

Safety Data Sheet



1. Identification of the Substance/Mixture and the Supplier

Supplier : National Institute of Advanced Industrial Science and Technology (AIST)
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Identity of Substance/Mixture : Reference material: NMIJ RM 5713-a
 Titanium(IV) Oxide Nanoparticles (specific surface area 76 m²/g, small particle size, surface modified with isobutyl groups)
 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 : Specific Target Organ Toxicity/ Systemic Toxicity (Single Exposure): Classified Hazard Category 3 (Narcotic effects)

GHS Label Element:



Signal Word : Warning

Other Hazards : Dust may get in eyes.

Statement

Precautionary Statement : [Precaution]

Statement : See "7. Handling and Storage Precautions."

[Action]

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.

[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 : 80-90 %

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 : Isobutyltrimethoxysilane

Chemical or structural formula : $\text{C}_7\text{H}_{18}\text{O}_3\text{Si}$

Molecular weight : -

CAS number : 18395-30-7

Content : 10-20 %

Reference Number in Gazetted List in Japan : Act on the Evaluation of Chemical Substances and Regulation of Their Manufacture, etc. : (2)-2052
Industrial Safety and Health Act : Published

This reference material is a nano-object, one of whose three dimensions to indicate its size is at least 1 nm to 100 nm, or a nanostructured material composed of nano-objects.

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 : Skin, Flare in eyes
 Delayed Symptom
 Most Critical : -
 Characteristic and
 Symptom
 Protection of First- : Use personal protective equipment.
 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 : Wear appropriate personal protective equipment.
 Personal Protective
 Equipment and
 Emergency Procedures
 Environmental : Avoid release to the environment. Prevent dust from scattering.
 Precautions
 Recovery and : Recover spillage by collecting it or wiping it out with wiping
 Neutralization cloth, etc.
 Prevention of : Collect and recover spillage.
 Secondary Disaster

7. Handling and Storage

Handling
 Engineering
 Precautions
 • Protect those : Do not breathe dust/smoke/gas/mist/vapor/spray.
 handling this Use specified personal protective equipment.
 reference
 material from
 exposure
 Precautions : Prevent this reference material from getting in eyes.
 Precautions for Safe : Do not handle until all safety precautions have been read and
 Handling 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 : Protect from direct sunlight. Store at temperature of 5 °C to 35

Conditions °C. Store in a well-ventilated area. Keep container tightly closed.
Do not pile up high.

Safe Container : Use containers which can be tightly closed.

Packaging Material

8. Exposure Controls/Personal Protection

Threshold Limit Value

Not specified

Permissible Concentration (Titanium(IV) oxide)

- ACGIH TWA : TWA 10 mg/m³
- Value recommended by Japan : Class 2 Dust
Society for Occupational Health 1 mg/m³ (Respirable fraction)
4 mg/m³ (Total dust)

Permissible Concentration (BN)

- ACGIH TLV(s) : Not specified
- Value recommended by Japan : Not specified
Society for Occupational Health
- 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 : No data
 - 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 : 3.5 g/cm³ to 4.2 g/cm³
-

- specific gravity
- Solubility : Insoluble
- *n*-Octanol/water partition coefficient (Log *P*_{o/w}) : No data
- Auto-ignition temperature : No data

10. Stability and Reactivity

- ◇Chemical Stability
 - Stable
 - Not cause any dangerous decomposition reactions or polymerization runaway reactions
- ◇Reactivity
 -
- ◇Conditions to Avoid
 -
- ◇Hazardous Decomposition Products
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11. Toxicological Information

Acute Toxicity	(Titanium(IV) Oxide) 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)) (Isobutyltrimethoxysilane) Inhalation LC50 > 1525 ppm – Inhalation Rat; 4 hr vapor
Serious Eye Damage/ Eye Irritation	(Titanium(IV) Oxide) 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	(Titanium(IV) Oxide) 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)). (Stearic Acid) Rabbit 500 mg/24hours: Moderate
Respiratory Sensitization	(Titanium(IV) Oxide) No data available
Skin Sensitization	(Titanium(IV) Oxide) 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	(Titanium(IV) Oxide) 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	(Titanium(IV) Oxide) 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	(Titanium(IV) Oxide) No data available
Toxicity to Respiratory Organ (Aspiration)	(Titanium(IV) Oxide) No data available
Immediate effects by short term exposure, delayed/chronic effects by prolonged exposure	Specific Target Organ Toxicity (Single Exposure, Classified Hazard Category 3 Narcotic effects) (Isobutyltrimethoxysilane) Narcotic effects
Specific Target Organ Toxicity/Systemic Toxicity	(Titanium(IV) Oxide) 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

◇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.
