Safety Data Sheet

1. Identification of the Substance/Mixture and the Supplier

Supplier	:	National Institute of Advanced Industrial Science and Technology (AIST)
Address	:	1-3-1 Kasumigaseki, Chiyoda, Tokyo, Japan
Office in Charge	:	Reference Materials Office, Center for Quality Management of Metrology, National Metrology Institute of Japan
Person in Charge	:	Certified Reference Material Staff
Telephone No.	:	+81-29-861-4059 Fax No. : +81-29-861-4009
Emergency Contact	:	Same as above
		Prepared on : April 10, 2014
		Revised on : August 31, 2022
		ID Number : 5711001
Identity of Substance/Mixture	:	Reference material: NMIJ RM 5711-a Titanium(IV) Oxide Nanoparticles (specific surface area 11 m^2/g, large particle size, no surface modification)
Recommended Use of the Chemical and Restriction on Use	:	This reference material can be used for quality control of specific surface area determination (BET multipoint method, 77 K nitrogen adsorption). Do not use this reference material for other purposes than testing/research. This CRM is a reference material (specified in the Japanese Industrial Standard (JIS) Q 0030).

2. Hazards Identification

GHS Classification:	No classification
GHS Label Element:	－
Signal Word:	－
Other Hazards Statement:	Dust may get in eyes.
Precautionary Statement:	［Precaution］ See “7. Handling and Storage Precautions.” ［Action］ Get medical advice/attention if feeling unwell, If exposed or concerned: Get medical advice/attention. ［Storage］ See “7. Handling and Storage Precautions.” ［Disposal］ Avoid release to the environment. Dispose of this reference material/containers in accordance with regional/national legislation.

The other hazards than the above do not result in classification or are not classifiable.

3. Composition/Information on Ingredients

Substance/Mixture	:	Mixture
Ingredient 1		
Chemical name	:	Titanium(IV) Oxide
Chemical or structural formula	:	TiO_2
Molecular weight	:	79.86
CAS number	:	13463-67-7
Content	:	90-99 %
Reference Number in Gazetted List in Japan	:	Act on the Evaluation of Chemical Substances and Regulation of Their Manufacture, etc, : (1)-558 Industrial Safety and Health Act : 2-3-509
Ingredient 2		
Chemical name	:	Aluminum Hydroxide
Chemical or structural formula	:	AlO_3H_3
Molecular weight	:	77.99
CAS number	:	21645-51-2
Content	:	0.1-10 %
Reference Number in Gazetted List in Japan	:	Act on the Evaluation of Chemical Substances and Regulation of Their Manufacture, etc, : (1)-17 Industrial Safety and Health Act : Published

4. First-aid Measures

General Measures		Get medical advice/attention if feeling unwell, If exposed or concerned: Get medical advice/attention.
If inhaled	:	Remove victim to fresh air and keep at rest in a position comfortable for breathing. Call a doctor/physician if feeling unwell,
If on skin	:	Gently wash with soap and plenty of water. If skin irritation or rash occurs: Get medical advice/attention.
If in eyes	:	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.
If swallowed	:	Rinse mouth. Call a doctor/physician if feeling unwell,
Expected Acute and Delayed Symptom	:	Skin, Flare in eyes
Most Critical Characteristic and Symptom	:	-
Protection of First-Aid Responder	:	-

5. Fire-fighting Measures

Extinguishing Media	:	Use extinguishing media appropriate for surrounding facilities. This reference material itself does not burn.

6. Accidental Release Measures

Personal Precaution Personal Protective Equipment and Emergency Procedures	:	Wear appropriate personal protective equipment.
Environmental Precautions	:	Prevent spillage from draining into sewage, drainage and lowland, Prevent dust from scattering.
Recovery and Neutralization	:	Collect spillage in containers.
Prevention of Secondary Disaster	:	Collect and recover spillage.

7. Handling and Storage

Handling

Engineering Precautions

・Protect those handling this reference material from exposure	:	Do not breathe dust/smoke/gas/mist/vapor/spray. Use specified personal protective equipment.
Precautions	:	Prevent this reference material from getting in eyes.
Precautions for Safe Handling	:	Do not handle until all safety precautions have been read and understood. Use only outdoors or in a well-ventilated area. Wear protective gloves/clothing and eye/face protection. Wash hands and contaminated areas thoroughly after handling. Do not eat, drink or smoke when using this reference material.

Storage

Appropriate Storage Conditions	:	Protect from direct sunlight, Store at temperature of 5 ºC to 35 ºC. Store in a well-ventilated area. Keep container tightly closed. Do not pile up high,
Safe Container Packaging Material	:	Use containers which can be tightly closed.

8. Exposure Controls/Personal Protection

Threshold Limit Value

Not specified

Permissible Concentration (Titanium(IV) oxide)

・ACGIH TWA	:	TWA 10 mg/m^3
・Value recommended by Japan Society for	:	Class 2 Dust 1 mg/m^3 (Respirable fraction)

Occupational Health 4 mg/m^3 (Total dust)

Permissible Concentration (BN)

- ACGIH TLV(s) : Not specified
- Value recommended by Japan Society for Occupational Health : Not specified
- OSHA PEL : Not specified

Engineering Controls

Ventilation/Exhaust : Local ventilation system or General ventilation system
Eye Washing Install eye washer
Hand Washing Install facilities to wash hands/face

Personal Protective Equipment (PPE)

Respiratory System : Respiratory protection
Hands : Protective gloves
Eyes : Eye protector/Face protection
Skin and Body : Protective clothing

Hygiene Controls

Wash contaminated areas thoroughly after handling. Do not eat, drink or smoke when using this reference material, Wash hands after handling.

9. Physical and Chemical Properties

- Appearance, etc. : Solid (Powder and granular material)
- Color : White
- Odor : Odorless
- pH : Neutral (10 % water dispersion)
- Melting point : 1820 °C to 1850 °C
- Boiling point : No data
- Flashing point : No data
- Explosive range : No data
- Vapor pressure : No data
- Relative vapor density(Air=1) : No data
- Specific gravity or bulk specific gravity : 3.5 g/cm^3 to 4.2 g/cm^3
- Solubility : Insoluble
- *n*-Octanol/water partition coefficient (Log Po/w) : No data
- Auto-ignition temperature : No data

10. Stability and Reactivity

◇Stability

- Stable

Not cause any dangerous decomposition reactions or polymerization runaway reactions

◇Reactivity

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◇Conditions to Avoid

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◇Hazardous Decomposition Products

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11. Toxicological Information

Titanium(IV) Oxide

Acute Toxicity	Oral Rat LD50 > 20000 mg/kg Dermal Rabbit approx LD50 > 10000 mg/kg (IUCLID (2000)) Dust/mist inhalation Rat LC > 6.82 mg/L/4h (IUCLID (2000))
Serious Eye Damage/ Eye Irritation	In one test using rabbits, mild irritation was reported, In another test in which eyes were rinsed five minutes after this reference material is applied, no irritation was reported (IUCLID (2000)), Not classifiable, based on the above results.
Skin Corrosion/ Irritation	In the test using rabbits, mild irritation was reported when 0.5 g of this reference material was applied for 24 hours and no irritation was reported when 0.1 g of this reference material was applied for 24 hours (IUCLID (2000)).
Respiratory Sensitization	No data available
Skin Sensitization	In the skin sensitization test (Maurer optimization test) using guinea pigs, no skin sensitization was reported (IUCLID (2000)). In the 48-hour patch test participated by 290 dermatitis patients, no one was found positive and no evidence of skin sensitization was obtained (IUCLID (2000)), Not classifiable as both of the above tests are List 2 data and tests using guinea pigs are not included in the recommended tests for classification.
Germ Cell Mutagenicity	No classification since negative results were reported in the bone marrow cell micronucleus test and the chromosome abnormality test both in which this reference material was administered to mice through abdominal cavity.
Carcinogenicity	Classified Group 2B by IARC, In the inhalation exposure test using rats, mice and hamsters, however, tumor incidence was observed only in the case of high-dose administration to rats, In addition, since rats indicate similar tendencies for other hardly-insoluble inactive particles, the tumor incidence is considered to be attributed to rat-specific immune system, In the epidemiological studies for humans carried out in Europe and North America, no cause-and-effect relationship was observed between titanium oxide and carcinogenicity, Not classifiable, based on the above.
Reproductive Toxicity	No data available
Toxicity to Respiratory Organ (Aspiration)	No data available

Specific Target Organ Toxicity/Systemic Toxicity	Single Exposure: In the oral administration test using rats, fatal dose was found to be 20000 mg/kg or more, For humans, intake of this reference material is considered practically non-toxic. No classification as to oral administration, Not classifiable for other routes of entry, however, due to lack of sufficient data. Repeated Exposure: In all tests using rats and mice, no effects attributed to exposure to this reference material were reported at dose of 1250 mg/kg/day which was above the upper limit of the guidance values, For a small number of workers who have been exposed to this reference material in their work for 20 years or more, symptoms of pneumoconiosis were observed, In the majority of the numerous epidemiological studies which aimed at finding out whether titanium oxide caused lung fibrosis, no cause-and-effect relationship was reported, No solid evidence indicating the link between titanium oxide and lung fibrosis has been obtained, In the two-year-long inhalation exposure test using rats, no significant effects were observed even if the concentration was set above the upper limit of the guidance values: 250 mg/m^3 (Dust: 5 days/week and 6 hours/day), Meanwhile no data is available for dermal exposure, Not classifiable, based on the above.

12. Ecological Information

Ecotoxicity

Toxicity to Aquatic Life (Acute): Not classifiable due to lack of sufficient data (Titanium(IV) oxide)

Toxicity to Aquatic Life (Chronic): Not classifiable since acute toxicity is not reported for the range of concentration up to water solubility

Solubility in water:
(Titanium(IV) oxide)
Insoluble (HSDB (2004))
(Aluminum hydroxide)
Insoluble (ICSC (1998))

Persistence and Degradability

・No data available。

Bioaccumulative Potential

・No data available

Mobility in Soil

・No data available

13. Disposal Considerations

Residual Waste	:	Avoid release to the environment. Dispose of this reference material/containers in accordance with regional/national legislation.
Contaminated	:	Dispose of containers after thoroughly emptying them.

Container and Package

14. Transport Information

UN Number	:	Not applicable
UN Classification	:	—
Shipping Name	:	—
Packing Group	:	—
Marine Pollutant	:	—
Precautions	:	This reference material does not fall under the category of dangerous goods. Keep this reference material dry, Transport this reference material while keeping it away from direct sunlight and rain.

15. Regulatory Information

◇Industrial Safety and Health Law

・Article 57-2 (Enforcement Order: Article 18) Hazardous substance whose name, etc. must be labeled : Titanium(IV) oxide

・Article 57-2 (Enforcement Order: Article 18-2) Hazardous substance whose name, etc. must be notified: No.191.

◇Pneumoconiosis Act

(Titanium(IV) oxide)

・Article 2, Enforcement Order: Article 2, Appendix “Work in Dusty Environment”

◇Information on Applicable Legislation

・Act for the Prevention of Marine Pollution and Maritime Disasters

・Hazardous Liquid Substance (Class Z): Titanium(IV) oxide

16. Other Information

Others

The information in this document is not intended to be exhaustive and is based on currently available information and data. The measures given in this document are applicable only to normal handling conditions. When handling this reference material under special conditions etc., it is recommended to take safety measures appropriate to each specific application and context of use. This document is intended to provide information and not intended to guarantee anything in handling this reference material.