

Titanium(IV) Butoxide Solution

Safety Data Sheet

Section 1: Identification

1.1 Identification

Product Name : Titanium(IV) Butoxide Solution

1.2 Relevant identified uses of the substance or mixture and uses advised against

Use of the substance/mixture : Component of Catalytic Resist Solution

1.3 Details of the supplier of the safety data sheet

Nano3D Systems LLC
1110 NE Circle Blvd., ATAMI/Bldg. 11
Corvallis, OR 97330

1.4 Emergency telephone number

Emergency number Chemtrec : 800-424-9300

Section 2: Hazard(s) identification

2.1 Classification of the substance or mixture

Classification (GHS-US)

Acute toxicity, Oral (Category 4)	H302
Skin irritation (Category 2)	H315
Eye irritation (Category 2A)	H319
Acute aquatic toxicity (Category 1)	H400
Chronic aquatic toxicity (Category 2)	H410

2.2 Label elements

GHS-US labeling

Hazard pictogram (GHS-US)



Signal word (GHS-US) : Danger

Hazard statements (GHS-US) : H225 – Highly flammable liquid and vapor
: H226 – Flammable liquid and vapor
: H319 – Causes serious eye irritation
: H336 – May cause allergy or asthma symptoms or breathing difficulties if inhaled

Precautionary statements (GHS-US) : P210 – Keep away from heat/sparks/open flames/hot surfaces. No smoking.
: P233 – Keep container tightly closed.
: P240 – Ground/bond container and receiving equipment.
: P241 – Use explosion-proof electrical/ ventilating/ lighting/ equipment
: P242 – Use only non-sparking tools.
: P243 – Take precautionary measures against static

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discharge.

- : P261 – Avoid breathing dust/ fume/ gas/ mist/ vapors/ spray.
- : P264 – Wash hands thoroughly after handling
- : P271 – Use only outdoors or in a well-ventilated area.
- : P280 – Wear protective gloves/protective clothing/ eye protection/face protection
- : P303+P361+P353 – If on skin (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/ shower.
- : P304+P340 – If inhaled: Remove person to fresh air and keep comfortable for breathing
- : P305+P351+P338 – If in eye: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
- : P312 – Call a POISON CENTER/doctor if you feel unwell.
- : P337+P313 – If eye irritation persists: Get medical advice/ attention.
- : P370+P378 – In case of fire: Use dry sand, dry chemical or alcohol-resistant foam for extinction.
- : P403+P233+P235 – Store in a well-ventilated place. Keep container tightly closed and keep cool.
- : P405 – Store locked up.
- : P501 – Dispose of contents/container to an approved waste disposal plant.

2.3 Other Hazards

May form explosive peroxides

2.4 Unknown acute toxicity (GHS US)

No additional information available

Section 3: Composition/information on ingredients

3.1 Substance

Not applicable

3.2 Mixture

Name	Product Identifier	%	Classification (GHS-US)
Isopropyl alcohol	(CAS-No.) 67-63-0	Trade Secret	Flam. Liq. 2; Eye Irrit. 2A; STOT SE 3; H225, H319, H336
Titanium(IV) Butanolate	(CAS-No.) 5593-70-4	Trade Secret	Flam. Liq. 3; Skin Irrit. 2; Eye Dam. 1; STOT SE 3; H226,

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			H315, H318, H335, H336
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Section 4: First Aid Measures

4.1 Description of first aid measures

General	: Consult a physician. Show this safety data sheet to the doctor in attendance. Move out of dangerous area.
Inhalation	: If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.
Skin contact	: Wash off with soap and plenty of water. Consult a physician.
Eye contact	: Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.
Ingestion	: Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician

4.2 Most important symptoms and effects, both acute and delayed

Inhalation	: No information available
Skin contact	: No information available
Eye contact	: No information available
Ingestion	: No information available

4.3 Indication of any immediate medical attention and special treatment needed

No further information available

Section 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media	: Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.
Unsuitable extinguishing media	: None

5.2 Special hazards arising from the substance or mixture

Fire hazard	: Flammable
Explosion hazard	: Vapors form explosive mixture with air

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5.3 Advice for firefighters

Protection during firefighting

: Wear self-contained breathing apparatus for firefighting if necessary.

Section 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures

6.1.1 For non-emergency personnel

: Use personal protective equipment. Avoid breathing vapors, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. Avoid breathing dust.

6.1.2 For emergency personnel

: No additional information available

6.2 Environmental precautions

Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

6.3 Methods and materials for containment and cleaning up

Pick up and arrange disposal without creating dust. Sweep up and shovel. Keep in suitable, closed containers for disposal.

6.4 Reference to other sections

For disposal see section 13.

Section 7: Handling and storage

7.1 Precautions for safe handling

Precautions for safe handling

: Avoid contact with skin and eyes. Avoid inhalation of vapor or mist. Use explosion-proof equipment. Keep away from sources of ignition - No smoking. Take measures to prevent the buildup of electrostatic charge.

7.2 Conditions for safe storage, including any incompatibilities

Storage conditions

: Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage. Handle and store under inert gas. Hygroscopic and hydrolysis readily.

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Section 8: Exposure controls/personal protection

8.1 Control parameters

Isopropyl Alcohol (CAS-No.) 67-63-0

TWA	980.00 mg/m ³	USA. NIOSH Recommended Exposure Limits
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Titanium(IV) Butanolate (CAS-No.) 5593-70-4

No exposure limit values

8.2 Exposure controls

Appropriate engineering controls	: Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.
Hand protection	: Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.
Eye protection	: Tightly fitting safety goggles. Faceshield (8-inch minimum). Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).
Skin and body protection	: Complete suit protecting against chemicals, flame retardant antistatic protective clothing., The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.
Respiratory protection	: Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Section 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

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Physical state	: Liquid
Color	: Colorless
Odor	: alcohol-like
Odor threshold	: No information available
pH	: No information available
Melting point	: -89.5 °C (Isopropanol)
Freezing point	: -89.5 °C (Isopropanol)
Boiling point	: 82 °C (Isopropanol)
Flash point	: 12.0 °C (Isopropanol)
Relative evaporation rate (butyl acetate = 1)	: 3.0
Flammability (solid, gas)	: No information available
Explosion limits	: 2 – 12.7 % (V)
Explosive properties	: No information available
Vapor pressure	: 32.4 mmHg @ 20 °C
Relative density	: No information available
Relative density at 20 °C	: 0.785 g/cm ³
Water Solubility	: Miscible
Log Pow	: 0.05
Auto-ignition temperature	: 425 °C
Viscosity	: No information available
Viscosity, kinematic	: No information available
Viscosity, dynamic	: No information available

9.2 Other information

No further information available

Section 10: Stability and reactivity

10.1 Reactivity

No information available

10.2 Chemical Stability

Stable under recommended storage conditions.

Test for peroxide formation before distillation or evaporation. Test for peroxide formation or discard after 1 year.

10.3 Possibility of hazardous reactions

Vapors may form explosive mixture with air.

10.4 Conditions to avoid

Heat, flames and sparks. Extremes of temperature and direct sunlight.

10.5 Incompatible materials

Oxidizing agents, Acid anhydrides, Aluminum, Halogenated compounds, Acids

10.6 Hazardous decomposition products

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Hazardous decomposition products formed under fire conditions - Carbon oxides

Other decomposition products – Titanium oxides

Section 11: Toxicological information

11.1 Control parameters

Acute toxicity : No information available

Isopropyl Alcohol (CAS-No.) 67-63-0

LD50 Oral - Rat - 5,045 mg/kg

LC50 Inhalation - Rat - 8 h - 16000 ppm

LD50 Dermal - Rabbit - 12,800 mg/kg

Titanium(IV) Butanolate (CAS-No.) 5593-70-4

No information available

Skin corrosion/irritation : No information available

Serious eye damage/irritation : No information available

Respiratory or skin sensitization : No information available

Germ cell mutagenicity : No information available

Carcinogenicity : No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC, NTP or OSHA.

Reproductive toxicity : No information available

Specific target organ toxicity (single exposure) : No information available

Specific target organ toxicity (repeated exposure) : No information available

Aspiration hazard : No information available

Additional information

Central nervous system depression, prolonged or repeated exposure can cause: Nausea, Headache, Vomiting, narcosis, Drowsiness, Overexposure may cause mild, reversible liver effects., Aspiration may lead to: Lung oedema, Pneumonia

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Section 12: Ecological information

12.1 Toxicity

Isopropyl Alcohol (CAS-No.) 67-63-0

Toxicity to fish

LC50 - Pimephales promelas (fathead minnow) - 9,640.00 mg/l - 96 h

Toxicity to daphnia and other aquatic invertebrates

EC50 - Daphnia magna (Water flea) - 5,102.00 mg/l - 24 h

Toxicity to algae

Immobilization EC50 - Daphnia magna (Water flea) - 6,851 mg/l - 24 h

EC50 - Desmodesmus subspicatus (green algae) - > 2,000.00 mg/l - 72 h

EC50 - Algae - > 1,000.00 mg/l - 24 h

Titanium(IV) Butanolate (CAS-No.) 5593-70-4

No information available

12.2 Persistence and degradability

Isopropyl Alcohol (CAS-No.) 67-63-0

No information available

Titanium(IV) Butanolate (CAS-No.) 5593-70-4

No information available

12.3 Bioaccumulative potential

Isopropyl Alcohol (CAS-No.) 67-63-0

No bioaccumulation is to be expected ($\log Pow \leq 4$).

Titanium(IV) Butanolate (CAS-No.) 5593-70-4

No information available

12.4 Mobility in soil

Isopropyl Alcohol (CAS-No.) 67-63-0

No information available

Titanium(IV) Butanolate (CAS-No.) 5593-70-4

No information available

12.4 Other adverse effects

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No information available

Section 13: Disposal considerations

13.1 Waste treatment methods

Product

Burn in a chemical incinerator equipped with an afterburner and scrubber but exert extra care in igniting as this material is highly flammable. Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material.

Contaminated packaging

Dispose of as unused product.

Section 14: Transportation information

14.1 Transportation information

Department of Transportation (DOT)

UN number: 1219 Class: 3 Packing group: II

Proper shipping name: Isopropanol

Reportable Quantity (RQ):

Poison Inhalation Hazard: No

Section 15: Regulatory information

15.1 US Federal regulations

Isopropyl Alcohol (CAS-No.) 67-63-0

SARA Title III, Sections 302, 311, 312, 313

Titanium(IV) Butanolate (CAS-No.) 5593-70-4

SARA Title III, Section 313

15.2 US State regulations

Isopropyl Alcohol (CAS-No.) 67-63-0

Massachusetts Right To Know

Pennsylvania Right To Know

New Jersey Right To Know

Titanium(IV) Butanolate (CAS-No.) 5593-70-4

Massachusetts Right To Know

Pennsylvania Right To Know

New Jersey Right To Know

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Section 16: Other information

HMIS Rating

Health	2
Chronic Health	*
Flammability	3
Physical	0

NFPA Rating

Health	2
Fire	3
Reactivity	0

SDS Preparation date: September 10, 2017 **Supersedes previous version:** New SDS

This SDS contains revisions in the following sections(s): Not applicable. New SDS.

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End of Safety Data Sheet

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