

CANON OPTRON INC.

SDS Number: EC03
 Product Name: CeO₂ (A, C)

SAFETY DATA SHEET

rev. 7.0 Date of Issue 2014/9/1
 Revised Date 2022/5/13

SECTION 1 Chemicals and company identification

| | |
|----------------------------|---|
| Product name | CeO ₂ (A, C) |
| Product code | EC03 |
| 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) | Not classified |
| | Acute toxicity (Inhalation: Gases) | Not applicable |
| | Acute toxicity (Inhalation: Vapors) | Classification not possible |

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| | | |
|------------------------------------|--|-----------------------------|
| | Acute toxicity (Inhalation: Dusts and mists) | Not classified |
| | Skin corrosion/irritation | Not classified |
| | Serious eye damage/eye irritation | Not classified |
| | Respiratory sensitization | Classification not possible |
| | Skin sensitization | Classification not possible |
| | Germ cell mutagenicity | Not classified |
| | 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. | |

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|----------------------|---|
| 【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 | Substance |
|--------------------------------------|--|
| Chemical name | Cerium oxide |
| Chemical formula | CeO2 |
| Concentration or concentration range | 99.9%< |
| CAS No. | 1306-38-3 |
| TSCA Inventory | Cerium oxide (CeO2) |
| EINECS number | 215-150-4 |
| 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 | Water spray, foam fire extinguishing agent, powder fire extinguishing agent , carbon dioxide gas, dry sand such |
|------------------------------|---|

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| Unsuitable extinguishing media | No data available |
| Specific hazards | Is a non-flammable, itself does not burn, but there is a risk which break down when heated, to generate fumes and toxic or corrosive /. Is likely to generate toxic gases irritating, corrosive and fire. |
| Specific extinguishing methods | It move a container from the fire area if not dangerous. Eliminate all ignition sources if safe to do so. |
| Special protective equipment for firefighters | It wear appropriate respiratory air, the protective clothing (heat resistance). |

SECTION 6 Accidental release measures

| | |
|--|--|
| Personal precautions, protective equipment, and emergency procedures | Immediately, It isolate leakage area as the appropriate distance in all directions. |
| Environmental precautions | It should not be released to the environment. |
| Methods and material for containment and cleaning up | Moisten with water to reduce dust in the air and prevent dispersion. Collection and neutralization: Sweep up leaked material and collect it in an empty container for later waste disposal. |
| Secondary disaster prevention measures | Was covered with a plastic sheet to prevent scattering. |

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 | Do not inhale dust, fumes, vapors, spray. |
| 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 locked up. |
| Safety packaging material | No data available |

SECTION 8 Exposure controls/personal protection

CeO₂

Permissible concentration

ACGIH

No data available

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|---|--|
| Appropriate engineering controls | The workshop handling or storage of this material, it is recommended that you install the appropriate safety shower and eye wash. In order to prevent the exposure, it is recommended that you install the appropriate general ventilation equipment, local exhaust ventilation in the workplace. |
| 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

| | |
|--|---------------------------|
| Melting point/freezing point | 2480°C |
| Boiling point or initial boiling point and boiling range | 3730°C |
| Flammability | No data available |
| Upper/lower flammability or explosive limits | No data available |
| Flash point | No data available |
| Auto-ignition temperature | No data available |
| Decomposition temperature | No data available |
| pH | No data available |
| Kinematic viscosity | No data available |
| Solubility | |
| Water | Insoluble |
| Other solvents | And insoluble in solvents |
| Partition coefficient: n-octanol/water | No data available |
| Vapour pressure | No data available |
| Density and/or relative density | 7.21 |

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| (Density) | ※ 4.0 ~ 4.4 (pellet) as CeO ₂ (A, C) |
| Relative vapor density | No data available |
| Particle characteristics | No data available |
| Other information | No data available |

SECTION 10 Stability and reactivity

CeO₂

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|------------------------------------|---|
| Reactivity | No data available |
| Chemical stability | It is considered stable. |
| 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. |
| Conditions to avoid | High-temperature and humidity |
| Incompatible materials | Carbon dioxide, acid |
| Hazardous decomposition products | Acid mist is generated upon dissolution of the acid. |

SECTION 11 Toxicological information

CeO₂

| | |
|--|--|
| Acute toxicity(oral) | Rat LD ₅₀ value:> 5000 mg / kg bw (IUCALID (2000)) |
| 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 (IUCALID (2000)), the substance was classified as "Not classified". |
| Acute toxicity (Inhalation: Gases) | Solid (GHS definition) |
| Acute toxicity (Inhalation: Vapours) | No data available |
| Acute toxicity (Inhalation: Dusts and mists) | Based on the rat LC ₅₀ value of 5.05 mg/L (OECD TG 403) (IUCALID (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% (IUCALID (2000)), the criterion values for dust/mist were adopted. |
| Skin corrosion/irritation | In the rabbit test (OECD TG404), application of 0.5 g of test substance caused no irritation (IUCALID (2000)). In another rabbit test, the primary skin irritation index value was 0.0 and it was concluded that the substance was not irritating (IUCALID (2000)). Based on the information, the substance was classified as "Not classified". |
| Serious eye damage/irritation | In the rabbit test (OECD TG405), instillation of 0.1 g of test substance to eye resulted in non-irritating (IUCALID (2000)). In another rabbit test, slightly irritating was reported (IUCALID (2000)). Based on the information, the substance was classified as "Not classified". |

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| 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 (IUCRID (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> |
| 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) (IUCRID (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> |
| 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> |
| Reproductive toxicity | <i>No data available</i> |
| Specific target organ toxicity(single exposure) | <i>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 (IUCRID (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 (IUCRID (2000)).</i> |
| Specific target organ toxicity(repeated exposure) | <i>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).</i> |

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| | |
|-------------------|-------------------|
| Aspiration hazard | No data available |
| Other information | No data available |

SECTION 12 Ecological information

CeO₂

Toxicity

| | |
|---|---|
| Hazardous to the aquatic environment Short-term(acute) | No data available |
| Hazardous to the aquatic environment Long-term(chronic) | No data available |
| Persistence and degradability | No data available |
| Bioaccumulative potential | No data available |
| Mobility in soil | No data available |
| Hazard to the ozone layer | This substance is not listed in Annexes to the Montreal Protocol. |
| 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. |

SECTION 14 Transport information

CeO₂

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 laws and regulations | No data available |

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Special precautions for users

*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.*

Special Provisions

-

SECTION 15 Regulatory information (Japan)

CeO₂

Occupational Safety and Health Law

No data available

PRTR Law

No data available

Poisonous and Deleterious Substances control Law

No data available

Labor Standards Act

No data available

Chemical substances control Law

No data available

Fire fighting Law

No data available

Air Pollution Control Act

No data available

Water Pollution Prevention Act

No data available

Water Supply Act

No data available

Sewerage Act

No data available

Marine Pollution Prevention Law

No data available

Waste Management and Public Cleansing Act

No data available

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.

Literature Reference

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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)