CANON OPTRON INC.
SDS Number: ET04
Product Name: TiO2

SAFETY DATA SHEET

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SECTION 1 Chemicals and company identification

Product name	TiO2
Product code	ET04
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
	Desensitize explosives	Classification not possible
Health hazards	Acute toxicity(oral)	Not classified
	Acute toxicity(dermal)	Not classified
	Acute toxicity (Inhalation: Gases)	Not applicable
	Acute toxicity (Inhalation: Vapors)	Classification not possible

	Acute toxicity (Inhalation: Dusts and mists)	Not classified
	Skin corrosion/irritation	Not classified
	Serious eye damage/eye irritation	Classification not possible
	Respiratory sensitization	Classification not possible
	Skin sensitization	Not classified
	Germ cell mutagenicity	Classification not possible
	Carcinogenicity	Category 2
	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)	Not classified
	Hazardous to the aquatic environment Long-term(chronic)	Not classified
	Hazardous to the ozone layer	Classification not possible

Label elements

hazard Pictograms — Health Hazard

Signal word — Danger

Dangerous goods hazard information — Suspected of causing cancer.
Causes damage to organs through prolonged or repeated exposure Respiratory organs.

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 exposed or concerned: Get medical advice/attention. Get medical advice/attention if you feel unwell.
【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	Titanium oxide
Chemical formula	TiO2
Concentration or concentration range	99.9<
CAS No.	13463-67-7
TSCA Inventry	Titanium oxide (TiO2)
EINECS number	236-675-5
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 use 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 fire, highly toxic degradation products may be generated.
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. If it is not dangerous to do so, move the container out of the fire area.
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	No data available

SECTION 8 Exposure controls/personal protection

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Permissible concentration

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ACGIH	TLV-TWA: 10 mg/m³ (titanium dioxide) (2016 version)
Appropriate engineering controls	In the work shop which dust produces, It use a device, an apparatus sealed up by all means or a local ventilator.
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	Blue black or white
Odour	None

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Melting point/freezing point	1855℃
Boiling point or initial boiling point and boiling range	2500～3000℃
Flammability	No data available
Upper/lower flammability or explosive limits	No data available
Flash point	No data available
Auto-ignition temperature	Noninflammability (HSDB (2016))
Decomposition temperature	1,860℃ (GESTIS (2016))
pH	SUSPENSION IN WATER (1 IN 10) IS NEUTRAL TO LITMUS (HSDB (2016))
Kinematic viscosity	No data available
Solubility	
Water	Insoluble
Other solvents	No data available
Partition coefficient: n-octanol/water	No data available
Vapour pressure	No data available
Density and/or relative density	4.23

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(Density)	※ (bulk density of the granular product) from 2.10 to 2.45 as TiO2
Relative vapor density	No data available
Particle characteristics	No data available
Other information	No data available

SECTION 10 Stability and reactivity

TiO2

Reactivity	It is stable under the normal handling condition.
Chemical stability	It is stable under the normal handling condition.
Possibility of hazardous reactions	Dangerous adverse reaction is not caused under the normal handling condition.
Conditions to avoid	It avoid direct rays of the sun and keep it in the cool and dark space.
Incompatible materials	Oxidizer, reducer
Hazardous decomposition products	In the case of fires, a toxic decomposition product may occur.

SECTION 11 Toxicological information

TiO2

Acute toxicity(oral)	For a rat LD50 price,> 2,000 mg/kg,> 5,000 mg/kg (SIDS (2015)) ,> 10,000 mg/kg (HSDB (Access on May 2016), Ministry of the Environment risk evaluation Vol. 8 (2010)) ,> 12,000 mg/kg,> 20,000 mg/kg (Ministry of the Environment risk evaluation Vol. 8 (2010)) There is a report.
Acute toxicity(dermal)	For an LD50 price of the hamsters,> 10,000 mg/kg (HSDB (Access on May 2016), Ministry of the Environment risk evaluation Vol. 8 (2010)) There is a report.
Acute toxicity (Inhalation: Gases)	Solid (GHS definition)
Acute toxicity (Inhalation: Vapours)	Solid (GHS definition)
Acute toxicity (Inhalation: Dusts and mists)	Based on a report of an LC50 value for rats of > 5.09 mg/L (SIDS (2015)), it was classified as "Not classified."
Skin corrosion/irritation	From descriptions (SIDS (2015)) of slight or no irritation in skin irritation tests using rabbits, it was classified as "Not classified" (Category 3 in UN GHS classification).
Serious eye damage/irritation	There is a report that in an eye irritation test (OECD TG 405) using rabbits, mild conjunctival redness was observed in 2 out of 3 animals 24 hours after the application, but disappeared within 48 hours, and there is a report that slight irritation was observed 24 hours after the application, but no irritation was observed after 48 and 72 hours (SIDS (2015)). The irritation observed in these tests may be thought to be due to physical stimulation, however, since the particle shape could not be confirmed, it was classified as "Classification not possible."

Respiratory or skin sensitization	Both a skin sensitization test using the guinea pigs (Buehler method, OECD TG 406) and a skin sensitization test using mice (LLNA method, OECD TG 429) were negative, and it was judged that this substance doesn't have skin sensitizing potential (SIDS (2015)). Therefore, it was classified as "Not classified."
Germ cell mutagenicity	As for in vivo, it was reported that micronucleus tests using peripheral erythrocytes or bone marrow cells of mice were negative, an hprt gene mutation assay using alveolar cells of rats was positive, a chromosomal aberration test using mouse bone marrow cells and a DNA damage test in rat lungs were negative (SIDS (2015), National Institute of Advanced Industrial Science and Technology (2011), DFGOT (2014), Environmental Risk Assessment for Chemical Substances Vol. 8 (Ministry of the Environment, 2010), IARC 93 (2010)). As for in vitro, negative results were reported in all of bacterial reverse mutation tests, micronucleus tests, chromosome aberration tests, and mouse lymphoma assays using cultured mammalian cells (SIDS (2015), OEL Documentations (Japan Society For Occupational Health (JSOH), 2013), National Institute of Advanced Industrial Science and Technology (2011), IARC 93 (2010), Environmental Risk Assessment for Chemical Substances Vol. 8 (Ministry of the Environment, 2010), DFGOT (2014)). In addition, it is evaluated in SIDS (2015) that it is not possible to conclude on the genotoxicity of this substance because positive in vivo findings are not by standard tests. From the above, it was classified as "Classification not possible."
Carcinogenicity	In a large-scale cohort study in Europe, the mild increase of the risk of the lung cancer was suggested by the occupation revelation to this material, but it was said to this material revelation and association with the carcinogenesis that the carcinogenic evidence in the Homo sapiens was restrictive in others which a dose-response relationship was not seen in in revelation group, a cohort study in the North America and the case-control study without being shown (IARC 93 (2010)) . Increase of the frequency of adenoma of the lungs and the squamous cancer was seen in a rat in one inhalational examination that came to light in the experimental animals in high density group (250 mg/m^3) for two years (IARC 93 (2010), SIDS (2015)) . In addition, increase (32/100 vs. control group 1/271) of the outbreak frequency of the lung tumor (benign squamous epithelium tumor, squamous cancer, adenoma, adenocarcinoma) was seen in the revelation group, but oncogenic increase was not seen even in the examination that inhaled super finer particles (P25) of this material to a rat for two years, and came to light in the murine examination (IARC 93 (2010)) . In addition, it was admitted the frequency increase of the benign and malignant lung tumor in the intratracheal examination that It injected to lat with titanium oxide. On the other hand, the increase of tumor was not seen in a rat, a mouse in oral, subcutis, neither examination that It gave intraperitoneally (IARC 93 (2010)) . It classified the IARC in group 2B than the above saying that there was carcinogenic enough evidence in the experimental animals (IARC 93 (2010)) . In addition, Nihon Sangyo hygiene society classifies it in second group B as a temporary classification (advice (2015) of the acceptable concentration) .
Reproductive toxicity	In a reproduction/developmental toxicity screening test (OECD TG 421) using rats, no adverse effects on fertility of parental animals, survival and development up to 4 days after delivery of offspring were observed even up to at a dose of 1,000 mg/kg/day administered by gavage (SIDS (2015)). However, because this test is a screening test, it was not possible to classify this substance as "Not classified" only from this result, and there is no other data available for classification. Therefore, the classification was not possible due to lack of data.
Specific target organ toxicity(single exposure)	No data available

Specific target organ toxicity(repeated exposure)	There is no information on humans. As for experimental animals, in a 2-year inhalation toxicity test using rats, increases in leukocyte and neutrophil counts, and increase in pneumonia, tracheitis, and rhinitis with squamous metaplasia in the anterior nasal cavity were observed at 10 mg/m³ which is in the range of Category 1, and in a 24-month inhalation toxicity study using rats, lung fibrosis, minor changes in cytologic pattern in bronchoalveolar lavage fluid (BALF), a slight increase in polymorphonuclear leukocyte count, increase in macrophage and hyperplasia of the lung-associated lymph nodes were observed at 5 mg/m³ (SIDS (2015)). Besides, as for oral route, no effects were observed even at doses corresponding to "Not classified" in 13-week or 103-week repeated dose toxicity tests using rats or mice dosed by feeding (Environmental Risk Assessment for Chemical Substances Vol. 8 (Ministry of the Environment, 2010)). Therefore, it was classified in Category 1 (respiratory organs).
Aspiration hazard	No data available
Other information	No data available

SECTION 12 Ecological information

TiO2

Toxicity

Hazardous to the aquatic environment Short-term(acute)	From 72-hour EL50 (growth rate) > 100 mg/L for algae (Pseudokirchneriella subcapitata), 48-hour EL50 > 100 mg/L for crustacea (Daphnia magna), and 96-hour LL50 > 100 mg/L for fish (Oryzias latipes) (all SIDS, 2015), it was classified as "Not classified."
Hazardous to the aquatic environment Long-term(chronic)	Reliable chronic toxicity data were not obtained. It is poorly water-soluble (insoluble in water, ICSC, 2002), and classified as "Not classified" for acute toxicity, but due to the unknown environmental behavior of the inorganic compound, it was classified in Category 4.
Persistence and degradablility	No data available
Bioaccumulative potential	No data available
Mobility in soil	No data available
Hazard to the ozone layer	No data available
Other adverse effects	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.

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SECTION 14 Transport information

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International regulation

UN number	Not applicable
UN proper shipping name	Not applicable
UN classification	Not applicable
Transport hazard class	Not applicable
Packing group	Not applicable
Hazardous to the aquatic environment	No data available
Maritime transport in bulk according to IMO instruments	No data available
Japanese lows and regulations	Land regulation information Not applicable Maritime regulatory information non-hazardous materials Aviation regulatory information non-hazardous materials
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.
Special Provisions	-

SECTION 15 Regulatoly information(Japan)

TiO2

Occupational Safety and Health Law	There is it in the case of an application or an application
PRTR Law	Not applicable
Poisonous and Deleterious Substances control Law	Not applicable
Labor Standards Act	There is it in the case of an application or an application
Chemical substances control Law	Not applicable
Fire fighting Law	Not applicable
Air Pollution Control Act	Not applicable
Water Pollution Prevention Act	Not applicable
Water Supply Act	Not applicable
Sewerage Act	Not applicable
Marine Pollution Prevention Law	There is it in the case of an application or an application

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Waste Management and Public Cleansing Act	Not applicable
Note	Ensure this material in compliance with federal requirements and ensure conformity to local regulations.

SECTION 16 Other information

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)