



TCI AMERICA

SAFETY DATA SHEET

Revision number: 3
Revision date: 08/18/2015

1. IDENTIFICATION

Product name: Zirconium(IV) Butoxide (ca. 80% in 1-Butanol)
Product code: Z0016

Product use: For laboratory research purposes.
Restrictions on use: Not for drug or household use.

Company:
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2. HAZARD(S) IDENTIFICATION

OSHA Haz Com: CFR 1910.1200: Acute Toxicity - Oral [Category 4]
Skin Corrosion/Irritation [Category 2]
Eye Damage/Irritation [Category 1]
Specific Target Organ Toxicity (Single Exposure) [Category 3]
Specific Target Organ Toxicity (Repeated Exposure) [Category 1]
Flammable Liquids [Category 3]

Signal word: Danger!

Hazard Statement(s): Causes serious eye damage
Causes skin irritation
Flammable liquid and vapor
Harmful if swallowed
May cause respiratory irritation. May cause drowsiness or dizziness.
Causes damage to organs: Central Nervous System Auditory System through prolonged or repeated exposure.

Pictogram(s) or Symbol(s):



Precautionary Statement(s):
[Prevention]

Do not eat, drink or smoke when using this product. Wash hands and face thoroughly after handling. Wear protective gloves. Wear eye protection. Wear face protection (full length face shield). Avoid breathing fume, mist, vapors or spray. Use only outdoors or in a well-ventilated area. Do not breathe fume, mist, vapors or spray. Keep away from heat, sparks, open flames or other hot surfaces. - No smoking. Keep container tightly closed. Ground or bond container and receiving equipment. Use explosion-proof electrical, ventilating, lighting, and equipment. Use only non-sparking tools. Take precautionary measures against static discharge. Wear protective gloves, eye protection and face protection.

[Response]

If swallowed: Immediately call a poison center or doctor. Rinse mouth. If on skin: Wash with plenty of water. If skin irritation or rash occurs: Get medical advice/attention. Take off contaminated clothing and wash it before reuse. If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Immediately call a poison center or doctor. If inhaled: Remove person to fresh air and keep comfortable for breathing. Call a poison center or doctor if you feel unwell. Get medical advice or attention if you feel unwell. If on skin (or hair): Take off immediately all contaminated clothing. Rinse skin with water or shower. In case of fire: Use dry chemical, CO₂, water spray or alcohol-resistant foam to extinguish.

2. HAZARD(S) IDENTIFICATION

| | |
|-------------------|---|
| [Storage] | Store in a well-ventilated place. Keep container tightly closed. Store locked up. Store in a well-ventilated place. Keep cool. |
| [Disposal] | Dispose of contents and container in accordance with US EPA guidelines for the classification and determination of hazardous waste listed in 40 CFR 261.3. (See Section 13) |

Hazards not otherwise classified: [HNOC] May be harmful if swallowed and enters airways. May be harmful if in contact with skin.

3. COMPOSITION/INFORMATION ON INGREDIENTS

| | |
|---------------------------------|---|
| Substance/Mixture: | Mixture |
| Components: | Zirconium(IV) Butoxide (ca. 80% in 1-Butanol) |
| Percent: | |
| Hazardous ingredient(s): | Zirconium(IV) Butoxide: ca. 80% 1-Butanol: ca. 20% |
| CAS Number: | 1071-76-7 |
| Molecular Weight: | 383.68 |
| Chemical Formula: | C ₁₆ H ₃₆ O ₄ Zr |
| Synonyms: | Zirconium(IV) Tetrabutoxide (ca. 80% in 1-Butanol) |

4. FIRST-AID MEASURES

| | |
|----------------------|--|
| Inhalation: | Immediately call a poison center or doctor. Effects of exposure (inhalation) to substance may be delayed. Inhalation of vapors or contact with substance will result in contamination and potential harmful effects. Move victim to fresh air. Give artificial respiration if victim is not breathing. Administer oxygen if breathing is difficult. Keep victim warm and quiet. Treat symptomatically and supportively. Ensure that medical personnel are aware of the material(s) involved and take precautions to protect themselves. |
| Skin contact: | Immediately call a poison center or doctor. Effects of exposure (skin contact) to substance may be delayed. Remove and wash contaminated clothing before re-use. Remove and isolate contaminated clothing and shoes. In case of contact with substance, immediately flush skin with running water for at least 20 minutes. Treat symptomatically and supportively. Ensure that medical personnel are aware of the material(s) involved and take precautions to protect themselves. |
| Eye contact: | IMMEDIATELY flush eyes with running water for at least 15 minutes, keeping eyelids open. Eye contact with vapors or substance may cause severe injury, burns, or death. Call emergency medical service. Move victim to fresh air. Check for and remove any contact lenses. Keep victim warm and quiet. Treat symptomatically and supportively. Effects of exposure to substance may be delayed. Ensure that medical personnel are aware of the material(s) involved and take precautions to protect themselves. |
| Ingestion: | Harmful if swallowed. Do not induce vomiting without medical advice. Effects of exposure (ingestion) to substance may be delayed. Call a physician or Poison Control Center immediately. Do not use mouth-to-mouth method if victim ingested the substance; give artificial respiration with the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical device. Loosen tight clothing such as a collar, tie, belt or waistband. If a person vomits place them in the recovery position so that vomit will not reenter the mouth and throat. Rinse mouth. Keep victim warm and quiet. Treat symptomatically and supportively. Ensure that medical personnel are aware of the material(s) involved and take precautions to protect themselves. |

Symptoms/effects:

| | |
|-----------------|--|
| Acute: | Dizziness. Pain. Redness. Drowsiness. |
| Delayed: | May have effects on the respiratory tract. |

Immediate medical attention:

WARNING: It might be hazardous to the person providing aid to give mouth-to-mouth respiration, because the inhaled material is harmful. WARNING: It might be hazardous to the person providing aid to give mouth-to-mouth respiration, because the inhaled material is corrosive. For severe burns, immediate medical attention is required. If breathing has stopped, perform artificial respiration. Use first aid treatment according to the nature of the injury. Ensure that medical personnel are aware of the material(s) involved and take precautions to protect themselves.

4. FIRST-AID MEASURES**Notes to physician:**

Basic Treatment: Establish a patent airway. Suction if necessary. Watch for signs of respiratory insufficiency and assist ventilations if necessary. Administer oxygen by nonrebreather mask at 10 to 15 L/min. Monitor for shock and treat if necessary. Monitor for pulmonary edema and treat if necessary. Anticipate seizures and treat if necessary. For eye contamination, flush eyes immediately with water. Irrigate each eye continuously with normal saline during transport. Do not use emetics. For ingestion, rinse mouth and administer 5 ml/kg up to 200 ml of water for dilution if the patient can swallow, has a strong gag reflex, and does not drool. Administer activated charcoal.

Advanced Treatment: Consider orotracheal or nasotracheal intubation for airway control in the patient who is unconscious or has severe pulmonary edema. Positive-pressure ventilation techniques, with a bag-valve-mask device, may be beneficial. Monitor cardiac rhythm and treat arrhythmias as necessary. Start an IV with D5W /SRP: "To keep open", minimal flow rate/. Use lactated Ringer's if signs of hypovolemia are present. Watch for signs of fluid overload. Monitor for signs of hypoglycemia (decreased LOC, tachycardia, pallor, dilated pupils, diaphoresis, and/or dextrose strip or glucometer readings below 50 mg) and administer 50% dextrose if necessary. Treat seizures with diazepam (Valium) For hypotension with signs of hypovolemia, administer fluid cautiously. Consider vasopressors if patient is hypotensive with a normal fluid volume. Watch for signs of fluid overload. Consider drug therapy for pulmonary edema. Use proparacaine hydrochloride to assist eye irrigation.

5. FIRE-FIGHTING MEASURES

Suitable extinguishing media: Dry chemical, CO₂ or water spray. Consult with local fire authorities before attempting large scale fire fighting operations.

Specific hazards arising from the chemical

Hazardous combustion products: These products include: Carbon oxides Metallic oxides

Other specific hazards: Closed containers may explode from heat of a fire.

Special precautions for fire-fighters:

Use water spray or fog; do not use straight streams. Dike fire-control water for later disposal; do not scatter the material. CAUTION: All these products have a very low flash point: Use of water spray when fighting fire may be inefficient. Do not use straight streams. Runoff to sewer may create fire or explosion hazard. Containers may explode when heated. Move containers from fire area if you can do it without risk.

Special protective equipment for fire-fighters:

Wear positive pressure self-contained breathing apparatus (SCBA). Structural fire fighters' protective clothing provides limited protection in fire situations ONLY; it may not be effective in spill situations. Wear chemical protective clothing which is specifically recommended by the manufacturer. It may provide little or no thermal protection.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions: Avoid contact with skin, eyes, and clothing. Keep people away from and upwind of spill/leak. Use spark-proof tools and explosion-proof equipment. Remove all sources of ignition. Do not touch damaged containers or spilled material unless wearing appropriate protective clothing (Section 8). Warn unnecessary personnel to move away. Stop leak if you can do it without risk. Ensure adequate ventilation. Isolate the hazard area and deny entry to unnecessary and unprotected personnel.

Personal protective equipment: Wear eye protection (splash goggles) and face protection (full length face shield). Lab coat. Vapor respirator. Be sure to use a MSHA/NIOSH approved respirator or equivalent. Wear protective gloves (nitrile).

Emergency procedures: Isolate area until gas has dispersed. Do not clean-up or dispose except under supervision of a specialist. In case of a spill and/or a leak, always shut off any sources of ignition, ventilate the area, and exercise caution. Do not touch damaged containers or spilled material unless wearing appropriate protective clothing. Warn personnel to move away. Prevent entry into sewers, basements or confined areas; dike if needed.

Methods and materials for containment and cleaning up:

ELIMINATE all ignition sources (no smoking, flares, sparks, or flames in immediate area). All equipment used when handling the product must be grounded. Stop leak if without risk. Ventilate the area. Absorb with an inert material and put the spilled material in an appropriate waste disposal container. Use clean non-sparking tools to collect absorbed material.

Environmental precautions:

Keep away from living quarters. Prevent further leakage or spillage if safe to do so. Water runoff can cause environmental damage. Prevent entry into sewers, basements or confined areas; dike if needed.

7. HANDLING AND STORAGE

Precautions for safe handling: Do NOT breath gas, fumes, vapor, or spray. Manipulate under an adequate fume hood. Do not ingest. Avoid contact with skin and eyes. Keep away from heat and sources of ignition. Use explosion-proof equipment. Use only non-sparking hand tool when handling this product. Ground all equipment containing material. Take measures to prevent build up of electrostatic charge. Good general ventilation should be sufficient to control airborne levels. Keep container dry. Handle and open container with care. Wear suitable protective clothing, gloves and eye/face protection. When using do not eat, drink, or smoke. Keep away from sources of ignition.

Conditions for safe storage: Store locked up. Keep containers tightly closed in a cool, well-ventilated place. Keep away from sources of ignition. Store and use away from heat, sparks, open flame, or any other ignition source. Keep away from incompatibles. Containers which are opened must be carefully resealed and kept upright to prevent leakage. Avoid prolonged storage periods. Store under inert gas (e.g. Argon). Moisture sensitive.

Storage incompatibilities: Combustible substances, Store away from oxidizing agents

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Exposure limits: No data available

Appropriate engineering controls:

Good general ventilation should be sufficient to control airborne levels. Ventilation is normally required when handling or using this product. Eyewash fountains should be provided in areas where there is any possibility that workers could be exposed to the substance. Follow safe industrial engineering/laboratory practices when handling any chemical.

Personal protective equipment

Respiratory protection: Vapor respirator. Be sure to use a MSHA/NIOSH approved respirator or equivalent.
Hand protection: Wear protective gloves.
Eye protection: Splash goggles.
Skin and body protection: Lab coat.

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical state (20°C): Liquid
Form: Clear
Color: Very pale yellow - Yellow
Odor: Alcoholic
Odor threshold: No data available

Melting point/freezing point: No data available
-90°C (-130°F) (1-Butanol)°C

pH: No data available

Boiling point/range: No data available
118°C (244.4°F) (1-Butanol)°C

Vapor pressure: No data available

Decomposition temperature: No data available

Vapor density: No data available

Relative density: 1.06

Dynamic Viscosity: No data available

Kinematic Viscosity: No data available

**Partition coefficient:
n-octanol/water (log P_{ow})** No data available

Evaporation rate: No data available
(Butyl Acetate = 1)

Flash point: 38°C (100°F)

Autoignition temperature: No data available

Flammability (solid, gas): No data available

Flammability or explosive limits:

Lower: 1.4%

Upper: 11.2%

Solubility(ies):

10. STABILITY AND REACTIVITY

Reactivity: Attacks some forms of plastic, rubber and coatings. Reacts with aluminium when heated to 100°C.
Chemical Stability: Moisture sensitive. Stable under recommended storage conditions. (See Section 7)
Possibility of Hazardous Reactions: In use, may form flammable/explosive vapor-air mixture.
Conditions to avoid: Exposure to moisture. Moisture sensitive.
Incompatible materials: Oxidizing agents
Hazardous Decomposition Products: No data available

11. TOXICOLOGICAL INFORMATION

RTECS Number:

EO1400000 (1-Butanol)

Acute Toxicity:

No data available

(1-Butanol) - Human LDLo (oral): 428mg/kg

Toxic Effects:
Not available.

(1-Butanol) - Rat LD50 (oral): 790mg/kg

Toxic Effects:
Liver - fatty liver degeneration.
Kidney, Ureter and Bladder - other changes.
Blood - other changes.

(1-Butanol) - Rabbit LD50 (dermal): 3400mg/kg

Toxic Effects:
Not available.(1-Butanol) - Rat LC50 (inhalation): 24000mg/m³/4H*Toxic Effects:*
Gastrointestinal - gastritis.
Liver - other changes.
Blood - hemorrhage.**Skin corrosion/irritation:**

No data available

(1-Butanol) Rabbit (dermal): 20 mg/24H MODERATE

Effects:
Skin and appendages - redness, pain, dry skin**Serious eye damage/irritation:**

No data available

(1-Butanol) - Rabbit (eye) 2 mg: SEVERE

Effects:
Eye - Redness, Pain.

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Respiratory or skin sensitization:

No data available

Germ cell mutagenicity:

No data available

(1-Butanol) - Sex Chromosome Loss/Nondisjunction Hamster (lung): 100 mmol/L

(1-Butanol) - Sex Chromosome Loss/Nondisjunction Aspergillus nidulans: 7000 ppm

Carcinogenicity:

No data available

IARC: No data available**NTP:** No data available**OSHA:** No data available**Reproductive toxicity:**

No data available

(1-Butanol) Rat TDLo (Oral): 35295 mg/kg, female 1-15 days of pregnancy

Toxic Effects:
Effects on fertility - female fertility index.
Effects on fertility - pre-implantation mortality.
Effects on fertility - post-implantation mortality.
Effects on embryo or fetus - fetotoxicity.
Effects on newborn - biochemical and metabolic.

(1-Butanol) Rat TDLo (Oral): 23100 mg/kg, female 8 weeks prior to mating and 0-20 days of pregnancy

Toxic Effects:
Specific developmental abnormalities - craniofacial.
Specific developmental abnormalities - musculoskeletal system.

(1-Butanol) Rat TDLo (Inhalation): 6000 ppm-7 hours, female 1-19 days or pregnancy

Toxic Effects:
Effects on embryo or fetus - fetotoxicity.**Routes of Exposure:**

Inhalation, Eye contact, Ingestion, Skin contact.

Symptoms related to exposure:

Overexposure may result in serious illness or death. Skin contact may result in inflammation; characterized by itching, scaling, reddening, or occasionally blistering. Skin contact may result in redness, pain or dry skin. Eye contact can result in corneal damage or blindness. Inhalation causes irritation of the lungs and respiratory system.

Potential Health Effects:

Skin and eye contact may result in irritation. Inhalation causes irritation of the lungs and respiratory system. May be harmful if inhaled or ingested. Overexposure may result in serious illness or death.

Aspiration hazard:

May be harmful if swallowed and enters airways.

Target organ(s):

May cause respiratory irritation. May cause drowsiness or dizziness.

Causes damage to organs: Central Nervous System Auditory System through prolonged or repeated exposure.

12. ECOLOGICAL INFORMATION**Ecotoxicity**

| | |
|-------------------|-------------------|
| Fish: | No data available |
| Crustacea: | No data available |
| Algae: | No data available |

| | |
|--|-------------------|
| Persistence and degradability: | No data available |
| Bioaccumulative potential (BCF): | No data available |
| Mobility in soil: | No data available |
| Partition coefficient: n-octanol/water (log P_{ow}) | No data available |
| Soil adsorption (K_{oc}): | No data available |
| Henry's Law: constant (PaM³/mol) | No data available |

Other adverse effects:

Environmental Fate: n-Butyl alcohol's production and use as a solvent for many natural resins, an ingredient in paint removers and industrial cleaners may result in its release to the environment through various waste streams. n-Butyl alcohol is an aroma component of apples and is also found in many foods. If released to air, a vapor pressure of 7 mm Hg at 25 deg C indicates n-butyl alcohol will exist solely as a vapor in the ambient atmosphere. Vapor-phase n-butyl alcohol will be degraded in the atmosphere by reaction with photochemically-produced hydroxyl radicals; the half-life for this reaction in air is estimated to be 46 hours. If released to soil, n-butyl alcohol is expected to have high mobility based upon an estimated K_{oc} of 72. Volatilization from moist soil surfaces is expected to be an important fate process based upon a Henry's Law constant of 8.8X10⁻⁶ atm-cu m/mole. n-Butyl alcohol may volatilize from dry soil surfaces based upon its vapor pressure. The biodegradation half-life of n-butyl alcohol in a sub-surface soil was approximately 7 days. If released into water, n-butyl alcohol is not expected to adsorb to suspended solids and sediment in water based upon the estimated K_{oc}. Volatilization from water surfaces is expected to be an important environmental fate process based upon this compound's Henry's Law constant. Estimated volatilization half-lives for a model river and model lake are 2 and 29 days, respectively. In a river die-away test, n-butyl alcohol achieved 33% of its theoretical BOD in 5 days, suggesting biodegradation will be an important fate process in water. An estimated BCF of 3 suggests the potential for bioconcentration in aquatic organisms is low. Hydrolysis is not expected to be an important environmental fate process since this compound lacks functional groups that hydrolyze under environmental conditions. Occupational exposure may occur through inhalation and dermal contact with this compound at workplaces where n-butyl alcohol is produced or used. The general population is exposed to n-butyl alcohol through the ingestion of foods that contain this compound and inhalation of ambient air.

13. DISPOSAL CONSIDERATIONS

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|-------------------------------|---|
| Disposal of product: | Recycle to process if possible. It is the generator's responsibility to comply with Federal, State and Local rules and regulations. US EPA guidelines for Identification and Listing of Hazardous Waste are listed in 40 CFR Parts 261. The product should not be allowed to enter the environment, drains, water ways, or the soil. You may be able to dissolve or mix material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber system. This section is intended to provide assistance but does not replace these laws, nor does compliance in accordance with this section ensure regulatory compliance according to the law. |
| Disposal of container: | Dispose of as unused product. Do not re-use empty containers. |
| Other considerations: | Observe all federal, state and local regulations when disposing of the substance. |

DOT (US)

| | | | |
|-------------------|------------------------------|---------------------------|-----------------------|
| UN number: | Proper Shipping Name: | Class or Division: | Packing Group: |
| UN1120 | Butanols | 3 Flammable liquid | III |

IATA

| | | | |
|-------------------|------------------------------|---------------------------|-----------------------|
| UN number: | Proper Shipping Name: | Class or Division: | Packing Group: |
| UN1120 | Butanols | 3 Flammable liquid | III |

IMDG

| | | | |
|-------------------|------------------------------|---------------------------|-----------------------|
| UN number: | Proper Shipping Name: | Class or Division: | Packing Group: |
| UN1120 | Butanols | 3 Flammable liquid | III |

| | |
|-----------------------------|------------------------------|
| EmS number: | F-E, S-D |
| Reportable Quantity: | 5000 Pounds (2270 Kilograms) |

15. REGULATORY INFORMATION**Toxic Substance Control Act (TSCA 8b.):**

This product is ON the EPA Toxic Substances Control Act (TSCA) inventory.

US Federal Regulations

| | |
|--|------------|
| CERCLA Hazardous substance and Reportable Quantity: | |
| SARA 313: | Not Listed |

15. REGULATORY INFORMATION

SARA 302: Not Listed

State Regulations**State Right-to-Know**

Massachusetts Not Listed

New Jersey Not Listed

Pennsylvania Not Listed

California Proposition 65: Not Listed

Other Information**NFPA Rating:**Health: 2
Flammability: 2
Instability: 0**HMIS Classification:**Health: 2
Flammability: 2
Physical: 0**International Inventories****WHMIS hazard class:**

E: Corrosive material.

D2A: Materials causing other toxic effects. (Very Toxic)

D2B: Materials causing other toxic effects. (Toxic)

EC-No:

213-995-3

16. OTHER INFORMATION**Revision date:** 08/18/2015**Revision number:** 3

TCI chemicals are for research purposes only and are NOT intended for use as drugs, food additives, households, or pesticides. The information herein is believed to be correct, but does not claim to be all inclusive and should be used only as a guide. Neither the above named supplier nor any of its affiliates or subsidiaries assumes any liability whatsoever for the accuracy or completeness of the information contained herein. Final determination of suitability of any material is the sole responsibility of the user. All chemical reagents must be handled with the recognition that their chemical, physiological, toxicological, and hazardous properties have not been fully investigated or determined. All chemical reagents should be handled only by individuals who are familiar with their potential hazards and who have been fully trained in proper safety, laboratory, and chemical handling procedures. Although certain hazards are described herein, we can not guarantee that these are the only hazards which exist. Our SDS are based only on data available at the time of shipping and are subject to change without notice as new information is obtained. Avoid long storage periods since the product is subject to degradation with age and may become more dangerous or hazardous. It is the responsibility of the user to request updated SDS for products that are stored for extended periods. Disposal of unused product must be undertaken by qualified personnel who are knowledgeable in all applicable regulations and follow all pertinent safety precautions including the use of appropriate protective equipment (e.g. protective goggles, protective clothing, breathing equipment, face mask, fume hood). For proper handling and disposal, always comply with federal, state and local regulations.