

CANON OPTRON INC.

SDS Number: EC03-2
Product Name: CeO₂ (B, D)

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	CeO ₂ (B, D)
Product code	EC03-2
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

CANON OPTRON INC.

SDS Number: EC03-2
Product Name: CeO2 (B, D)

SAFETY DATA SHEET

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

	Acute toxicity (Inhalation: Dusts and mists)	Classification not possible
	Skin corrosion/irritation	Classification not possible
	Serious eye damage/eye irritation	Classification not possible
	Respiratory sensitization	Classification not possible
	Skin sensitization	Classification not possible
	Germ cell mutagenicity	Classification not possible
	Carcinogenicity	Classification not possible
	Reproductive toxicity	Classification not possible
	Reproductive toxicity, effects on or via lactation	Classification not possible
	Specific target organ toxicity(single exposure)	Category 2
	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	May cause damage to organs Lungs. Causes damage to organs through prolonged or repeated exposure Lungs.	
Precautionary statements		
【Safety measures】	Do not breathe dust/fume/gas/mist/vapours/spray. Wash hands thoroughly after handling. Do not eat, drink or smoke when using this product.	

CANON OPTRON INC.

SDS Number: EC03-2
 Product Name: CeO2 (B, D)

SAFETY DATA SHEET

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

【First-aid measures】	If exposed or concerned: Call poison center or doctor/physician. Get medical advice/attention if you feel unwell. Specific treatment.
【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	<i>Cerium oxide</i>	<i>Aluminum oxide</i>
Chemical formula	<i>CeO2</i>	<i>Al2O3</i>
Concentration or concentration range	CeO2 : 97.0- 99.9 Al2O3 : 0.1-3.0	
CAS No.	1306-38-3	1344-28-1
TSCA Inventory	<i>Cerium oxide (CeO2)</i>	<i>Aluminum oxide (Al2O3)</i>
EINECS number	<i>215-150-4</i>	<i>215-691-6</i>
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

Suitable extinguishing media	This product itself is not flammable.
------------------------------	---------------------------------------

CANON OPTRON INC.

SDS Number: EC03-2
 Product Name: CeO₂ (B, D)

SAFETY DATA SHEET

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

Unsuitable extinguishing media	No data available
Specific hazards	No data available
Specific extinguishing methods	In the case of a fire in the periphery, the portable container is quickly moved to a safe place.
Special protective equipment for firefighters	Wear suitable protective equipment (gloves, glasses and a mask) in fire-fighting.

SECTION 6 Accidental release measures

Personal precautions, protective equipment, and emergency procedures	Protection equipment (specified as those in which the properties of the product are suitable) worn during operation so that airborne droplets, etc., do not adhere to the skin and dusts and gases are not absorbed.
Environmental precautions	The leakage may not directly flow into rivers or sewage.
Methods and material for containment and cleaning up	The leaked material is scooped up, or swept up and gathered to be recovered in a paper bag or a drum. After recovery, a small amount of the residue is absorbed in sediment, sawdust, etc.
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	Handling work must be practiced in a room where there is a local or total ventilation facility.
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	Store in a well-ventilated place. Keep container tightly closed. Store locked up.
Safety packaging material	No data available

SECTION 8 Exposure controls/personal protection

	<u>CeO₂</u>	<u>Al₂O₃</u>
Permissible concentration		

CANON OPTRON INC.

SDS Number: EC03-2
 Product Name: CeO₂ (B, D)

SAFETY DATA SHEET

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

ACGIH

No data available

(Particulate asbestos-free, less than 1% crystalline silica) TLV-TWA 10mg/m³

Appropriate engineering controls

Use sealed devices, equipment, or a local exhaust ventilation as much as possible.

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

CeO₂

Al₂O₃

Melting point/freezing point	<i>2480°C</i>	<i>2072°C</i>
Boiling point or initial boiling point and boiling range	<i>3730°C</i>	<i>2980°C</i>
Flammability	<i>No data available</i>	<i>No data available</i>
Upper/lower flammability or explosive limits	<i>No data available</i>	<i>No data available</i>
Flash point	<i>No data available</i>	<i>Noncombustibility</i>
Auto-ignition temperature	<i>No data available</i>	<i>Noncombustibility</i>
Decomposition temperature	<i>No data available</i>	<i>No data available</i>
pH	<i>No data available</i>	<i>No data available</i>
Kinematic viscosity	<i>No data available</i>	<i>No data available</i>
Solubility		
Water	<i>Insoluble</i>	<i>Insoluble</i>
Other solvents	<i>And insoluble in solvents</i>	<i>The slightly soluble in non-polar organic solvent</i>

CANON OPTRON INC.

SDS Number: EC03-2
 Product Name: CeO₂ (B, D)

SAFETY DATA SHEET

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

Partition coefficient: n-octanol/water	No data available	No data available
Vapour pressure	No data available	0.073Pa (mp.)
Density and/or relative density (Density)	7.21 ※ 4.1 ~ 4.95(pellet) as CeO ₂ (B, D)	3.97
Relative vapor density	No data available	No data available
Particle characteristics	No data available	No data available
Other information	No data available	No data available

SECTION 10 Stability and reactivity

CeO₂

Al₂O₃

Reactivity	No data available	No data available
Chemical stability	It is considered stable.	Stability
Possibility of hazardous reactions	Do not react in the storage conditions and normal handling. It will generate NO _x gas in the reaction of chlorine gas, and nitric acid reaction with hydrochloric acid.	Possibility of hazardous reaction is negligible.
Conditions to avoid	High-temperature and humidity	Generation of dust, diffusion.
Incompatible materials	Carbon dioxide, acid	Not applicable
Hazardous decomposition products	Acid mist is generated upon dissolution of the acid.	Not applicable

SECTION 11 Toxicological information

CeO₂

Al₂O₃

Acute toxicity(oral)	Rat LD ₅₀ value:> 5000 mg / kg bw (IUCRID (2000))	SPECIES: Rat ENDPOINT: LD ₅₀ VALUE: > 5000 mg/kg
Acute toxicity(dermal)	Based on the result that administration of 2000 mg/kg bw to rats caused no mortality, and LD ₅₀ value was > 2000 mg/kg bw (IUCRID (2000)), the substance was classified as "Not classified".	No data available
Acute toxicity (Inhalation: Gases)	Solid (GHS definition)	Solid (GHS definition)
Acute toxicity (Inhalation: Vapours)	No data available	No data available

CANON OPTRON INC.

SDS Number: EC03-2
 Product Name: CeO₂ (B, D)

SAFETY DATA SHEET

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

Acute toxicity (Inhalation: Dusts and mists)	<i>Based on the rat LC50 value of 5.05 mg/L (OECD TG 403) (IUCLID (2000)), the substance was classified as "Not classified" in the JIS classification (corresponding to Category 5 in the UN-GHS classification). According to the description that the test particles which was less than 3 micrometer in particle diameter were account for 85.4% (IUCLID (2000)), the criterion values for dust/mist were adopted.</i>	No data available
Skin corrosion/irritation	<i>In the rabbit test (OECD TG404), application of 0.5 g of test substance caused no irritation (IUCLID (2000)). In another rabbit test, the primary skin irritation index value was 0.0 and it was concluded that the substance was not irritating (IUCLID (2000)). Based on the information, the substance was classified as "Not classified".</i>	No data available
Serious eye damage/irritation	<i>In the rabbit test (OECD TG405), instillation of 0.1 g of test substance to eye resulted in non-irritating (IUCLID (2000)). In another rabbit test, slightly irritating was reported (IUCLID (2000)). Based on the information, the substance was classified as "Not classified".</i>	No data available
Respiratory or skin sensitization	<i>In the maximization test using guinea pigs (OECD TG406), no reaction of sensitization was observed after elicitation, and concluded as a non-sensitizer (IUCLID (2000)). However, since it was the "List 2" information source designated in the GHS classification guidance for the Japanese government, the substance was classified as "Classification not possible".</i>	No data available
Germ cell mutagenicity	<i>The substance was classified as "Classification not possible" due to the negative results in the micronucleus test (OECD TG474) using bone marrow cells of mice orally administered (in vivo mutagenicity test in somatic cells) (IUCLID (2000)). As relevant information, as for in vitro study, negative results in the Ames test were reported (Initial Environmental Risk Assessment of Chemicals (Ministry of the Environment), vol. 8 (2010)).</i>	<i>The in vivo mutagenicity test has not been carried out, and in the in vitro mutagenicity test, we could only find the Ames test (negative). Therefore we presupposed that we could not classify it for the lack of data.</i>
Carcinogenicity	<i>No data were available. As relevant information, the US EPA reports that the data of this substance are insufficient to evaluate the possibility of carcinogenicity in humans under the carcinogenicity risk assessment guidelines (IRIS (2009) Tox Review).</i>	Not classified because of "A"
Reproductive toxicity	No data available	No data available

CANON OPTRON INC.

SDS Number: EC03-2

Product Name: CeO₂ (B, D)

SAFETY DATA SHEET

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

Specific target organ toxicity(single exposure)

In the acute inhalation study in rats exposed to dust for 4 hours at the range of concentrations from 4.12 to 5.98 mg/L (OECD TG 433, GLP-compliant), labored respiration and ruffled fur were noted in two of ten animals, and the lungs of all animals were incompletely collapsed with diffuse whitish foci (IUCLID (2000)). Based on these findings observed in the concentration corresponding nearly to the upper limit within Category 2 of the guidance values, the substance was classified as Category 2 (lung). In addition, in the acute oral toxicity study in rats administered up to 5000 mg/kg bw, no mortality was recorded, body weight gain was normal, and no abnormalities were observed at necropsy (IUCLID (2000)).

It was set as category 3 (respiratory irritation) from the statement of upper respiratory irritation (ICSC (2000)).

CANON OPTRON INC.

SDS Number: EC03-2
 Product Name: CeO₂ (B, D)

SAFETY DATA SHEET

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

Specific target organ
 toxicity(repeated exposure)

In the lungs of the workers exposed for many years to the fumes of rare-earth elements such as cerium, accumulation of rare-earth elements was observed, and lung lesions such as granuloma, emphysema, or interstitial fibrosis and decrease of pulmonary breathing capacity were reported (Initial Environment Risk Assessment of Chemicals (Ministry of Environment), vol. 8 (2010)). Many reports were published describing long-term residue of rare earth elements in lung and numerous cases of workers who developed adverse lung effects associated with cerium oxide as follows. In the case of the 58-year-old worker who came to hospital complaining of dyspnea at least 15 years after exposures to cerium oxide polishing agents, slight pleural thickening, and pulmonary obstruction were noted. He was diagnosed by histopathological examination as chronic pachypleuritis (Initial Environment Risk Assessment of Chemicals (Ministry of Environment), vol. 8 (2010)). In the case of 68-year-old man who was engaged in the abrasive operation of the optical lens for 35 years, rare earth pneumoconiosis associated with cerium oxide exposure was identified after 13 years of separation of work (PATTY, 5th (2001)). On the other hand, in the 13-week repeated inhalation study in rats exposed to dust, enlargement and discoloration of diaphragm in approximately half of the animals, changes of bronchial lymph nodes in all animals were found at 5 mg/m³ or higher, and discoloration of the lungs in all animals at 51 mg/m³ or higher at necropsy. Histopathologically, lymphoid hyperplasia and pigmentation in the bronchial lymph nodes, and pigmentation in the lung were noted at 5 mg/m³ or higher in both sexes, and alveolar epithelial hyperplasia in the lungs and metaplasia and pigmentation in the larynx were noted at 51 mg/m³ or higher in both sexes (Initial Environment Risk Assessment of Chemicals (Ministry of Environment), vol. 8 (2010)). These effects were observed at doses within Category 1 of the guidance values. Based on the findings for both humans and experimental animals, the substance was classified as Category 1 (lung).

It was classified into Category 1 according to the statement that by occupational exposure of aluminas, pulmonary fibrosis was occurred (EHC (1997)).

CANON OPTRON INC.
 SDS Number: EC03-2
 Product Name: CeO2 (B, D)

SAFETY DATA SHEET

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

Aspiration hazard	<i>No data available</i>	<i>No data available</i>
Other information	No data available	

SECTION 12 Ecological information

	<u><i>CeO2</i></u>	<u><i>Al2O3</i></u>
Toxicity Hazardous to the aquatic environment Short-term(acute)	<i>No data available</i>	<i>No data available</i>
Hazardous to the aquatic environment Long-term(chronic)	<i>No data available</i>	<i>No data available</i>
Persistence and degradability	<i>No data available</i>	<i>No data available</i>
Bioaccumulative potential	<i>No data available</i>	<i>No data available</i>
Mobility in soil	<i>No data available</i>	<i>No data available</i>
Hazard to the ozone layer	<i>This substance is not listed in Annexes to the Montreal Protocol.</i>	<i>No data available</i>
Other adverse effects	<i>No data available</i>	<i>No data available</i>

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><i>CeO2</i></u>	<u><i>Al2O3</i></u>
International regulation		
UN number	<i>Not applicable</i>	<i>Not applicable</i>
UN proper shipping name	<i>Not applicable</i>	<i>Not applicable</i>
UN classification	<i>Not applicable</i>	<i>Not applicable</i>
Transport hazard class	<i>Not applicable</i>	<i>Not applicable</i>
Packing group	<i>Not applicable</i>	<i>Not applicable</i>
Hazardous to the aquatic environment	<i>No data available</i>	<i>No data available</i>
Maritime transport in bulk according to IMO instruments	<i>No data available</i>	<i>No data available</i>

CANON OPTRON INC.

SDS Number: EC03-2
Product Name: CeO₂ (B, D)

SAFETY DATA SHEET

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

Japanese laws and regulations	<i>No data available</i>	<i>Land regulation information Not applicable Maritime regulatory information non-hazardous materials Aviation regulatory information non-hazardous materials</i>
Special precautions for users	<i>Requires retention of yellow card when transporting. When transporting, protect from direct sunlight and take on cargo without breakage of container, corrosion and leakage. Do not transport with food and feedstuffs. Do not stack heavy good thereupon.</i>	<i>When transporting, protect from direct sunlight and take on cargo without breakage of container, corrosion and leakage.</i>
Special Provisions	-	-

SECTION 15 Regulatory information (Japan)

	<u>CeO₂</u>	<u>Al₂O₃</u>
Occupational Safety and Health Law	<i>No data available</i>	<i>There is it in the case of an application or an application</i>
PRTR Law	<i>No data available</i>	<i>Not applicable</i>
Poisonous and Deleterious Substances control Law	<i>No data available</i>	<i>Not applicable</i>
Labor Standards Act	<i>No data available</i>	<i>Not applicable</i>
Chemical substances control Law	<i>No data available</i>	<i>Not applicable</i>
Fire fighting Law	<i>No data available</i>	<i>Not applicable</i>
Air Pollution Control Act	<i>No data available</i>	<i>Not applicable</i>
Water Pollution Prevention Act	<i>No data available</i>	<i>There is it in the case of an application or an application</i>
Water Supply Act	<i>No data available</i>	<i>There is it in the case of an application or an application</i>
Sewerage Act	<i>No data available</i>	<i>Not applicable</i>
Marine Pollution Prevention Law	<i>No data available</i>	<i>Not applicable</i>
Waste Management and Public Cleansing Act	<i>No data available</i>	<i>Not applicable</i>

Note Ensure this material in compliance with federal requirements and ensure conformity to local regulations.

CANON OPTRON INC.

SDS Number: EC03-2
Product Name: CeO₂ (B, D)

SAFETY DATA SHEET

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

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)