



## 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 Japan: Industrial Safety and Health Act, existing chemical substance
Chemical Formula	TiO <sub>2</sub>
Other information	Including nanomaterials based on in-house standards
Source/References	Section 3 of the SDS issued by Resonac Corporation

### 4. USES AND APPLICATIONS

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.

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 20 ° C	Not available

Relative density	No data available
Density	3.9 g/cm <sup>3</sup> 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 Resonac Corporation

## 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 Resonac Corporation

- 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 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.
- 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. It is considered to be a lower hazard.
- Classification not possible : 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 Resonac Corporation

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 Resonac Corporation

## 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
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.
	Local and general ventilation: The product should be handled in a place where forced general

	<p>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/m<sup>3</sup>  Titanium oxide: Control concentration 3.0 mg/m<sup>3</sup>, Japan Society for Occupational Health 0.3 mg/m<sup>3</sup> (nanoparticles), ACGIH (American Conference of Governmental Industrial Hygienists) TWA 0.2 mg/m<sup>3</sup> (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	<p>Since the substance is not used by general consumers, the possibility of exposure to consumers is extremely low.</p>
Environment	<p>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.</p>
Special notes (emergency measures in case of leakage, etc.)	<p>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.</p>
	<p>Environmental precautions:  Do not discharge product into the environment such as drains or rivers.</p>

	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 Resonac Corporation.

## 10. STATE AGENCY REVIEW


Hazard assessment	Situations of review
International Chemical Safety Cards	International Chemical Safety Card ICSC: 0338 (Titanium dioxide) <a href="https://www.ilo.org/dyn/icsc/showcard.display?p_lang=en&amp;p_card_id=0338&amp;p_version=2">https://www.ilo.org/dyn/icsc/showcard.display?p_lang=en&amp;p_card_id=0338&amp;p_version=2</a> ICSC: 1782 (Titanium dioxide; nano-form) <a href="https://www.ilo.org/dyn/icsc/showcard.display?p_lang=en&amp;p_card_id=1782&amp;p_version=2">https://www.ilo.org/dyn/icsc/showcard.display?p_lang=en&amp;p_card_id=1782&amp;p_version=2</a>
OECD HPV	High production volume chemical testing programme <a href="https://hpvchemicals.oecd.org/UI/Search.aspx">https://hpvchemicals.oecd.org/UI/Search.aspx</a>
NITE-CHRIP (NITE Chemical Risk Information Platform)	<a href="https://www.nite.go.jp/en/chem/chrip/chrip_search/srhInput">https://www.nite.go.jp/en/chem/chrip/chrip_search/srhInput</a>
GHS Classification Results by the Japanese Government	<a href="https://www.nite.go.jp/chem/english/ghs/16-mhlw-0099e.html">https://www.nite.go.jp/chem/english/ghs/16-mhlw-0099e.html</a>

## 11. REGULATORY INFORMATION/GHS CLASSIFICATION AND LABELLING INFORMATION

Regulatory information only in Japan

Applicable laws	Regulatory situations
Industrial Safety and Health Act	Dangerous or Harmful Substances Subject to Be Indicated their Names (Article 57 Paragraph (1) of the Act, Article 18 item ( i ) and item ( ii ) appended Table No. 9 of the Enforcement Order) Titanium(IV) oxide  Dangerous Articles and Harmful Substances Whose Names, etc. Should Be Notified (Article 57-2 of the Act, Article 18-2 item ( i ) and item ( ii ) appended Table No. 9 of the Enforcement Order) Titanium(IV) oxide (Cabinet Order Number : 191) hydrogen chloride (Cabinet Order Number : 98)
Poisonous and Deleterious Substances Control Act	Not applicable
Water Pollution Prevention Act	Designated Substances (Article 2, Paragraph 4 of the Act, Article 3-3 of the Enforcement Order) hydrogen chloride
Air Pollution Control Act	Emission Control Substances (Hazardous Substances) (Article 2, Paragraph (1) 3, of the Act, Article 1 of the Cabinet Order) chlorine and hydrogen chloride specified substance (Article 17, Paragraph 1 of the Act, Article 10 of the Cabinet Order) hydrogen chloride

Act on Prevention of Marine Pollution and Maritime Disaster	Hazardous liquid substances (Class Z substances) (appended Table 1 of the Enforcement Ordinance) titanium oxide hydrochloric acid
Foreign Exchange and Foreign Trade Act	Row 16 of Appended Table 1 of Cabinet Order on Export Trade Control
Act on the Assessment of Releases of Specified Chemical Substances in the Environment and the Promotion of Management Improvement and Transfer Register / PRTR)	Not applicable
Labor Standards Act	Occupational disease chemicals (Article 75, Paragraph 2 of the Act, Article 35, Appended Table 1-2, Item 4-1 of the Enforcement Ordinance) Hydrochloric acid (including hydrogen chloride)
Pneumoconiosis Act	Article 2 of the Act, Article 2 of the Enforcement Ordinance, Appended Table Dusty work titanium oxide
UN classification	Not applicable

<b>GHS 分類情報</b>	
<b>Hazards</b>	
Health hazards	Skin corrosion/irritation, Category 2 Carcinogenicity, Category 2
<b>Labelling Information</b>	
Hazard pictograms (GHS)	
Signal word (GHS)	Warning
Hazard statements (GHS)	if in eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing (P305+P351+P338).

## 12. CONTACT INFORMATION

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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
January 1, 2023	3, 6, 10-13	update to the latest information	rev.2

The contents are based on the safety data sheet (SDS) revised on January 1, 2023.

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.