

SHOWA DENKO K.K.



GPS/JIPS Safety Summary

1. SUBSTANCE NAME

Titanium dioxide (CAS No. 13463-67-7)

2. GENERAL STATEMENT

SUPER TITANIA™ is ultrafine titanium oxide manufactured by the vapor phase oxidation method using titanium tetrachloride as the raw material. Ultrafine high-purity titanium oxide with very low metal impurities and suitable for a wide range of needs including electronic materials and various fillers.

It is harmful to the human body and causes strong eye irritation. Moreover, it is suspected to have carcinogenicity. For this reason, it is necessary to wear appropriate protective equipment in a well-ventilated place to protect the eyes and prevent inhalation.

3. CHEMICAL IDENTITY

| Item | Description |
|--------------------------|---|
| Chemical or generic name | Titanium dioxide |
| Trade name | SUPER TITANIA™ |
| Other No. | Japan: Chemical Substances Control Law:(1)-558 |
| Chemical Formula | TiO ₂ |
| Other information | Including nanomaterials based on in-house standards |
| Source/References | Section 3 of the SDS issued by SHOWA DENKO K.K. |

4. USES AND APPLICATIONS

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| Main uses | Electronic materials, various fillers |
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5. PHYSICAL/CHEMICAL PROPERTIES

The product is an odorless white powder. It is stable for general storage and handling. The product should be stored indoors in principle and should be stored in a dry, safe place and protected from moisture.

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|-----------------------------|--------------------------------|
| Physical state | Solid |
| Appearance | Powder |
| Color | White |
| Odour | Odourless |
| pH | 3 - 4 (as 2 wt% slurry) |
| Melting point/Boiling point | 1560 °C(Anatase type)/ 3000 °C |
| Flash point | No flammability |
| Flammability (solid, gas) | Non flammable |
| Explosive limits (vol %) | Not available. |
| Auto-ignition temperature | No flammable |
| Vapour pressure | Not available |
| Relative vapour density at | Not available |

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| 20 ° C | |
| Relative density | No data available |
| Density | 3.9 g/cm ³ Anatase type |
| Solubility | Water: < 1 µg/l (Insoluble in water) , And no data available in the case of other solvent. |
| Partition coefficient n-octanol/water (Log Pow) | Not available |
| Sources/references | Section 9 and 10 of the SDS issued by SHOWA DENKO K.K. |

6. HEALTH EFFECTS

| Effect assessment | Results (GHS Hazard Classification) |
|---|--|
| Acute toxicity (oral) | Not classified |
| Acute toxicity (dermal) | Not classified |
| Acute toxicity (inhalation: gas) | Not applicable |
| Acute toxicity (inhalation: vapours) | Classification not possible |
| Acute toxicity (inhalation: dust, mist) | Not classified |
| Skin corrosion/irritation | Classification not possible |
| Serious eye damage/eye irritation, | Category 2 Causes serious eye irritation. |
| Respiratory sensitisation | Classification not possible |
| Skin sensitisation | Classification not possible |
| Germ cell mutagenicity | Classification not possible |
| Carcinogenicity | Category 2 Suspected of causing cancer |
| Reproductive toxicity | Classification not possible |
| Specific target organ toxicity – Single exposure, | Classification not possible |
| Specific target organ toxicity (repeated exposure) | Classification not possible |
| Aspiration hazard | Classification not possible |
| Sources/references | Section 2 and 11 of SDS issued by SHOWA DENKO K.K. |
| <ul style="list-style-type: none"> · GHS (Globally Harmonized System of Classification and Labelling of Chemicals): A system that classifies chemicals according to the type and degree of hazards, labels the information, and provides safety data sheets according to globally harmonized rules. · Not classified: Sufficient information has been obtained to implement the GHS classification, and as a result of the classification, it does not fall under any of the hazard categories specified in the GHS. · Not applicable: Since the priority of physical state, chemical structure, chemical property, and hazard items used in the GHS classification procedures does not fall under the category, it is not subject to the classification for the category. · Classification not possible: Classification is not possible because there is no sufficiently reliable data to make judgment on GHS classification after examining various information sources and in-house data, etc. Or there is not enough information for GHS classification, and classification is not possible. | |

7. ENVIRONMENTAL EFFECTS

| Effect assessment | Results (GHS Hazard Classification) |
|---|---|
| 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 |
| Sources/references | Sections 2 and 12 of the SDS issued by SHOWA DENKO K.K. |

| Environmental fate/dynamics | |
|-----------------------------|--|
| Mobility in soil | No additional information available. |
| Persistence/degradability | No additional information available. |
| Bioaccumulation potential | Bioconcentration test (common carp, 6 weeks) low Bioconcentration potential. |
| Conclusion about PBT/vPvB | The criteria for persistent bioaccumulative and toxic (PBT; remaining persistently in the environment and possessing high bioaccumulation potential and toxicity) and very persistent and very bioaccumulative (vPvB; remaining very persistently in the environment and possessing very high bioaccumulation potential) chemicals are believed to inapplicable. |
| Sources/references | Sections 12 of the SDS issued by SHOWA DENKO K.K. |

8. EXPOSURE

| Details | Exposure potentials through main uses |
|-------------------------|--|
| Occupational exposures | The product is manufactured and used in closed/continuous process with controlled exposure, or used in synthesis or compounding operation in closed batches, but there is a potential for dermal or inhalation exposure in operators in case of maintenance, sampling, equipment failure, etc. (PROC2, 3). During batch and other process operations, there is a potential for dermal and inhalation exposure to operators during maintenance, sampling, filling, emptying, and equipment failure (PROC 4). There is a potential for dermal and inhalation exposure in operators during blending/mixing operation in batches in the formulation and manufacture of articles (PROC 5). During the use of the reagent in a small test laboratory, there is a potential for dermal or inhalation exposure in operators (PROC15). |
| Consumer exposures | This product is not used directly by general consumers. |
| Environmental exposures | The product is manufactured and used in closed systems or other potentially exposed processes. Therefore, in the production process, the product may be released primarily to the air and water environment (ERC 1). |
| Precautions | If there is a possibility of exposure in other uses, take appropriate measures with reference to recommended risk management measures. |

9. RISK MANAGEMENT RECOMMENDATIONS

Recommended risk management measures can minimize risks to workers, consumers, and the environment from Section 8 exposure scenarios.

| Details | Risk management recommendations |
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| Worker | Technical measures: The carcinogenic potential of dust inhalation has been identified for this product. Handle the product in a room with forced general ventilation using local exhaust ventilation by wearing appropriate protective equipment to protect operators from dust. Take measures as much as possible to prevent dust from adhering to clothes and skin. Install facilities for hand washing and eye washing, etc., and wash hands and face, etc. thoroughly after handling. |

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| | <p>Local and general ventilation: The product should be handled in a place where forced general ventilation is possible with local exhaust ventilation. In addition, since there is a possibility of exposure during the transfer operation to containers, etc., perform the operation in a room where forced general ventilation is possible with local exhaust ventilation.</p> <p>Acceptable concentration: SUPER TITANIA™: Control concentration 3.0 mg/m³ Titanium oxide: Control concentration 3.0 mg/m³, Japan Society for Occupational Health 0.3 mg/m³ (nanoparticles), ACGIH (American Conference of Governmental Industrial Hygienists) TWA 0.2 mg/m³ (nanoscale respirable particulate matter) Hydrochloric acid/Hydrogen chloride: 2 ppm (maximum allowable concentration) from Japan Society for Occupational Health, and TWA-STEEL (C) 2 ppm from ACGIH Manage and control the values below the above values.</p> <p>Protective equipment: When handling the product, wear respiratory protective equipment (a certified dust mask [with a collection rate of 95% or higher]), chemically resistant rubber gloves (APF20 [with a protection rate of 95%]), protective glasses, and protective clothing to avoid skin contact. In addition, wear protective gloves, apron, boots, and protective equipment for head and face depending on the use status. [Example of protective equipment] Respiratory protective equipment: dust mask (mask with collection rate of 95% or higher) Hand protective equipment: chemically resistant rubber gloves (APF20 [protection rate 95%]) Eye protective equipment: Goggles Protective equipment for skin and body: Apron, protective equipment for head and face, etc.</p> <p>Precautions: The operation manager should educate operators about the selection of appropriate protective equipment, proper usage method, and control method of the work site.</p> |
| Consumer | Since the substance is not used by general consumers, the possibility of exposure to consumers is extremely low. |
| Environment | Install appropriate wastewater treatment facilities and exhaust gas treatment facilities. In addition, take measures to prevent leakage, and pay attention to periodic confirmation of discharge volume, daily control, and handling. |
| Special notes (emergency measures in case of leakage, etc.) | Precautions for human, protective equipment, and emergency measures: In case of leakage, wear appropriate protective equipment (respiratory protective equipment, protective clothing, protective gloves, and eye and face protective equipment), and remove the product using a vacuum cleaner. |
| | Environmental precautions: |


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| | Do not discharge product into the environment such as drains or rivers. If it leaks, immediately remove it with a vacuum cleaner. |
| Precautions | For normal handling, emergency response, disposal, and transportation control measures, refer to sections 4, 5, 6, 7, 8, 13, and 14 of the SDS issued by Showa Denko K.K. |

10. STATE AGENCY REVIEW

| Hazard assessment | Situations of review |
|-------------------------------------|---|
| International Chemical Safety Cards | ICSC: 0338 (Titanium dioxide) https://www.ilo.org/dyn/icsc/showcard.display?p_lang=en&p_card_id=0338&p_version=2 ICSC: 1782 (Titanium dioxide; nano-form) https://www.ilo.org/dyn/icsc/showcard.display?p_lang=en&p_card_id=1782&p_version=2 |
| OECD HPV | https://hpvchemicals.oecd.org/UI/Search.aspx |
| REACH | https://echa.europa.eu/substance-information/-/substanceinfo/100.033.327 |

11. REGULATORY INFORMATION / GHS CLASSIFICATION AND LABELLING INFORMATION

When using the product outside Japan, it must be handled in accordance with applied laws and regulations in that country or territory.

| Hazards | |
|-------------------------|---|
| Health hazards | Skin corrosion/irritation, Category 2 Carcinogenicity, Category 2 |
| Labelling Information | |
| Hazard pictograms (GHS) |  |
| Signal word (GHS) | Warning |
| Hazard statements (GHS) | Causes serious eye irritation. (H319) Suspected of causing cancer. (H351) |

12. CONTACT INFORMATION

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| Company | SHOWA DENKO K.K. |
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13. DATE OF ISSUE / REVISION, ADDITIONAL INFORMATION

Date of issue: December 27, 2022

Revisions:

| Date of revision | Revised section | Revised item | Version |
|------------------|-----------------|--------------|---------|
| | | | |

Special instructions: Notification on Precautionary Measures for Prevention of Exposure etc. to Nanomaterials (Labor Standards Bureau, Ministry of Health, Labor and Welfare, March 31st, 2009, LSB Notification No.0331013)

14. DISCLAIMER

The safety summary is part of the effort for the voluntary management of chemical substance in the chemical industry (GPS/JIPS: Japan Initiative of Product Stewardship). The purpose of the safety summary is to provide information on the safe handling of the product as an overview and not to provide professional information, such as the risk evaluation process and its impact on human health and the environment. This document is not meant to serve as an alternative to risk evaluation, such as a Safety Data Sheet (SDS) or a Chemical Safety Report (CSR). This safety summary is being written as accurately as possible based on data such as laws, materials, and information available at the time of publication, but it does not include all data. It does not guarantee anything.