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Safety Data Sheet

1. Chemical product and company identification

Product name : Titanium(IV) oxide

Company information

Name of manufacturer	:	KANTO CHEMICAL CO., INC.
Address	:	2-1, Nihonbashi, Muromachi 2-Chome, Chuo-Ku, Tokyo, 103-0022, JP
Name of section	:	Business Administration Department, Reagent Division
Telephone number	:	+81-3-6214-1090
Facsimile number	:	+81-3-3241-1047
Mail address	:	BC32@kanto.co.jp
Reference No	:	40983
Recommended use	:	For research use only
Restrictions on use	:	Seek expert judgment when using the product for applications other than those recommended.

2. Hazards identification

GHS classification

Health hazards	Carcinogenicity	Category 2
	Specific target organ toxicity (repeated exposure)	Category 1 (respiratory organs)

Hazard pictograms

Signal word : Danger

Hazard statements : Suspected of causing cancer
Causes damage to organs (respiratory organs) through prolonged or repeated exposure

Precautionary statements

Prevention : Do not handle until all safety precautions have been read and understood.
Do not breathe dust.
Wash hands, forearms and face thoroughly after handling.
Do not eat, drink or smoke when using this product.
Wear protective gloves/protective clothing/eye protection/face protection.

Response : 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 to hazardous or special waste collection point, in accordance with local, regional, national and/or international regulation.

3. Composition/information on ingredients

Distinction of substance or mixture : Substance

Synonyms : Titanium dioxide

Chemical name	Concentration (%)	Formula	TSCA	EC-No.	CAS RN
Titanium(IV) oxide	≥ 99.5	TiO2	Listed	236-675-5	13463-67-7

＊Crystal system : Anatase form 80%.

4. First aid measures

First aid measures

First-aid measures after inhalation : Remove the victim to fresh air, and make him blow his nose and gargle.

First-aid measures after skin contact : Wash the affected areas under running water.

First-aid measures after eye contact : Wash the affected areas under running water.

First-aid measures after ingestion : Give the victim water or milk and induce vomiting. Get medical attention.

Personal Protection in First Aid and Measures : Rescuers should wear proper protective equipment like rubber gloves, goggles.

5. Fire fighting measures

Suitable extinguishing media : This product is noncombustible.

Unsuitable extinguishing media : None

Firefighting instructions : Move containers from fire area if it can be done without risk, if not possible, apply water from a safe distance to cool and protect surrounding area.

Personal protection (Emergency response) : Firefighters should wear protective equipment.

6. Accidental release measures

Personal Precautions, Protective Equipment and Emergency Procedures

General measures : Wear proper protective equipment and avoid contact with skin and inhalation of dust. Conduct operations from upwind and evacuate people downwind.

Environmental precautions

Environmental precautions : Attention should be given to avoid damage to the environment by flowing of spillage to rivers.

Methods and Equipment for Containment and Cleaning up

For containment : Sweep up in a chemical waste container. Flush contaminated area with copious amounts of water.

7. Handling and storage

Handling

Technical measures : Wear appropriate protective equipment to avoid contact with skin

or inhalation of dust.

Precautions for safe handling : Avoid formation of dust and aerosols.

Storage

Storage conditions : Store in a dark, cool place and tightly closed.

Material used in packaging/containers : Glass, polyethylene, polypropylene.

8. Exposure controls / Personal protection equipment

ACGIH TWA	10 mg/m³

Appropriate engineering controls : Install a local ventilation system in case of dusty condition.

Protective equipment

Respiratory protection : If necessary, wear dust mask

Hand protection : Impervious protective gloves

Eye protection : Safety goggles

Skin and body protection : Protective clothing, protective boots

9. Physical and chemical properties

Physical state : Solid

Color : White

Odor : Odorless

pH : No data available

Melting point : 1840 ° C

Freezing point : No data available

Boiling point : No data available

Flash point : No data available

Auto-ignition temperature : No data available

Decomposition temperature : ≥ 3000 ° C

Flammability : Non flammable.

Vapor pressure : No data available

Relative density : 3.9

Density : No data available

Relative gas density : No data available

Solubility : Water: Insoluble.

Partition coefficient n-octanol/water (log Pow) : No data available

Explosive limits (vol %) : No data available

Viscosity, kinematic : No data available

Particle characteristics : Particle size:

Particle specific surface area:

10. Stability and reactivity

Reactivity : It dissolves in hot concentrated sulfuric acid to become TiOSO4 and melts with alkali to become alkali titanate.

Chemical stability	:	Stable under normal conditions.
Possibility of hazardous reactions	:	When reduced with lithium, magnesium, and zinc, it is accompanied by significant heat generation.
Conditions to avoid	:	Light, heat.
Incompatible materials	:	Reducing substances.
Hazardous decomposition products	:	fume.

11. Toxicological information

Acute toxicity (oral)	:	No classification rat LD50>5000mg/kg
Acute toxicity (dermal)	:	Classification not possible
Acute toxicity (inhalation)	:	No classification (gas) No classification (vapor) Classification not possible (dust, mist)
Skin corrosion/irritation	:	No classification Based on a report that no clear skin irritation was observed in the volunteer tests using an emulsion containing titanium dioxide nanoparticles and on a description that no skin irritation was observed in animals, it was classified as "Not classified."
Serious eye damage/irritation	:	No classification Based on a description that no eye irritation was observed in animals, it was classified as "Not classified."
Respiratory sensitization	:	Classification not possible
Skin sensitization	:	Classification not possible
Germ cell mutagenicity	:	Classification not possible As for in vivo, micronucleus tests in peripheral erythrocytes of mice was positive, DNA damage tests in peripheral erythrocytes and liver of mice were positive, a comet assay using the lung of rats was negative. In addition, a gene mutation test, a micronucleus test and the comet assay by intravenous administration to transgenic mice were reported recently, and all tests results were negative. As for in vitro, it was reported that in tests, bacterial reverse mutation tests were negative, gene mutation tests using cultured mammalian cells such as primary cultured embryonic fibroblasts derived from gpt delta transgenic mice, micronucleus test of mammalian cultured cells and chromosome aberration test were positive or negative. From the above, positive result in vivo could not be regarded as definite finding because there are contradictory findings to positive in vivo findings observed so far, and it is evaluated that indirect (secondary) genotoxicity caused by free radicals was involved rather than direct action by this substance. Therefore, it was classified as "Classification not possible."

Carcinogenicity	:	Suspected of causing cancer In a study in which female rats were exposed by inhalation to titanium dioxide nanoparticles at an average weight concentration of 10 mg/m3 for 2 years, the number of animals which developed lung tumors increased as 19/100 in the exposed group versus 1/217 in the non-exposed group. The breakdown of lung tumors was 3/100 for squamous cell carcinomas, 4/100 for adenomas, and 17/100 for adenocarcinomas. In a study in which male and female rats were exposed by inhalation to titanium dioxide, 99% of which had a primary particle size of 0.5 micrometer, at 15.95 mg/m3 for 12 weeks and tumor incidences were checked after 140 weeks, mortality was high, but in surviving animals, adenoma and squamous cell papilloma of the respiratory tract were observed in each one male, and bronchiolar alveolar adenoma was observed in one female. Moreover, in a test using rats given two types of titanium oxide fine particles of P25 or AL23 by intratracheal administration at three or six times, high incidence of lung tumors was observed. As described above, there were the evidences that titanium oxide nanoparticles showed carcinogenicity in experimental animals, and part of them was the evidence data based on which IARC classified titanium oxide in group 2B. Therefore, the substance was classified into category 2.
Reproductive toxicity	:	Classification not possible
STOT-single exposure	:	Classification not possible
STOT-repeated exposure	:	Causes damage to organs (respiratory organs) through prolonged or repeated exposure There is no information on humans. As for experimental animals, in studies in which rats, mice and hamsters were exposed by inhalation to titanium dioxide nanoparticles for 13 weeks and pulmonary responses were measured at 4, 13, 26 and 52 weeks after the end of exposure, significant increases in total number of cells in bronchoalveolar lavage fluid (BALF), neutrophil count, macrophage count, and lymphocyte count as the fraction of BALF, LDH, protein concentration was observed at 10 mg/m3, which is equivalent to category 1, and in rats and mice, pulmonary clearance was delayed, indicating that overload of titanium dioxide occurred. In addition, it was reported that in a 12-week toxicity study using rats exposed by inhalation to 23 mg/m3 of titanium dioxide fine particles or titanium dioxide nanoparticles, pulmonary inflammatory response appeared more strongly in the nanoparticle group, but after 64 weeks, it became almost the same as in the control group and exhibited reversibility at 23 mg/m3, which is equivalent to category 1. Therefore, it was classified into category 1 (respiratory organ).
Aspiration hazard	:	Classification not possible

12. Ecological information

Ecotoxicity

Aquatic acute	:	Classification not possible Because evaluation of the reliability of an ecological toxicity test using nanoparticles is not possible, it was classified as "Classification not possible."
Aquatic chronic	:	Classification not possible Because evaluation of the reliability of an ecological toxicity test using nanoparticles is not possible, it was classified as "Classification not possible."

Persistence and degradability

No additional information available

Bioaccumulative potential

No additional information available

Mobility in soil

No additional information available

Hazardous to the ozone layer

Ozone : Classification not possible

13. Disposal considerations

Ecological waste information : Bury in a landfill site approved for the disposal of chemical and hazardous wastes. Or entrust approved waste disposal companies with the disposal.

14. Transport information

International Regulations

Transport by sea(IMDG)

UN-No. (IMDG) : Not applicable
Proper Shipping Name (IMDG) : Not applicable
Packing group (IMDG) : Not applicable
Transport hazard class(es) (IMDG) : Not applicable

Air transport(IATA)

UN-No. (IATA) : Not applicable
Proper Shipping Name (IATA) : Not applicable
Packing group (IATA) : Not applicable
Transport hazard class(es) (IATA) : Not applicable

Marine pollutant : Not applicable

Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code

Pollutant category : Z

15. Regulatory information

Regulatory information with regard to this substance in your country or region should be examined by your own responsibility.

16. Other information

Data sources : Encyclopaedia Chimica, Kyoritsu Shuppan Co, Ltd. (1963) .
Handbook of 17322 Chemical Products, The Chemical Daily Co. (2022) .
NITE Chemical Risk Information Platform (NITE-CHRIP), National Institute of Technology and Evaluation.

The information contained herein is based on several references and the present state of our knowledge. However the SDS does not always cover all information about the product, handle the product carefully.The information is intended to ordinary usage, in case of particular handlings, conduct appropriate safety measurements.The information herein is only provision of information, and it does not represent a guarantee the properties of the product.The Safety Data Sheet(SDS) is prepared based on JIS Z7253.