (ATSDR (2005)).

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Aspiration hazard	No data available	No data available
Other information	No data available	

## SECTION 12 Ecological information

	<u>In2O3</u>	<u>SnO2</u>
Toxicity		
Hazardous to the aquatic environment Short-term(acute)	No data available	No data available
Hazardous to the aquatic environment Long-term(chronic)	No data available	No data available
Persistence and degradability	No data available	No data available
Bioaccumulative potential	No data available	No data available
Mobility in soil	No data available	No data available
Hazard to the ozone layer	No data available	No data available
Other adverse effects	No data available	No data available

## SECTION 13 Disposal considerations

Waste treatment methods	Process is contracted to industrial waste disposers who received approval of a prefectural governor.
Contaminated container and contaminated packaging	The container is recycled after being cleaned, or is appropriately processed according to the standards of related laws and regulations. When disposing of empty containers, the contents should be completely removed.

## SECTION 14 Transport information

	<u>In2O3</u>	<u>SnO2</u>
International regulation		
UN number	Not applicable	Not applicable
UN proper shipping name	Not applicable	Not applicable
UN classification	Not applicable	Not applicable
Transport hazard class	Not applicable	Not applicable
Packing group	Not applicable	Not applicable
Hazardous to the aquatic environment	No data available	No data available
Maritime transport in bulk according to IMO instruments	No data available	No data available

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Japanese laws and regulations	Land regulation information Not applicable Maritime regulatory information non-hazardous materials Aviation regulatory information non-hazardous materials	Refer to "15. Regulatory information."
Special precautions for users	When transporting, protect from direct sunlight and take on cargo without breakage of container, corrosion and leakage. Do not stack heavy good thereupon.	When transporting, protect from direct sunlight and take on cargo without breakage of container, corrosion and leakage. Do not stack heavy good thereupon.
Special Provisions	-	-

## SECTION 15 Regulatory information (Japan)

	<u>In2O3</u>	<u>SnO2</u>
Occupational Safety and Health Law	There is it in the case of an application or an application	There is it in the case of an application or an application
PRTR Law	There is it in the case of an application or an application	Not applicable
Poisonous and Deleterious Substances control Law	Not applicable	Not applicable
Labor Standards Act	There is it in the case of an application or an application	Not applicable
Chemical substances control Law	Not applicable	Not applicable
Fire fighting Law	Not applicable	Not applicable
Air Pollution Control Act	There is it in the case of an application or an application	Not applicable
Water Pollution Prevention Act	Not applicable	Not applicable
Water Supply Act	Not applicable	Not applicable
Sewerage Act	Not applicable	Not applicable
Marine Pollution Prevention Law	Not applicable	Not applicable
Waste Management and Public Cleansing Act	Not applicable	Not applicable
Note	Ensure this material in compliance with federal requirements and ensure conformity to local regulations.	

## SECTION 16 Other information

Please refer to Japan Ministry of Health, Labour and Welfare notification.

① About thorough prevention of healthy obstacle by handling work such as the indium tin oxide

② A technical indicator about the prevention of healthy obstacle by handling work such as the indium tin oxide (1222 the second December 22, 2010)

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The Safety Data Sheet (SDS) has been prepared based on currently available materials, information and data, and may be revised based on new information. Further, the important points in the SDS are made for the purpose of normal handling.

When handling the user product in a specialized manner, take the appropriate safety measures for the application or method.

Further, Canon Optron Inc. has paid sufficient attention to the described contents of the SDS, but does not guarantee the accuracy of its contents.

The SDS prepared by our company includes all findings from our investigation for reference. Not applicable to all items listed.

## Literature Reference

[WEB site]

National Institute of Technology and Evaluation Homepage

Japan Advanced Information Center of Safety and Health Homepage

Ministry of Health, Labour and Welfare Homepage

[Regulatory review Tools]

ezCRIC+ (Japan Chemical Database Ltd)