CANON OPTRON INC.
SDS Number: EI02
Product Name: ITO

SAFETY DATA SHEET

rev. 7.2 Date of Issue 2014/9/1
Revised Date 2022/10/3

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 tumber	+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

	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	*In2O3*	*SnO2*
Concentration or concentration range	In2O3 : 88- 99 SnO2 : 1- 12 ※As oxidation indium (Ⅲ) and tin oxide (Ⅳ) more than 99.9%	
CAS No.	1312-43-2	18282-10-5
TSCA Inventry	*Indium oxide (In2O3)*	*Tin oxide (SnO2)*
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 rising.
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

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.

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Safety packaging material	It uses the container which it can seal up without damage and the leak.

SECTION 8 Exposure controls/personal protection

	In2O3	***SnO2***
Permissible concentration		
ACGIH	*TLV-TWA: 0.1 mg/m³ (as indium) (indium and the compound) (2016 version)*	*TLV-TWA: 2 mg/m³ (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

	In2O3	***SnO2***
Melting point/freezing point	*1,912 degrees Celsius – 2,000 degrees Celsius (Ministry of the Environment risk evaluation Vol. 11, 2013)*	*1127℃*
Boiling point or initial boiling point and boiling range	*It disintegrate at 850 degrees Celsius and volatilize (PATTY (6th, 2012))*	*1800～1900℃*
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*

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Decomposition temperature	*850℃*	*No data available*
pH	*No data available*	*4～5 (20℃) (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	*7.18*	*6.95 g/㎤ (ICSC (2004))*
(Density)	※ 3.9 ~ 4.8 (pellet) as ITO	
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

	In2O3	***SnO2***
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

	In2O3	***SnO2***
Acute toxicity(oral)	*For a rat LD50 price,> 10,000 mg/kg (PATTY, (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*

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^3 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^3, 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*

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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/m³ (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)).*
Aspiration hazard	*No data available*	*No data available*
Other information	No data available	

SECTION 12 Ecological information

	In2O3	***SnO2***
Toxicity		

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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 degradablility	*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

	In2O3	***SnO2***
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*
Japanese lows 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	–	–

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SECTION 15 Regulatoly information(Japan)

	In2O3	***SnO2***
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	*No data available*	*Not applicable*
Water Supply Act	*No data available*	*Not applicable*
Sewerage Act	*No data available*	*Not applicable*
Marine Pollution Prevention Law	*No data available*	*Not applicable*
Waste Management and Public Cleansing Act	*No data available*	*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.
①About thorough prevention of healthy obstacle by handling work such as the indium tin oxide
②A technical indicator about the prevention of healthy obstacle by handling work such as the indium tin oxide(1222 the second December 22, 2010)

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)