

COMPOUND SUMMARY

Titanium tetrabutoxide

PubChem CID	21801
Structure	 2D3D
Chemical Safety	 FlammableCorrosiveIrritant Laboratory Chemical Safety Summary (LCSS) Datasheet
Molecular Formula	C ₁₆ H ₃₆ O ₄ Ti
Synonyms	5593-70-4 Titanium butoxide Titanium tetrabutoxide Butyl titanate TETRABUTYL TITANATE View More...
Molecular Weight	340.32 g/mol <i>Computed by PubChem 2.2 (PubChem release 2021.10.14)</i>
Parent Compound	 CID 263 (1-Butanol)
Component Compounds	 CID 23963 (Titanium)



CID 263 (1-Butanol)

Dates

Create:

Modify:

2005-08-08

2024-08-17

Description

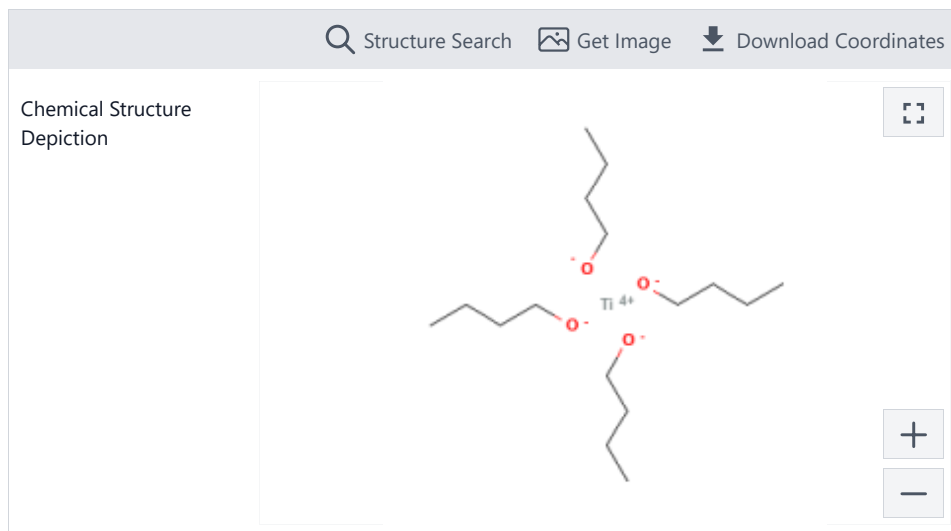
Tetrabutyl titanate appears as a **water**-white to pale-yellow liquid with an alcohol-like odor. About the same density as **water**. Flash point 170 °F. Contact may irritate or cause burns.

[▶ CAMEO Chemicals](#)

1 Structures



1.1 2D Structure



1.2 3D Conformer



3D Conformer of Parent



► PubChem

2 Names and Identifiers



2.1 Computed Descriptors



2.1.1 IUPAC Name



butan-1-olate;titanium(4+)

Computed by Lexichem TK 2.7.0 (PubChem release 2021.10.14)

► PubChem

2.1.2 InChI



InChI=1S/4C4H9O.Ti/c4*1-2-3-4-5;/h4*2-4H2,1H3;/q4*-1;+4

Computed by InChI 1.0.6 (PubChem release 2021.10.14)

► PubChem

2.1.3 InChIKey



YHWCPXVTRSHPNY-UHFFFAOYSA-N

Computed by InChI 1.0.6 (PubChem release 2021.10.14)

► PubChem

2.1.4 Canonical SMILES



CCCC[O-].CCCC[O-].CCCC[O-].CCCC[O-].[Ti+4]

Computed by OEChem 2.3.0 (PubChem release 2021.10.14)

► PubChem

2.2 Molecular Formula



C₁₆H₃₆O₄Ti

Computed by PubChem 2.2 (PubChem release 2021.10.14)

► CAMEO Chemicals; PubChem

2.3 Other Identifiers



2.3.1 CAS



9022-96-2

► Australian Industrial Chemicals Introduction Scheme (AICIS); ChemIDplus; EPA Chemicals under t...

5593-70-4

► Australian Industrial Chemicals Introduction Scheme (AICIS); CAMEO Chemicals; ChemIDplus; EP...

2.3.2 Related CAS



9022-96-2 (homopolymer)

▶ ChemIDplus

5593-70-4 (Parent)

▶ ChemIDplus

2.3.3 Deprecated CAS



104183-13-3, 106206-82-0, 114486-31-6, 118547-86-7, 124760-72-1, 1336-30-7, 1352435-28-9, 1449684-78-9, 153313-64-5, 156138-67-9, 15821-58-6, 159179-54-1, 176679-99-5, 184529-19-9, 1874280-36-0, 188622-64-2, 210407-19-5, 216859-05-1, 2241760-48-3, 250741-36-7, 26198-43-6, 2691109-76-7, 597533-81-8, 59978-00-6, 75659-54-0, 757-47-1

▶ ChemIDplus

102727-12-8, 129037-79-2, 133109-09-8, 1874280-37-1, 597533-82-9, 9047-53-4

▶ ChemIDplus; EPA Chemicals under the TSCA

104183-13-3, 106206-82-0, 114486-31-6, 118547-86-7, 124760-72-1, 1336-30-7, 1352435-28-9, 1449684-78-9, 153313-64-5, 156138-67-9, 15821-58-6, 159179-54-1, 176679-99-5, 184529-19-9, 1874280-36-0, 188622-64-2, 210407-19-5, 216859-05-1, 2241760-48-3, 250741-36-7, 26198-43-6, 2691109-76-7, 2767341-10-4, 2791409-75-9, 597533-81-8, 59978-00-6, 75659-54-0, 757-47-1

▶ EPA Chemicals under the TSCA

104183-13-3, 106206-82-0, 114486-31-6, 118547-86-7, 124760-72-1, 1336-30-7, 1352435-28-9, 153313-64-5, 156138-67-9, 15821-58-6, 159179-54-1, 176679-99-5, 184529-19-9, 188622-64-2, 210407-19-5, 216859-05-1, 250741-36-7, 26198-43-6, 597533-81-8, 59978-00-6, 75659-54-0, 757-47-1

▶ EPA DSSTox

2.3.4 European Community (EC) Number



227-006-8

▶ European Chemicals Agency (ECHA)

638-841-6

▶ European Chemicals Agency (ECHA)

2.3.5 UNII



FJS8Q2MX9I

▶ FDA Global Substance Registration System (GSRS)

2.3.6 UN Number



2920 (TETRABUTYL TITANATE)

▶ CAMEO Chemicals

2.3.7 DSSTox Substance ID



DTXSID6041262

▶ EPA DSSTox

2.3.8 Nikkaji Number



J36.546G

▶ Japan Chemical Substance Dictionary (Nikkaji)

2.3.9 Wikidata



Q4456610

▶ Wikidata

2.3.10 Wikipedia



Titanium_butoxide

► [Wikipedia](#)

2.4 Synonyms



2.4.1 MeSH Entry Terms



1-butanol, titanium(4+) salt
tetrabutoxy titanium
tetrabutoxy titanium dimer
tetrabutoxy titanium homopolymer
tetrabutoxy titanium tetramer
titanium tetrabutoxide

► [Medical Subject Headings \(MeSH\)](#)

2.4.2 Depositor-Supplied Synonyms



5593-70-4	Tetrabutoxy titanium	1-Butanol, titanium(4+) salt (4:1)	HSDB 839
Titanium butoxide	Titanium tetrabutylate	Titanium tetrabutanolate	NSC-5979
Titanium tetrabutoxide	Titanium, tetrabutoxy-	Tetrabutyltitanate	NSC-2202
Butyl titanate	Titanium(4+) butoxide	Titanium butylate	Orthotita
TETRABUTYL TITANATE	Titanium tetrakis(butoxide)	butan-1-olate;titanium(4+)	EINECS 2
9022-96-2	FJS8Q2MX9I	Organics TA 25	UNII-FJS8
Butyl titanate(IV)	Titanic acid, tetrabutyl ester	B 1 (titanate)	NSC 5979
Tetrabutyl orthotitanate	Titanium butoxide (Ti(OBu)4)	Butyl titanate monomer	NSC 2202
Tyzor BP	1-Butanol, titanium(4+) salt	Tetrabutyltitanate [Czech]	Tetrabuto
Butyl orthotitanate	Butyl titanate(IV), (BuO)4Ti	Orthotitanic acid tetrabutylester	EC 227-0
Tyzor TBT	Butyl alcohol, titanium(4+) salt	1-Butanol titanium(4+) salt	DTXSID60

► [PubChem](#)

3 Chemical and Physical Properties



3.1 Computed Properties



Property Name	Property Value	Reference
Molecular Weight	340.32 g/mol	Computed by PubChem 2.2 (PubChem release 2021.10.14)
Hydrogen Bond Donor Count	0	Computed by Cactvs 3.4.8.18 (PubChem release 2021.10.14)
Hydrogen Bond Acceptor Count	4	Computed by Cactvs 3.4.8.18 (PubChem release 2021.10.14)
Rotatable Bond Count	8	Computed by Cactvs 3.4.8.18 (PubChem release 2021.10.14)
Exact Mass	340.2093003 g/mol	Computed by PubChem 2.2 (PubChem release 2021.10.14)
Monoisotopic Mass	340.2093003 g/mol	Computed by PubChem 2.2 (PubChem release 2021.10.14)
Topological Polar Surface Area	92.2Å ²	Computed by Cactvs 3.4.8.18 (PubChem release 2021.10.14)
Heavy Atom Count	21	Computed by PubChem
Formal Charge	0	Computed by PubChem
Complexity	13.1	Computed by Cactvs 3.4.8.18 (PubChem release 2021.10.14)
Isotope Atom Count	0	Computed by PubChem
Defined Atom Stereocenter Count	0	Computed by PubChem
Undefined Atom Stereocenter Count	0	Computed by PubChem
Defined Bond Stereocenter Count	0	Computed by PubChem
Undefined Bond Stereocenter Count	0	Computed by PubChem
Covalently-Bonded Unit Count	5	Computed by PubChem
Compound Is Canonicalized	Yes	Computed by PubChem (release 2021.10.14)

[▶ PubChem](#)

3.2 Experimental Properties



3.2.1 Physical Description



Tetrabutyl titanate appears as a **water**-white to pale-yellow liquid with an alcohol-like odor. About the same density as **water**. Flash point 170 °F. Contact may irritate or cause burns.

[▶ CAMEO Chemicals](#)

Water or Solvent Wet Solid; Liquid; Other Solid

[▶ EPA Chemical Data Reporting \(CDR\)](#)

Colorless to pale yellow liquid with a mild odor of alcohol; [HSDB] Clear liquid with an odor of alcohol; [MSDSonline]

[▶ Haz-Map, Information on Hazardous Chemicals and Occupational Diseases](#)

Yellowish to amber liquid with an odor of alcohol; [Intec Polymers MSDS]

[▶ Haz-Map, Information on Hazardous Chemicals and Occupational Diseases](#)

3.2.2 Color / Form



COLORLESS TO LIGHT-YELLOW LIQUID

U.S. Coast Guard, Department of Transportation. CHRIS - Hazardous Chemical Data. Volume II. Washington, D.C.: U.S. Government Printing Office, 1984-5.

[▶ Hazardous Substances Data Bank \(HSDB\)](#)

Pale yellow, viscous liquid

Ashford, R.D. Ashford's Dictionary of Industrial Chemicals. London, England: Wavelength Publications Ltd., 1994., p. 161

[▶ Hazardous Substances Data Bank \(HSDB\)](#)

3.2.3 Odor



WEAK, ALCOHOL-LIKE ODOR

U.S. Coast Guard, Department of Transportation. CHRIS - Hazardous Chemical Data. Volume II. Washington, D.C.: U.S. Government Printing Office, 1984-5.

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

3.2.4 Boiling Point



593 °F at 760 mmHg (USCG, 1999)

U.S. Coast Guard. 1999. Chemical Hazard Response Information System (CHRIS) - Hazardous Chemical Data. Commandant Instruction 16465.12C. Washington, D.C.: U.S. Government Printing Office.

▶ [CAMEO Chemicals](#)

312 °C

U.S. Coast Guard, Department of Transportation. CHRIS - Hazardous Chemical Data. Volume II. Washington, D.C.: U.S. Government Printing Office, 1984-5.

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

3.2.5 Melting Point



-67 °F (USCG, 1999)

U.S. Coast Guard. 1999. Chemical Hazard Response Information System (CHRIS) - Hazardous Chemical Data. Commandant Instruction 16465.12C. Washington, D.C.: U.S. Government Printing Office.

▶ [CAMEO Chemicals](#)

-55 °C

U.S. Coast Guard, Department of Transportation. CHRIS - Hazardous Chemical Data. Volume II. Washington, D.C.: U.S. Government Printing Office, 1984-5.

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

3.2.6 Flash Point



170 °F (USCG, 1999)

U.S. Coast Guard. 1999. Chemical Hazard Response Information System (CHRIS) - Hazardous Chemical Data. Commandant Instruction 16465.12C. Washington, D.C.: U.S. Government Printing Office.

▶ CAMEO Chemicals

170 °F (CLOSED CUP)

U.S. Coast Guard, Department of Transportation. CHRIS - Hazardous Chemical Data. Volume II. Washington, D.C.: U.S. Government Printing Office, 1984-5.

▶ Hazardous Substances Data Bank (HSDB)

3.2.7 Solubility



Sol in most organic solvents except ketones

Lewis, R.J., Sr (Ed.). Hawley's Condensed Chemical Dictionary. 13th ed. New York, NY: John Wiley & Sons, Inc. 1997., p. 1082

▶ Hazardous Substances Data Bank (HSDB)

Sol in aliphatic aromatic, chlorinated, and oxygenated solvents

Ashford, R.D. Ashford's Dictionary of Industrial Chemicals. London, England: Wavelength Publications Ltd., 1994., p. 161

▶ Hazardous Substances Data Bank (HSDB)

3.2.8 Density



0.998 at 77 °F (USCG, 1999) - Less dense than [water](#); will float

U.S. Coast Guard. 1999. Chemical Hazard Response Information System (CHRIS) - Hazardous Chemical Data. Commandant Instruction 16465.12C. Washington, D.C.: U.S. Government Printing Office.

▶ CAMEO Chemicals

0.998 @ 25 °C (liquid)

U.S. Coast Guard, Department of Transportation. CHRIS - Hazardous Chemical Data. Volume II. Washington, D.C.: U.S. Government Printing Office, 1984-5.

▶ Hazardous Substances Data Bank (HSDB)

3.2.9 Vapor Density



11.7 (Air= 1)

Sax, N.I. *Dangerous Properties of Industrial Materials*. Vol 1-3 7th ed. New York, NY: Van Nostrand Reinhold, 1989., p. V1 655

► [Hazardous Substances Data Bank \(HSDB\)](#)

3.2.10 Decomposition



When heated to decomposition it emits acrid & irritating fumes.

Lewis, R.J. *Sax's Dangerous Properties of Industrial Materials*. 9th ed. Volumes 1-3. New York, NY: Van Nostrand Reinhold, 1996., p. 603

► [Hazardous Substances Data Bank \(HSDB\)](#)

3.2.11 Heat of Vaporization



79 CAL/G

U.S. Coast Guard, Department of Transportation. *CHRIS - Hazardous Chemical Data*. Volume II. Washington, D.C.: U.S. Government Printing Office, 1984-5.

► [Hazardous Substances Data Bank \(HSDB\)](#)

3.2.12 Refractive Index



Index of refraction: 1.486

Lewis, R.J., Sr (Ed.). *Hawley's Condensed Chemical Dictionary*. 13th ed. New York, NY: John Wiley & Sons, Inc. 1997., p. 1082

► [Hazardous Substances Data Bank \(HSDB\)](#)

3.2.13 Other Experimental Properties



REACTS WITH [WATER](#) TO FORM [BUTANOL](#) AND [TITANIUM DIOXIDE](#)

U.S. Coast Guard, Department of Transportation. *CHRIS - Hazardous Chemical Data*. Volume II. Washington, D.C.: U.S. Government Printing Office, 1984-5.

► [Hazardous Substances Data Bank \(HSDB\)](#)

Forms a glass below -55 °C; decomp in [water](#)

Lewis, R.J., Sr (Ed.). *Hawley's Condensed Chemical Dictionary*. 13th ed. New York, NY: John Wiley & Sons,

Inc. 1997, p. 1082

► [Hazardous Substances Data Bank \(HSDB\)](#)

3.3 Chemical Classes



Metals -> Metal Alkoxides

► [Haz-Map, Information on Hazardous Chemicals and Occupational Diseases](#)

Plastics & Rubber -> Polymers

► [Haz-Map, Information on Hazardous Chemicals and Occupational Diseases](#)

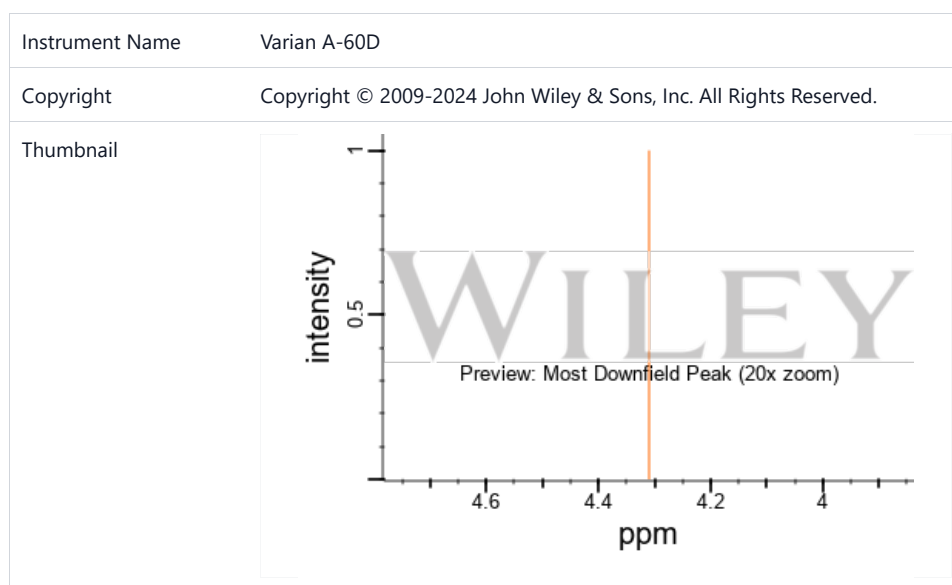
4 Spectral Information



4.1 1D NMR Spectra



4.1.1 1H NMR Spectra



► [SpectraBase](#)

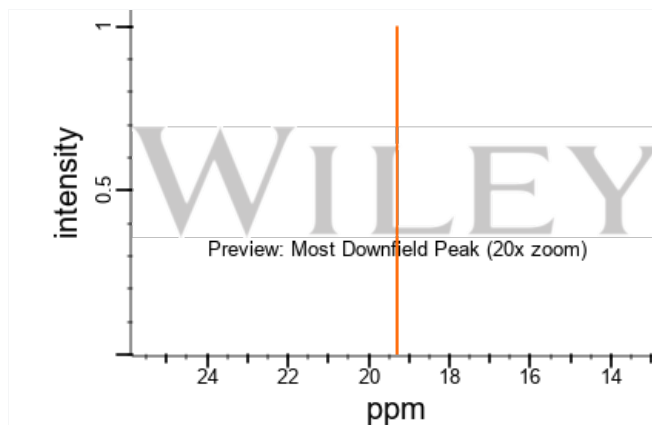
4.1.2 ¹³C NMR Spectra

1 of 2

Source of Sample	Eastman Organic Chemicals, Rochester, New York
------------------	--

Copyright	Copyright © 1980, 1981-2024 John Wiley & Sons, Inc. All Rights Reserved.
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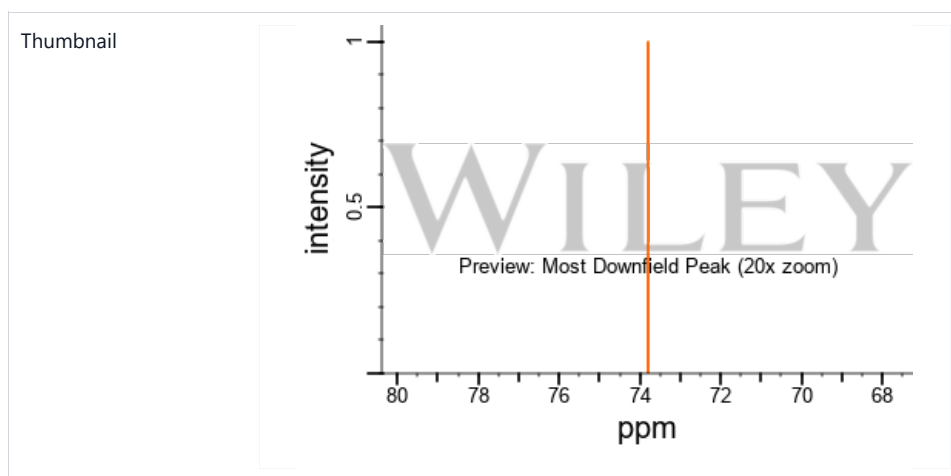
Thumbnail

[► SpectraBase](#)

2 of 2

Instrument Name	Varian HA-100
-----------------	---------------

Copyright	Copyright © 2002-2024 Wiley-VCH Verlag GmbH & Co. KGaA. All Rights Reserved.
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► SpectraBase

4.2 IR Spectra

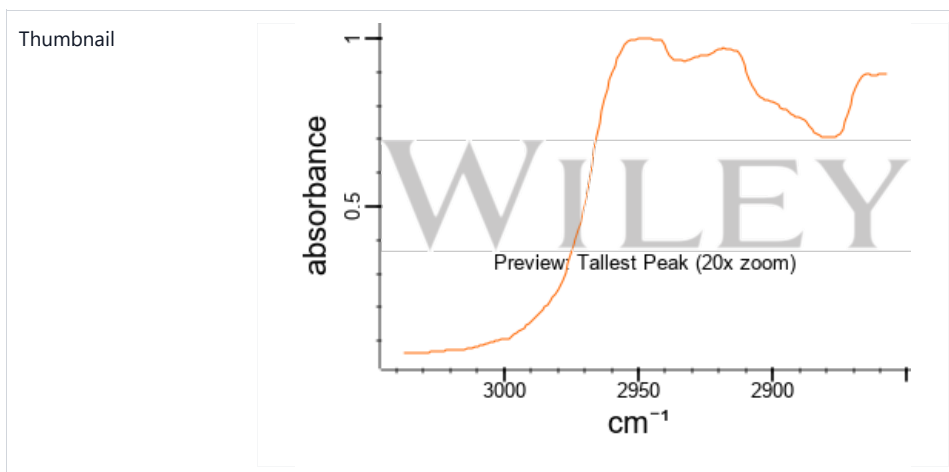


4.2.1 FTIR Spectra

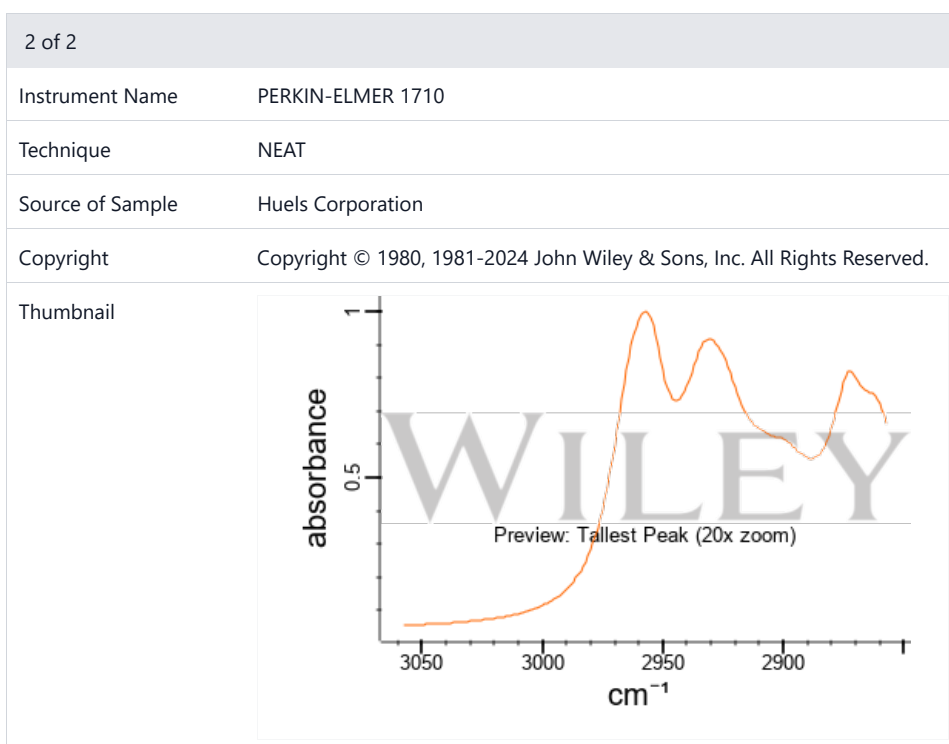


1 of 2

Technique	BETWEEN SALTS
Source of Sample	Dupont Company, Wilmington, Delaware
Copyright	Copyright © 1980, 1981-2024 John Wiley & Sons, Inc. All Rights Reserved.

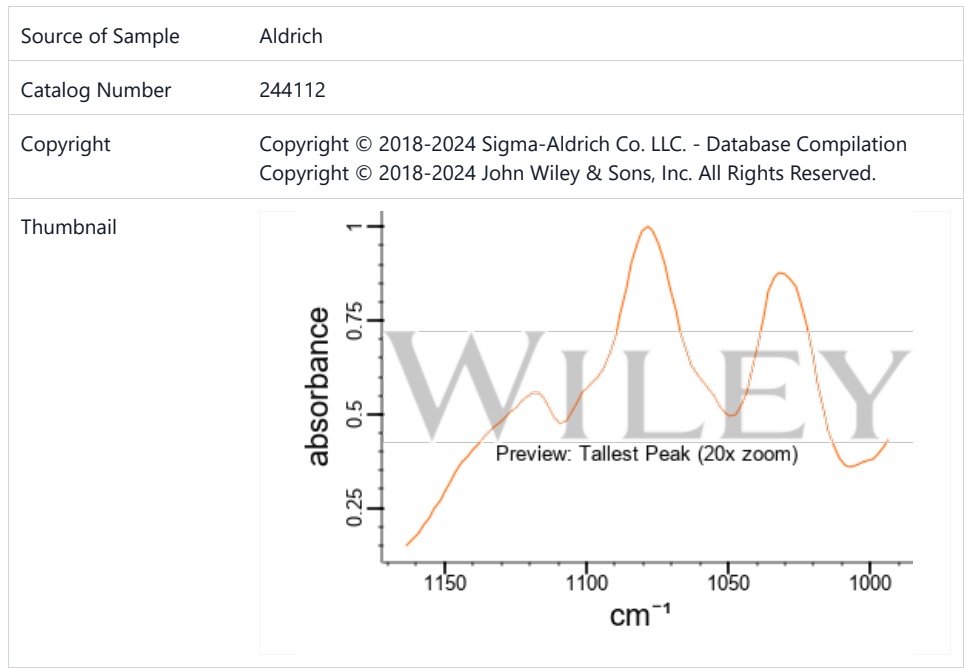


► SpectraBase



► SpectraBase

4.2.2 ATR-IR Spectra

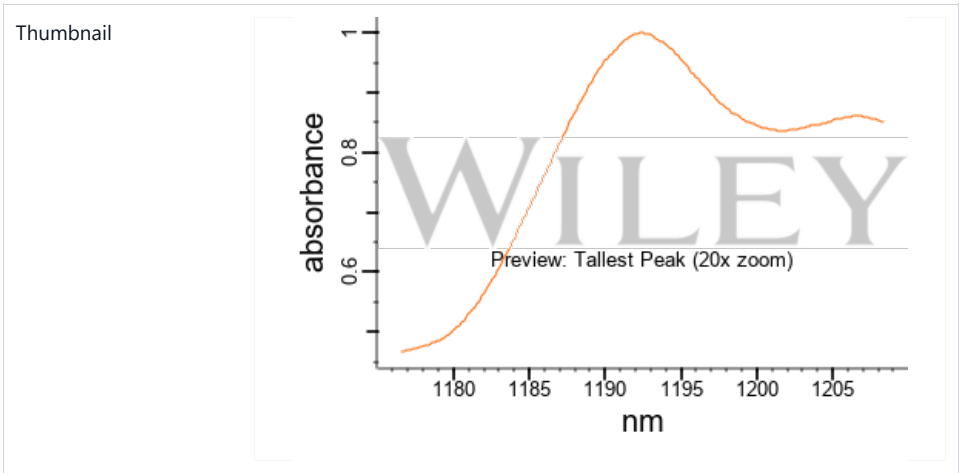


► SpectraBase

4.2.3 Near IR Spectra



1 of 2	
Instrument Name	BRUKER IFS 88
Technique	NIR Spectrometer= INSTRUMENT PARAMETERS=INST=BRUKER,RSN=5642,REO=2,CNM=HEI,ZFF=2
Source of Spectrum	Prof. Buback, University of Goettingen, Germany
Copyright	Copyright © 1989, 1990-2024 Wiley-VCH Verlag GmbH & Co. KGaA. All Rights Reserved.



► SpectraBase

2 of 2	
Instrument Name	BRUKER IFS 88
Technique	NIR Spectrometer= INSTRUMENT PARAMETERS=INST=BRUKER,RSN=5642,REO=2,CNM=HEI,ZFF=2
Source of Spectrum	Prof. Buback, University of Goettingen, Germany
Copyright	Copyright © 1989, 1990-2024 Wiley-VCH Verlag GmbH & Co. KGaA. All Rights Reserved.
Thumbnail	

[► SpectraBase](#)

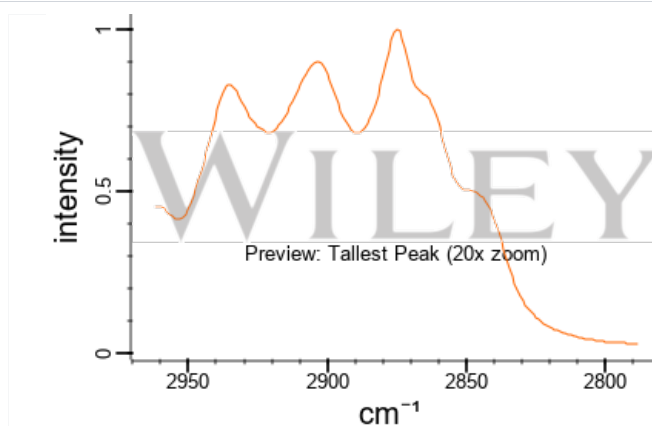
4.3 Raman Spectra



1 of 2

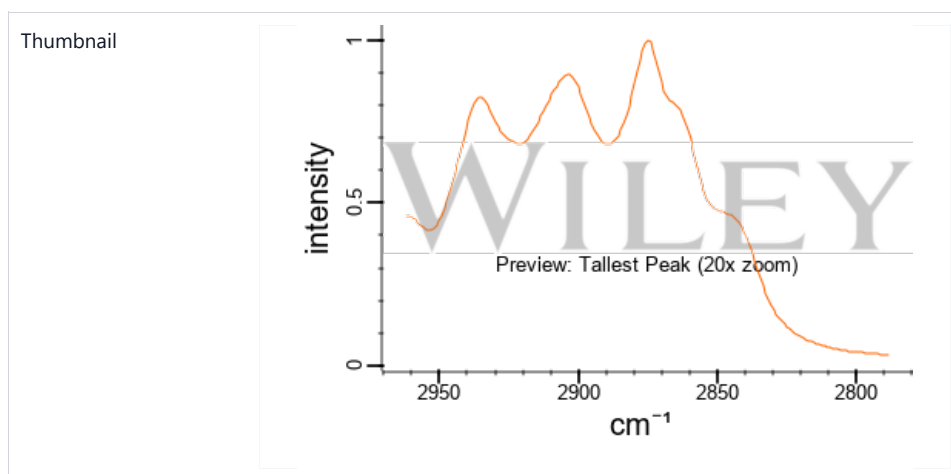
Instrument Name	Bio-Rad FTS 175C with Raman accessory
Technique	FT-Raman
Source of Sample	Fluka Chemie AG, Buchs, Switzerland
Catalog Number	86910
Copyright	Copyright © 1980, 1981-2024 John Wiley & Sons, Inc. All Rights Reserved.

Thumbnail

[► SpectraBase](#)

2 of 2

Instrument Name	Bio-Rad FTS 175C with Raman accessory
Technique	FT-Raman
Source of Sample	Fluka Chemie AG, Buchs, Switzerland
Catalog Number	86910
Copyright	Copyright © 1980, 1981-2024 John Wiley & Sons, Inc. All Rights Reserved.



► SpectraBase

5 Related Records



5.1 Related Compounds with Annotation



Follow these links to [do a live 2D search](#) or [do a live 3D search](#) for this compound, sorted by annotation score. This section is deprecated (see [here](#) for details), but these live search links provide equivalent functionality to the table that was previously shown here.

► PubChem

5.2 Parent Compound



CID 263 (1-Butanol)

► PubChem

5.3 Component Compounds



CID 23963 (Titanium)



CID 263 (1-Butanol)

[► PubChem](#)

5.4 Related Compounds



Same Parent, Connectivity Count	713
Same Parent, Exact Count	683
Mixtures, Components, and Neutralized Forms Count	2
Similar Compounds (2D)	View in PubChem Search
Similar Conformers (3D)	View in PubChem Search

[► PubChem](#)

5.5 Substances



5.5.1 Related Substances



Same Count	56
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[► PubChem](#)

5.5.2 Substances by Category



▶ PubChem

6 Chemical Vendors



▶ PubChem

7 Food Additives and Ingredients



7.1 FDA Indirect Additives used in Food Contact Substances



1 of 2	
Indirect Additives	BUTYL TITANATE, POLYMERIZED
Title 21 of the U.S. Code of Federal	175.105

► FDA Center for Food Safety and Applied Nutrition (CFSAN)

Indirect Additives **TETRABUTYL TITANATE**

Title 21 of the U.S. Code of Federal Regulations (21 CFR)	175.300
	177.1590

► FDA Center for Food Safety and Applied Nutrition (CFSAN)

Friberg, L., Nordberg, G.F., Kessler, E. and Vouk, V.B. (eds). *Handbook of the Toxicology of Metals*. 2nd ed. Vols I, II.: Amsterdam: Elsevier Science Publishers B.V., 1986., p. V2 601

► Hazardous Substances Data Bank (HSDB)



The Chemical and Products Database, a resource for exposure-relevant data on chemicals in consumer products, Scientific Data, volume 5, Article number: 180125 (2018), DOI:10.1038/sdata.2018.125

► [EPA Chemical and Products Database \(CPDat\)](#)

Sources/Uses

Used in ester exchange reactions, heat-resistant paints, medical/dental bonding compositions, and anhydrous hair set compositions; Also used as an adhesion promoter (paints, rubber, and plastics-metal), curing agent (alkyl, epoxy, and [silicon](#) resins), catalyst, and glass coating; [HSDB]

► [Haz-Map, Information on Hazardous Chemicals and Occupational Diseases](#)

Industrial Processes with risk of exposure

[Painting \(Pigments, Binders, and Biocides\)](#) [Category: Paint]

[Plastic Composites Manufacturing](#) [Category: Industry]

[Dressing Hair](#) [Category: Other]

[Glass Manufacturing](#) [Category: Industry]

► [Haz-Map, Information on Hazardous Chemicals and Occupational Diseases](#)

Sources/Uses

Used as a crosslinking agent for wire enamels, surface coatings, and printing inks, catalyst for trans-esterification, adhesion promoter, binder, and primer in coating applications; [Intec Polymers MSDS]

► [Haz-Map, Information on Hazardous Chemicals and Occupational Diseases](#)

Industrial Processes with risk of exposure

[Painting \(Pigments, Binders, and Biocides\)](#) [Category: Paint]

[Working with Glues and Adhesives](#) [Category: Other]

► [Haz-Map, Information on Hazardous Chemicals and Occupational Diseases](#)

Ester exchange reactions; heat-resistant paints (up to 500 °C); improving adhesion of paints, rubber, and plastics to metal surfaces; cross linking agent; condensation catalyst

Lewis, R.J., Sr (Ed.). *Hawley's Condensed Chemical Dictionary*. 13th ed. New York, NY: John Wiley & Sons, Inc. 1997., p. 1082

► [Hazardous Substances Data Bank \(HSDB\)](#)

Esterification/alcoholysis catalysts; alkyl/epoxy/[silicon](#) resin crosslinking agent; Ziegler catalyst component; high temperature coatings ingredient; glass surface treatment agent

Ashford, R.D. *Ashford's Dictionary of Industrial Chemicals*. London, England: Wavelength Publications Ltd., 1994., p. 161

► [Hazardous Substances Data Bank \(HSDB\)](#)

9.1.1 Industry Uses



Polymerization promoter
Process regulators
Intermediates
Catalyst
Not Known or Reasonably Ascertainable
Paint additives and coating additives not described by other categories

<https://www.epa.gov/chemical-data-reporting>

► [EPA Chemical Data Reporting \(CDR\)](#)

9.1.2 Consumer Uses



Process regulators
Catalyst

<https://www.epa.gov/chemical-data-reporting>

► [EPA Chemical Data Reporting \(CDR\)](#)

9.1.3 Household Products



Household & Commercial/Institutional Products

Information on 6 consumer products that contain Titanium tetrabutanolate in the following categories is provided:

- Home Maintenance

- Inside the Home

- ▶ [Consumer Product Information Database \(CPID\)](#)

9.2 Methods of Manufacturing



Reaction of [titanium tetrachloride](#) with [butanol](#).

Lewis, R.J., Sr (Ed.). Hawley's Condensed Chemical Dictionary. 13th ed. New York, NY: John Wiley & Sons, Inc. 1997., p. 1082

- ▶ [Hazardous Substances Data Bank \(HSDB\)](#)

9.3 Formulations / Preparations



Grades of Purity: Technical

U.S. Coast Guard, Department of Transportation. CHRIS - Hazardous Chemical Data. Volume II. Washington, D.C.: U.S. Government Printing Office, 1984-5.

- ▶ [Hazardous Substances Data Bank \(HSDB\)](#)

9.4 U.S. Production



Aggregated Product Volume

2019: 500,000 - <1,000,000 lb

2018: 1,000,000 - <10,000,000 lb

2017: 100,000 - <500,000 lb

2016: 100,000 - <500,000 lb

<https://www.epa.gov/chemical-data-reporting>

- ▶ [EPA Chemical Data Reporting \(CDR\)](#)

9.5 General Manufacturing Information



Industry Processing Sectors

All Other Basic Inorganic Chemical Manufacturing
Paint and Coating Manufacturing
Plastics Material and Resin Manufacturing

▶ [EPA Chemical Data Reporting \(CDR\)](#)

EPA TSCA Commercial Activity Status

[1-Butanol, titanium\(4+\) salt \(4:1\)](#): ACTIVE

▶ [EPA Chemicals under the TSCA](#)

EPA TSCA Commercial Activity Status

[1-Butanol, titanium\(4+\) salt \(4:1\), homopolymer](#): ACTIVE

▶ [EPA Chemicals under the TSCA](#)

EPA TSCA Regulatory Flag

XU - indicates a substance exempt from reporting under the Chemical Data Reporting Rule, (40 CFR 711).

<https://www.epa.gov/tscainventory>

▶ [EPA Chemicals under the TSCA](#)

IN DENTAL OR MEDICAL BONDING COMPOSITIONS

KAWAHARA H ET AL; EUR PAT APPL PATENT NO 17937 10/29/80 (KANEBO, LTD)

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

IN ANHYDROUS HAIR SET COMPOSITION

TOLGYESI E, BRESAK AF; CAN PATENT NO 1112181 11/10/81 (GILLETTE CO)

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

10 Safety and Hazards



10.1 Hazards Identification



10.1.1 GHS Classification



1 of 3 View All 	
Pictogram(s)	   Flammable Corrosive Irritant
Signal	<u>Danger</u>
GHS Hazard Statements	H226 (90.01%): Flammable liquid and vapor [Warning Flammable liquids] H315 (96.32%): Causes skin irritation [Warning Skin corrosion/irritation] H318 (86.33%): Causes serious eye damage [Danger Serious eye damage/eye irritation] H319 (12.63%): Causes serious eye irritation [Warning Serious eye damage/eye irritation] H335 (38.1%): May cause respiratory irritation [Warning Specific target organ toxicity, single exposure; Respiratory tract irritation] H336 (38.45%): May cause drowsiness or dizziness [Warning Specific target organ toxicity, single exposure; Narcotic effects]
Precautionary Statement Codes	P210, P233, P240, P241, P242, P243, P261, P264, P264+P265, P271, P280, P302+P352, P303+P361+P353, P304+P340, P305+P351+P338, P305+P354+P338, P317, P319, P321, P332+P317, P337+P317, P362+P364, P370+P378, P403+P233, P403+P235, P405, and P501 (The corresponding statement to each P-code can be found at the GHS Classification page.)
ECHA C&L Notifications Summary	<i>Aggregated GHS information provided by 1543 reports by companies from 44 notifications to the ECHA C&L Inventory. Each notification may be associated with multiple companies.</i> <i>Reported as not meeting GHS hazard criteria by 102 of 1543 reports by companies. For more detailed information, please visit ECHA C&L website.</i> <i>Of the 43 notification(s) provided by 1441 of 1543 reports by companies with hazard statement code(s).</i> <i>Information may vary between notifications depending on impurities, additives, and other factors. The percentage value in parenthesis indicates the notified classification ratio from companies that provide hazard codes. Only hazard codes with percentage values above 10% are shown.</i>

► [European Chemicals Agency \(ECHA\)](#)

10.1.2 Hazard Classes and Categories



Flam. Liq. 3 (90.01%)

Skin Irrit. 2 (96.32%)

Eye Dam. 1 (86.33%)

Eye Irrit. 2 (12.63%)

STOT SE 3 (38.1%)

STOT SE 3 (38.45%)

▶ [European Chemicals Agency \(ECHA\)](#)

Flam. Liq. 3 (53.45%)

Acute Tox. 4 (12.64%)

Skin Irrit. 2 (13.22%)

Eye Dam. 1 (13.79%)

Eye Irrit. 2 (85.63%)

STOT SE 3 (12.64%)

STOT SE 3 (12.64%)

▶ [European Chemicals Agency \(ECHA\)](#)

[View More...](#)

10.1.3 Health Hazards



LIQUID: Irritating to skin and eyes. If swallowed will cause nausea and vomiting. (USCG, 1999)

U.S. Coast Guard. 1999. Chemical Hazard Response Information System (CHRIS) - Hazardous Chemical Data. Commandant Instruction 16465.12C. Washington, D.C.: U.S. Government Printing Office.

▶ [CAMEO Chemicals](#)

10.1.4 Fire Hazards



Combustible. Containers may explode in fire. May give off dense white smoke. Containers may explode. (USCG, 1999)

U.S. Coast Guard. 1999. Chemical Hazard Response Information System (CHRIS) - Hazardous Chemical Data. Commandant Instruction 16465.12C. Washington, D.C.: U.S. Government Printing Office.

► [CAMEO Chemicals](#)

10.1.5 Hazards Summary



Decomposed by [water](#) producing [butanol](#) and [titanium dioxide](#); A skin, eye, and respiratory tract irritant; May cause corneal damage; [HSDB] Reacts with [water](#) forming [butanol](#) and [titanium dioxide](#); A skin and eye irritant; [CAMEO] A skin irritant; Corrosive to eyes; [eChemPortal: ERMA] A corrosive substance that can cause injury to the skin, eyes, and respiratory tract; Inhalation may cause chemical pneumonitis; [MSDSonline]

► [Haz-Map, Information on Hazardous Chemicals and Occupational Diseases](#)

Contains 2-5% [n-butyl alcohol](#) (CAS# [71-36-3](#)); Hydrolyzed by [water](#); An irritant that may cause serious eye injury; Vapors may cause drowsiness and dizziness; Harmful by ingestion; [Intec Polymers MSDS] See [Tetrabutyl titanate](#).

► [Haz-Map, Information on Hazardous Chemicals and Occupational Diseases](#)

10.1.6 Fire Potential



FLAMMABLE WHEN EXPOSED TO HEAT OR FLAME.

Lewis, R.J. Sax's Dangerous Properties of Industrial Materials. 9th ed. Volumes 1-3. New York, NY: Van Nostrand Reinhold, 1996., p. 603

► [Hazardous Substances Data Bank \(HSDB\)](#)

10.2 Safety and Hazard Properties



10.2.1 Flammable Limits



2%-12%

U.S. Coast Guard, Department of Transportation. CHRIS - Hazardous Chemical Data. Volume II. Washington, D.C.: U.S. Government Printing Office, 1984-5.

► [Hazardous Substances Data Bank \(HSDB\)](#)

10.2.2 Lower Explosive Limit (LEL)



2 % (USCG, 1999)

U.S. Coast Guard. 1999. Chemical Hazard Response Information System (CHRIS) - Hazardous Chemical Data. Commandant Instruction 16465.12C. Washington, D.C.: U.S. Government Printing Office.

► [CAMEO Chemicals](#)

10.2.3 Upper Explosive Limit (UEL)



12 % (USCG, 1999)

U.S. Coast Guard. 1999. Chemical Hazard Response Information System (CHRIS) - Hazardous Chemical Data. Commandant Instruction 16465.12C. Washington, D.C.: U.S. Government Printing Office.

► [CAMEO Chemicals](#)

10.2.4 Explosive Limits and Potential



CONTAINERS MAY EXPLODE IN FIRE.

U.S. Coast Guard, Department of Transportation. CHRIS - Hazardous Chemical Data. Volume II. Washington, D.C.: U.S. Government Printing Office, 1984-5.

► [Hazardous Substances Data Bank \(HSDB\)](#)

10.3 First Aid Measures



10.3.1 First Aid



INHALATION: move from contaminated atmosphere; if symptoms of respiratory discomfort persist, see a physician.

EYES: immediately flush with large quantities of running [water](#) for a minimum of 15 minutes; obtain medical attention if irritation persists.

SKIN: immediately flush affected areas with [water](#); obtain medical attention if irritation persists.

INGESTION: give large amounts of [water](#) or warm salty [water](#) to induce vomiting; if this measure is unsuccessful, vomiting may be induced by tickling the back of the patient's throat with a finger; vomiting should be encouraged until vomitus is clear; obtain medical attention if abdominal discomfort persists. (USCG, 1999)

U.S. Coast Guard. 1999. Chemical Hazard Response Information System (CHRIS) - Hazardous Chemical

Data. Commandant Instruction 16465.12C. Washington, D.C.: U.S. Government Printing Office.

► CAMEO Chemicals

10.4 Fire Fighting



Excerpt from ERG Guide 132 [Flammable Liquids - Corrosive]:

Some of these materials may react violently with [water](#).

SMALL FIRE: Dry chemical, CO2, [water](#) spray or alcohol-resistant foam.

LARGE FIRE: [Water](#) spray, fog or alcohol-resistant foam. If it can be done safely, move undamaged containers away from the area around the fire. Dike runoff from fire control for later disposal. Do not get [water](#) inside containers.

FIRE INVOLVING TANKS, RAIL TANK CARS OR HIGHWAY TANKS: Fight fire from maximum distance or use unmanned master stream devices or monitor nozzles. Cool containers with flooding quantities of [water](#) until well after fire is out. Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank. ALWAYS stay away from tanks in direct contact with flames. For massive fire, use unmanned master stream devices or monitor nozzles; if this is impossible, withdraw from area and let fire burn. (ERG, 2024)

2024 Emergency Response Guidebook, <https://www.phmsa.dot.gov/training/hazmat/erg/emergency-response-guidebook-erg>

► CAMEO Chemicals

10.4.1 Fire Fighting Procedures



EXTINGUISH WITH DRY CHEM OR [CARBON DIOXIDE](#). DO NOT USE [WATER](#) ON FIRE. COOL EXPOSED CONTAINERS WITH [WATER](#).

U.S. Coast Guard, Department of Transportation. CHRIS - Hazardous Chemical Data. Volume II. Washington, D.C.: U.S. Government Printing Office, 1984-5.

► Hazardous Substances Data Bank (HSDB)

10.4.2 Firefighting Hazards



MAY GIVE OFF DENSE WHITE SMOKE.

U.S. Coast Guard, Department of Transportation. CHRIS - Hazardous Chemical Data. Volume II. Washington, D.C.: U.S. Government Printing Office, 1984-5.

► [Hazardous Substances Data Bank \(HSDB\)](#)

10.5 Accidental Release Measures



10.5.1 Isolation and Evacuation



Excerpt from ERG Guide 132 [Flammable Liquids - Corrosive]:

IMMEDIATE PRECAUTIONARY MEASURE: Isolate spill or leak area for at least 50 meters (150 feet) in all directions.

SPILL: Increase the immediate precautionary measure distance, in the downwind direction, as necessary.

FIRE: If tank, rail tank car or highway tank is involved in a fire, ISOLATE for 800 meters (1/2 mile) in all directions; also, consider initial evacuation for 800 meters (1/2 mile) in all directions. (ERG, 2024)

2024 Emergency Response Guidebook, <https://www.phmsa.dot.gov/training/hazmat/erg/emergency-response-guidebook-erg>

► [CAMEO Chemicals](#)

10.5.2 Disposal Methods



SRP: At the time of review, criteria for land treatment or burial (sanitary landfill) disposal practices are subject to significant revision. Prior to implementing land disposal of waste residue (including waste sludge), consult with environmental regulatory agencies for guidance on acceptable disposal practices.

► [Hazardous Substances Data Bank \(HSDB\)](#)

10.6 Handling and Storage



10.6.1 Nonfire Spill Response



Excerpt from ERG Guide 132 [Flammable Liquids - Corrosive]:

ELIMINATE all ignition sources (no smoking, flares, sparks or flames) from immediate area.

All equipment used when handling the product must be grounded. Do not touch or walk through spilled material. Stop leak if you can do it without risk. Prevent entry into waterways, sewers, basements or confined areas. A vapor-suppressing foam may be used to

reduce vapors. Absorb with earth, sand or other non-combustible material. For [hydrazine](#), absorb with DRY sand or inert absorbent (vermiculite or absorbent pads). Use clean, non-sparking tools to collect absorbed material.

LARGE SPILL: Dike far ahead of liquid spill for later disposal. [Water](#) spray may reduce vapor, but may not prevent ignition in closed spaces. (ERG, 2024)

2024 Emergency Response Guidebook, <https://www.phmsa.dot.gov/training/hazmat/erg/emergency-response-guidebook-erg>

► [CAMEO Chemicals](#)

10.6.2 Storage Conditions



IN GENERAL, MATERIALS ... TOXIC AS STORED OR WHICH CAN DECOMP INTO TOXIC COMPONENTS ... SHOULD BE STORED IN COOL ... VENTILATED PLACE, OUT OF ... SUN, AWAY FROM ... FIRE HAZARD ... BE PERIODICALLY INSPECTED & MONITORED. INCOMPATIBLE MATERIALS SHOULD BE ISOLATED ...

Sax, N.I. Dangerous Properties of Industrial Materials. 4th ed. New York: Van Nostrand Reinhold, 1975., p. 498

► [Hazardous Substances Data Bank \(HSDB\)](#)

10.7 Exposure Control and Personal Protection



10.7.1 Personal Protective Equipment (PPE)



Excerpt from ERG Guide 132 [Flammable Liquids - Corrosive]:

Wear positive pressure self-contained breathing apparatus (SCBA). Wear chemical protective clothing that is specifically recommended by the manufacturer when there is NO RISK OF FIRE. Structural firefighters' protective clothing provides thermal protection but only limited chemical protection. (ERG, 2024)

2024 Emergency Response Guidebook, <https://www.phmsa.dot.gov/training/hazmat/erg/emergency-response-guidebook-erg>

► [CAMEO Chemicals](#)

SELF-CONTAINED BREATHING APPARATUS OR ORGANIC CANISTER MASK; GOGGLES OR FACE SHIELD; RUBBER GLOVES.

U.S. Coast Guard, Department of Transportation. CHRIS - Hazardous Chemical Data. Volume II. Washington, D.C.: U.S. Government Printing Office, 1984-5.

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

10.8 Stability and Reactivity



10.8.1 Air and Water Reactions



Soluble in [water](#). Reacts with [water](#) to form [butanol](#) and [titanium dioxide](#), the reaction is not generally thought to be hazardous.

▶ [CAMEO Chemicals](#)

10.8.2 Reactive Group



Bases, Strong

▶ [CAMEO Chemicals](#)

10.8.3 Reactivity Profile



Organometallics are strongly reactive with many other groups. Incompatible with acids and bases. Organometallics are good reducing agents and therefore incompatible with oxidizing agents. Often reactive with [water](#) to generate toxic or flammable gases. Generally highly toxic. Often react on contact with tissues to give toxic products.

▶ [CAMEO Chemicals](#)

10.8.4 Hazardous Reactivities and Incompatibilities



Incompatible with oxidizing materials.

Lewis, R.J. Sax's Dangerous Properties of Industrial Materials. 9th ed. Volumes 1-3. New York, NY: Van Nostrand Reinhold, 1996, p. 603

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

10.9 Transport Information



10.9.1 DOT Label



Corrosive Flammable Liquid

▶ CAMEO Chemicals

10.10 Regulatory Information



The Australian Inventory of Industrial Chemicals

Chemical: [1-Butanol, titanium\(4+\) salt](#), homopolymer

▶ Australian Industrial Chemicals Introduction Scheme (AICIS)

The Australian Inventory of Industrial Chemicals

Chemical: [1-Butanol, titanium\(4+\) salt](#)

▶ Australian Industrial Chemicals Introduction Scheme (AICIS)

REACH Registered Substance

Status: Active Update: 27-04-2023 <https://echa.europa.eu/registration-dossier/-/registered-dossier/14260>

▶ European Chemicals Agency (ECHA)

New Zealand EPA Inventory of Chemical Status

1-Butanol, titanium (IV) salt: Does not have an individual approval but may be used under an appropriate group standard

▶ New Zealand Environmental Protection Authority (EPA)

New Zealand EPA Inventory of Chemical Status

[1-Butanol, titanium\(4+\) salt](#), homopolymer: Does not have an individual approval but may be used as a component in a product covered by a group standard. It is not approved for use as a chemical in its own right.

▶ New Zealand Environmental Protection Authority (EPA)

11 Toxicity



11.1 Toxicological Information



11.1.1 Adverse Effects



Dermatotoxin - Skin burns.

Toxic Pneumonitis - Inflammation of the lungs induced by inhalation of metal fumes or toxic gases and vapors.

► [Haz-Map, Information on Hazardous Chemicals and Occupational Diseases](#)

11.1.2 Acute Effects



► [ChemIDplus](#)

11.1.3 Human Toxicity Excerpts



INHALATION CAUSES NONSPECIFIC IRRITATION OF THE UPPER RESP TRACT. CONTACT WITH LIQUID MAY CAUSE CORNEAL DAMAGE IN EYES AND LOCAL IRRITATION OF SKIN. INGESTION CAUSES NONSPECIFIC IRRITATION OF GI TRACT, NAUSEA, VOMITING, CRAMPS, AND DIARRHEA; IN SEVERE CASES, CENTRAL NERVOUS SYSTEM DEPRESSION MAY RESULT.

U.S. Coast Guard, Department of Transportation. CHRIS - Hazardous Chemical Data. Volume II. Washington, D.C.: U.S. Government Printing Office, 1984-5.

► [Hazardous Substances Data Bank \(HSDB\)](#)

11.1.4 Non-Human Toxicity Values



LD50 Rat oral 3122 mg/kg

Lewis, R.J. Sax's Dangerous Properties of Industrial Materials. 9th ed. Volumes 1-3. New York, NY: Van Nostrand Reinhold, 1996., p. 603

► [Hazardous Substances Data Bank \(HSDB\)](#)

LD50 Mouse iv 180 mg/kg

Lewis, R.J. Sax's Dangerous Properties of Industrial Materials. 9th ed. Volumes 1-3. New York, NY: Van Nostrand Reinhold, 1996., p. 603

► [Hazardous Substances Data Bank \(HSDB\)](#)

12 Literature



12.1 Consolidated References



► [PubChem](#)

12.2 NLM Curated PubMed Citations





► PubChem

12.3 Chemical Co-Occurrences in Literature



► PubChem

12.4 Chemical-Gene Co-Occurrences in Literature



► PubChem

12.5 Chemical-Disease Co-Occurrences in Literature



► PubChem

13 Patents



13.1 Depositor-Supplied Patent Identifiers



▶ PubChem

[Link to all deposited patent identifiers](#)

▶ PubChem

13.2 Chemical Co-Occurrences in Patents



▶ PubChem

13.3 Chemical-Disease Co-Occurrences in Patents



► PubChem

13.4 Chemical-Gene Co-Occurrences in Patents



► PubChem

14 Classification



14.1 MeSH Tree



► Medical Subject Headings (MeSH)

14.2 ChemIDplus



► ChemIDplus

14.3 CAMEO Chemicals



► CAMEO Chemicals

14.4 UN GHS Classification



► GHS Classification (UNECE)

14.5 EPA CPDat Classification



► EPA Chemical and Products Database (CPDat)

14.6 NORMAN Suspect List Exchange Classification



► NORMAN Suspect List Exchange

14.7 EPA DSSTox Classification



▶ EPA DSSTox

14.8 Consumer Product Information Database Classification



▶ Consumer Product Information Database (CPID)

14.9 EPA TSCA and CDR Classification



► EPA Chemicals under the TSCA

14.10 EPA Substance Registry Services Tree



► EPA Substance Registry Services

15 Information Sources



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1. Australian Industrial Chemicals Introduction Scheme (AICIS)

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<https://www.industrialchemicals.gov.au/copyright>

1-Butanol, titanium(4+) salt, homopolymer

<https://services.industrialchemicals.gov.au/search-inventory/>

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TETRABUTYL TITANATE

<https://cameochemicals.noaa.gov/chemical/9105>

CAMEO Chemical Reactivity Classification

<https://cameochemicals.noaa.gov/browse/react>

3. ChemIDplus

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Tetrabutyl titanate

<https://pubchem.ncbi.nlm.nih.gov/substance/?source=chemidplus&sourceid=0005593704>

1-Butanol, titanium(4+) salt (4:1), homopolymer

<https://pubchem.ncbi.nlm.nih.gov/substance/?source=chemidplus&sourceid=0009022962>

ChemIDplus Chemical Information Classification

<https://pubchem.ncbi.nlm.nih.gov/source/ChemIDplus>

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<https://www.epa.gov/chemical-data-reporting>

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1-Butanol, titanium(4+) salt (4:1)

<https://www.epa.gov/chemicals-under-tsca>

EPA TSCA Classification

<https://www.epa.gov/tsca-inventory>

6. EPA DSSTox

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<https://www.epa.gov/privacy/privacy-act-laws-policies-and-resources>

Titanium(IV) n-butoxide

<https://comptox.epa.gov/dashboard/DTXSID6041262>

CompTox Chemicals Dashboard Chemical Lists

<https://comptox.epa.gov/dashboard/chemical-lists/>

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<https://echa.europa.eu/web/guest/legal-notice>

Titanium tetrabutanolate

<https://chem.echa.europa.eu/100.024.552>

1-Butanol, titanium(4+) salt (4:1), homopolymer

<https://echa.europa.eu/substance-information/-/substanceinfo/100.166.467>

Titanium tetrabutanolate

<https://echa.europa.eu/information-on-chemicals/cl-inventory-database/-/discli/details/99476>

1-Butanol, titanium(4+) salt (4:1), homopolymer

<https://echa.europa.eu/information-on-chemicals/cl-inventory-database/-/discli/details/171302>

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TITANIUM TETRABUTOXIDE

<https://gsrs.ncats.nih.gov/ginas/app/beta/substances/FJS8Q2MX9I>

9. Hazardous Substances Data Bank (HSDB)

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TETRABUTYL TITANATE

<https://pubchem.ncbi.nlm.nih.gov/source/hsdb/839>

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1-Butanol, titanium (IV) salt

<https://www.epa.govt.nz/industry-areas/hazardous-substances/guidance-for-importers-and-manufacturers/hazardous-substances-databases/>

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<https://haz-map.com/About>

Tetrabutyl titanate

<https://haz-map.com/Agents/7335>

Titanium tetrabutylate polymer

<https://haz-map.com/Agents/18055>

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<https://www.whatsinproducts.com/contents/view/1/6>

Titanium tetrabutanolate

<https://www.whatsinproducts.com/chemicals/view/1/3909/005593-70-4>

Consumer Products Category Classification

<https://www.whatsinproducts.com/>

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Titanium(IV) n-butoxide

<https://comptox.epa.gov/dashboard/DTXSID6041262#exposure>

EPA CPDat Classification

<https://www.epa.gov/chemical-research/chemical-and-products-database-cpdat>

14. NITE-CMC

Tetra-n-butoxytitanium - FY2010 (New/original classification)

<https://www.nite.go.jp/chem/english/ghs/10-mhlw-0198e.html>

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BUTYL TITANATE, POLYMERIZED

<https://www.cfsanappsexternal.fda.gov/scripts/fdcc/index.cfm?set=IndirectAdditives&id=BUTYLITANATEPOLYMERIZED>

TETRABUTYL TITANATE

<https://www.cfsanappsexternal.fda.gov/scripts/fdcc/index.cfm?set=IndirectAdditives&id=TETRABUTYLITANATE>

16. Japan Chemical Substance Dictionary (Nikkaji)

http://jglobal.jst.go.jp/en/redirect?Nikkaji_No=J36.546G

17. SpectraBase

TETRABUTYL TITANATE

<https://spectrabase.com/spectrum/Aw8l4uj2Fim>

TETRABUTYL TITANATE

<https://spectrabase.com/spectrum/6tTlki7L37L>

BUTYL ALCOHOL, TITANIUM(4+) SALT

<https://spectrabase.com/spectrum/GNKj9cYa28W>

Ortho-titanic acid, tetrabutyl ester

<https://spectrabase.com/spectrum/KMOVc4lpR4i>

butyl alcohol, titanium(4+) salt

<https://spectrabase.com/spectrum/3DkUpLcKIJb>

TETRABUTYL ORTHOTITANATE

<https://spectrabase.com/spectrum/BHfl70xeMdR>

TETRABUTYL ORTHOTITANATE

<https://spectrabase.com/spectrum/3AExKüVVvt>

1-Butanol, titanium(4+) salt

<https://spectrabase.com/spectrum/Lohz0hjpyBK>

1-Butanol, titanium(4+) salt

<https://spectrabase.com/spectrum/EghkCBnqn2t>

Titanium(IV) butoxide

<https://spectrabase.com/spectrum/1ROixiqL3U2>

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19. Wikipedia

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https://en.wikipedia.org/wiki/Titanium_butoxide

20. PubChem

<https://pubchem.ncbi.nlm.nih.gov>

21. Medical Subject Headings (MeSH)

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tetrabutoxy titanium

<https://www.ncbi.nlm.nih.gov/mesh/67060171>

MeSH Tree

<http://www.nlm.nih.gov/mesh/meshhome.html>

22. GHS Classification (UNECE)

GHS Classification Tree

http://www.unece.org/trans/danger/publi/ghs/ghs_welcome_e.html

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NORMAN Suspect List Exchange Classification

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EPA SRS List Classification

https://sor.epa.gov/sor_internet/registry/substreg/LandingPage.do

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8 Pharmacology and Biochemistry	▼
9 Use and Manufacturing	▼
10 Safety and Hazards	▼
11 Toxicity	▼
12 Literature	▼
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15 Information Sources	