

Titanium(IV) Oxide, Rutile Nanoparticle Dispersion	Pricing >
Titanium(IV) Oxide, Rutile Nanoparticles / Nanopowder	Pricing >
Titanium(IV) Oxide, Rutile Single Crystal Substrate	Pricing >

Linear Formula	TiO ₂
Pubchem CID	26042
MDL Number	MFCD00011269
EC No.	215-282-2
IUPAC Name	dioxotitanium
Beilstein/Reaxys No.	N/A
SMILES	O=[Ti]=O
Inchl Identifier	InChI=1S/2O.Ti
Inchl Key	GWEVSGVZZGPLCZ-UHFFFAOYSA-N
Signal Word	Warning
Hazard Statements	H315-H319-H332-H335
Hazard Codes	Xn
Risk Codes	20-40
Safety Statements	22
RTECS Number	VM2940000
Transport Information	N/A
WGK Germany	3

[Create Printable PDF](#)

SAFETY DATA SHEET

Date Accessed: 07/23/2021

Date Revised: 05/15/2015

SECTION 1. IDENTIFICATION

Product Identifiers: All applicable American Elements product codes for CAS #1317-80-2

Relevant identified uses of the substance:

Scientific research and development

Supplier details:

American Elements
10884 Weyburn Ave.
Los Angeles, CA 90024
Tel: +1 310-208-0551
Fax: +1 310-208-0351

Emergency telephone number:

Domestic, North America +1 800-424-9300
International +1 703-527-3887

SECTION 2. HAZARDS IDENTIFICATION

Classification of the substance or mixture

Classification according to Regulation (EC) No
1272/2008

GHS08 Health hazard

Carc. 2 H351 Suspected of causing cancer.

Classification according to Directive 67/548/EEC or
Directive 1999/45/EC

Xn; Harmful

R40: Limited evidence of a carcinogenic effect.

Information concerning particular hazards for human
and environment:

N/A

Hazards not otherwise classified

No data available

Label elements

Labelling according to Regulation (EC) No 1272/2008

The substance is classified and labeled according to
the CLP regulation.

Hazard pictograms



GHS08

Signal word:

Warning

Hazard statements

H351 Suspected of causing cancer.

Precautionary statements

P281 Use personal protective equipment as required.

P201 Obtain special instructions before use.

P202 Do not handle until all safety precautions have
been read and understood.

P308+P313 IF exposed or concerned: Get medical
advice/attention.

P405 Store locked up.

P501 Dispose of contents/container in accordance
with local/regional/national/international regulations.

WHMIS classification
D2A - Very toxic material causing other toxic effects
Classification system
HMIS ratings (scale 0-4)
(Hazardous Materials Identification System)
HEALTH
FIRE
REACTIVITY
1
0
1
Health (acute effects) = 1
Flammability = 0
Physical Hazard = 1
Other hazards
Results of PBT and vPvB assessment
PBT:
N/A
vPvB:
N/A

SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS

Substances
CAS No. / Substance Name:
1317-80-2 Titanium(IV) oxide
Identification number(s):
EC number:
236-675-5

SECTION 4. FIRST AID MEASURES

Description of first aid measures
If inhaled:
Supply patient with fresh air. If not breathing, provide artificial respiration. Keep patient warm.
Seek immediate medical advice.
In case of skin contact:
Immediately wash with soap and water; rinse thoroughly.
Seek immediate medical advice.
In case of eye contact:
Rinse opened eye for several minutes under running water. Consult a physician.
If swallowed:
Seek medical treatment.
Information for doctor
Most important symptoms and effects, both acute and delayed
No data available

Indication of any immediate medical attention and special treatment needed
No data available

SECTION 5. FIREFIGHTING MEASURES

Extinguishing media

Suitable extinguishing agents

Product is not flammable. Use fire-fighting measures that suit the surrounding fire.

Special hazards arising from the substance or mixture
If this product is involved in a fire, the following can be released:

Titanium oxides

Advice for firefighters

Protective equipment:

Wear self-contained respirator.

Wear fully protective impervious suit.

SECTION 6. ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures

Use personal protective equipment. Keep unprotected persons away.

Ensure adequate ventilation

Environmental precautions:

Do not allow product to enter drains, sewage systems, or other water courses.

Do not allow material to penetrate the ground or soil.

Methods and materials for containment and cleanup:

Dispose of contaminated material as waste according to section 13.

Prevention of secondary hazards:

No special measures required.

Reference to other sections

See Section 7 for information on safe handling

See Section 8 for information on personal protection equipment.

See Section 13 for disposal information.

SECTION 7. HANDLING AND STORAGE

Handling

Precautions for safe handling

Keep container tightly sealed.

Store in cool, dry place in tightly closed containers.

Ensure good ventilation at the workplace.

Information about protection against explosions and

fires:

The product is not flammable

Conditions for safe storage, including any incompatibilities

Requirements to be met by storerooms and receptacles:

No special requirements.

Information about storage in one common storage facility:

Store away from oxidizing agents.

Further information about storage conditions:

Keep container tightly sealed.

Store in cool, dry conditions in well-sealed containers.

Specific end use(s)

No data available

SECTION 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Additional information about design of technical systems:

Properly operating chemical fume hood designed for hazardous chemicals and having an average face velocity of at least 100 feet per minute.

Control parameters

Components with limit values that require monitoring at the workplace:

1317-80-2 Titanium(IV) oxide (100.0%)

PEL (USA) Long-term value: 15* mg/m³

*total dust

REL (USA) See Pocket Guide App. A

TLV (USA) Long-term value: (10) NIC-1* mg/m³

*respirable fraction, NIC-A3

EL (Canada) Long-term value: 10 mg/m³

IARC 2B

EV (Canada) Long-term value: 10 mg/m³

total dust

Additional information:

No data

Exposure controls

Personal protective equipment

Follow typical protective and hygienic practices for handling chemicals.

Keep away from foodstuffs, beverages and feed.

Remove all soiled and contaminated clothing immediately.

Wash hands before breaks and at the end of work.

Maintain an ergonomically appropriate working environment.

Breathing equipment:

Use suitable respirator when high concentrations are

present.

Protection of hands:

Impervious gloves

Inspect gloves prior to use.

Suitability of gloves should be determined both by material and quality, the latter of which may vary by manufacturer.

Penetration time of glove material (in minutes)

No data available

Eye protection:

Safety glasses

Body protection:

Protective work clothing.

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

Information on basic physical and chemical properties

Appearance:

Form: Powder or solid in various forms

Color: White

Odor: Odorless

Odor threshold: No data available.

pH: N/A

Melting point/Melting range: 1830-1850 °C

(3326-3362 °F)

Boiling point/Boiling range: 2500-3000 °C (4532-5432

°F)

Sublimation temperature / start: No data available

Flammability (solid, gas)

No data available.

Ignition temperature: No data available

Decomposition temperature: No data available

Autoignition: No data available.

Danger of explosion: No data available.

Explosion limits:

Lower: No data available

Upper: No data available

Vapor pressure: N/A

Density at 20 °C (68 °F): 4.26 g/cm³ (35.55 lbs/gal)

Relative density

No data available.

Vapor density

N/A

Evaporation rate

N/A

Solubility in Water (H₂O): Insoluble

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

Viscosity:

Dynamic: N/A

Kinematic: N/A

Other information

No data available

SECTION 10. STABILITY AND REACTIVITY

Reactivity

No data available

Chemical stability

Stable under recommended storage conditions.

Thermal decomposition / conditions to be avoided:

Decomposition will not occur if used and stored according to specifications.

Possibility of hazardous reactions

Reacts with strong oxidizing agents

Conditions to avoid

No data available

Incompatible materials:

Oxidizing agents

Hazardous decomposition products:

Titanium oxides

SECTION 11. TOXICOLOGICAL INFORMATION

Information on toxicological effects

Acute toxicity:

The Registry of Toxic Effects of Chemical Substances (RTECS) contains acute toxicity data for this substance.

LD/LC50 values that are relevant for classification:

No data

Skin irritation or corrosion:

May cause irritation

Eye irritation or corrosion:

May cause irritation

Sensitization:

No sensitizing effects known.

Germ cell mutagenicity:

The Registry of Toxic Effects of Chemical Substances (RTECS) contains mutation data for this substance.

Carcinogenicity:

Suspected of causing cancer.

IARC-2B: Possibly carcinogenic to humans: limited evidence in humans in the absence of sufficient evidence in experimental animals.

ACGIH A4: Not classifiable as a human carcinogen:

Inadequate data on which to classify the agent in terms of its carcinogenicity in humans and/or animals. The Registry of Toxic Effects of Chemical Substances (RTECS) contains tumorigenic and/or carcinogenic and/or neoplastic data for this substance.

Reproductive toxicity:

No effects known.
Specific target organ system toxicity - repeated exposure:
No effects known.
Specific target organ system toxicity - single exposure:
No effects known.
Aspiration hazard:
No effects known.
Subacute to chronic toxicity:
The Registry of Toxic Effects of Chemical Substances (RTECS) contains multiple dose toxicity data for this substance.
Additional toxicological information:
To the best of our knowledge the acute and chronic toxicity of this substance is not fully known.

SECTION 12. ECOLOGICAL INFORMATION

Toxicity
Aquatic toxicity:
No data available
Persistence and degradability
No data available
Bioaccumulative potential
No data available
Mobility in soil
No data available
Additional ecological information:
Avoid transfer into the environment.
Results of PBT and vPvB assessment
PBT:
N/A
vPvB:
N/A
Other adverse effects
No data available

SECTION 13. DISPOSAL CONSIDERATIONS

Waste treatment methods
Recommendation
Consult official regulations to ensure proper disposal.
Uncleaned packagings:
Recommendation:
Disposal must be made according to official regulations.

SECTION 14. EXPOSURE CONTROLS/PERSONAL PROTECTION

UN-Number

DOT, ADN, IMDG, IATA

N/A

UN proper shipping name

DOT, ADN, IMDG, IATA

N/A

Transport hazard class(es)

DOT, ADR, ADN, IMDG, IATA

Class

N/A

Packing group

DOT, IMDG, IATA

N/A

Environmental hazards:

N/A

Special precautions for user

N/A

Transport in bulk according to Annex II of

MARPOL73/78 and the IBC Code

N/A

Transport/Additional information:

DOT

Marine Pollutant (DOT):

No

SECTION 15. REGULATORY INFORMATION

Safety, health and environmental
regulations/legislation specific for the substance or
mixture

National regulations

All components of this product are listed in the U.S.
Environmental Protection Agency Toxic Substances
Control Act Chemical substance Inventory.

All components of this product are listed on the
Canadian Domestic Substances List (DSL).

SARA Section 313 (specific toxic chemical listings)

Substance is not listed.

California Proposition 65

Prop 65 - Chemicals known to cause cancer

1317-80-2 Titanium(IV) oxide

Prop 65 - Developmental toxicity

Substance is not listed.

Prop 65 - Developmental toxicity, female

Substance is not listed.

Prop 65 - Developmental toxicity, male

Substance is not listed.

Information about limitation of use:

For use only by technically qualified individuals.

Other regulations, limitations and prohibitive regulations

Substance of Very High Concern (SVHC) according to the REACH Regulations (EC) No. 1907/2006.

Substance is not listed.

The conditions of restrictions according to Article 67 and Annex XVII of the Regulation (EC) No 1907/2006 (REACH) for the manufacturing, placing on the market and use must be observed.

Substance is not listed.

Annex XIV of the REACH Regulations (requiring Authorisation for use)

Substance is not listed.

REACH - Pre-registered substances

Substance is listed.

Chemical safety assessment:

A Chemical Safety Assessment has not been carried out.

16. OTHER INFORMATION

Safety Data Sheet according to Regulation (EC) No. 1907/2006 (REACH). The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. American Elements shall not be held liable for any damage resulting from handling or from contact with the above product. See reverse side of invoice or packing slip for additional terms and conditions of sale. COPYRIGHT 1997-2016 AMERICAN ELEMENTS. LICENSED GRANTED TO MAKE UNLIMITED PAPER COPIES FOR INTERNAL USE ONLY.

Research

- A facile synthesis of rutile-rich titanium oxide nanoparticles using reverse micelle method and their photocatalytic applications. Jiye Noh, Minyoung Yi, Sinyoung Hwang, Kyung Min Im, Jinsoo Kim. Journal of Industrial and Engineering Chemistry, Volume 33, 25 January 2016, Pages 369-373.
- Fabrication and characterization of rutile-phased titanium dioxide (TiO₂) nanorods array with various reaction times using one step hydrothermal method. S. M. Mokhtar, M. K. Ahmad, C. F. Soon, N.

Nafarizal, K. Murakami. *Optik*, Volume 154, February 2018, Pages 510-515.

- Nitrogen-doped, metal-modified rutile titanium dioxide as photocatalysts for water remediation. D. Dolat, S. Mozia, R. J. Wróbel, D. Moszyński, A. W. Morawski. *Applied Catalysis B: Environmental*, Volume 162, January 2015, Pages 310-318.
- Preparation of rutile titanium dioxide pigment from low-grade titanium slag pretreated by the NaOH molten salt method. Liu Yahui, Meng Fancheng, Fang Fuqiang, Wang Weijing, Qi Tao. *Dyes and Pigments*, Volume 125, February 2016, Pages 384-391.
- Synthesis of few-to-monolayer graphene on rutile titanium dioxide. Tanesh Bansal, Christopher A. Durcan, Nikhil Jain, Robin B. Jacobs-Gedrim, Bin Yu. *Carbon*, Volume 55, April 2013, Pages 168-175.
- The carrier transport properties and photodegradation ability of low temperature synthesized phase pure rutile titanium oxide nanostructured materials. M. D. Purkayastha, S. Middya, J. Datta, P. P. Ray, D. Das. *Materials Chemistry and Physics*, Volume 226, 15 March 2019, Pages 362-370.
- Sub-10 nm rutile titanium dioxide nanoparticles for efficient visible-light-driven photocatalytic hydrogen production. Li L, Yan J, Wang T, Zhao ZJ, Zhang J, Gong J, Guan N. *Nature Communications*. 2015 Jan 6;6:5881.
- Synthesis of Nanoporous Rutile Nanocrystals under Mild Conditions. Sabyrov K, Yuwono VM, Penn RL. *MRS Online Proceedings Library Archive*. 2015;1721.
- Rutile TiO₂ submicroboxes with superior lithium storage properties. Yu XY, Wu HB, Yu L, Ma FX, Lou XW. *Angewandte Chemie International Edition*. 2015 Mar 23;54(13):4001-4.
- Rutile TiO₂ as an anode material for water-splitting dye-sensitized photoelectrochemical cells. Swierk JR, Regan KP, Jiang J, Brudvig GW, Schmuttenmaer CA. *ACS Energy Letters*. 2016 Aug 25;1(3):603-6.
- Direction-specific van der Waals attraction between rutile TiO₂ nanocrystals. Zhang X, He Y, Sushko ML, Liu J, Luo L, De Yoreo JJ, Mao SX, Wang C, Rosso KM. *Science*. 2017 Apr 28;356(6336):434-7.