



TERT-BUTANOL (ANHYDROUS) (OD, 99%)

Safety Data Sheet

according to Regulation (EC) No. 453/2010 and according to Federal Register / Vol. 77, No. 58 / Monday, March 26, 2012 / Rules and Regulations

Date of issue: 14/12/2010

Revision date: 30/06/2016

Supersedes: 21/02/2014

Version: 3.0

DLM-1109

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1. Product identifier

Product form : Substance
Substance name : TERT-BUTANOL (ANHYDROUS) (OD, 99%)
EC index no : 603-005-00-1 (Unlabeled)
EC no : 200-889-7 (Unlabeled)
CAS No : 3972-25-6
REACH registration No : 01-2119444321-51
Product code : DLM-1109
Formula : (CH₃)₃COD
Synonyms : 2-Methyl-2-propanol / Trimethyl carbinol / tert-Butyl alcohol

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

1.2.1. Relevant identified uses

Intended for general public
Main use category : Professional use
Industrial/Professional use spec : For professional use only.

1.2.2. Uses advised against

No additional information available

1.3. Details of the supplier of the safety data sheet

Cambridge Isotope Laboratories, Inc.
50 Frontage Road
Andover, MA 01810
USA
USA: 1-800-322-1174 Int: 1-978-749-8000
cilsales@isotope.com www.isotope.com

Emergency telephone number

Emergency numbers:

Chemtrec: 1-800-424-9300 (24 hours)
International: 1-703-741-5970 (24 hours)

SECTION 2: Hazards identification

2.1. Classification of the substance or mixture

Classification according to Regulation (EC) No. 1272/2008 [CLP]

Flam. Liq. 2 H225
Acute Tox. 4 (Inhalation:dust,mist) H332
Eye Irrit. 2 H319
STOT SE 3 H335
STOT SE 3 H336

Full text of H-phrases: see section 16

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

F; R11
Xi; R36/37
Xn; R20
R67

Full text of R-phrases: see section 16

Classification (GHS-US)

Flam. Liq. 2 H225
Acute Tox. 4 (Inhalation) H332
Eye Irrit. 2A H319
STOT SE 3 H336
STOT SE 3 H335

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Adverse physicochemical, human health and environmental effects

Central nervous system, Kidney, Liver, Bladder, Thyroid.

2.2. Label elements

Labeling according to Regulation (EC) No. 1272/2008 [CLP]

Hazard pictograms (CLP) :



Signal word (CLP) :

Danger

Hazard statements (CLP) :

H225 - Highly flammable liquid and vapor
H319 - Causes serious eye irritation
H332 - Harmful if inhaled
H335 - May cause respiratory irritation
H336 - May cause drowsiness or dizziness

Precautionary statements (CLP) :

P210 - Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking
P233 - Keep container tightly closed
P240 - Ground/bond container and receiving equipment
P241 - Use explosion-proof electrical, lighting, ventilating equipment
P261 - Avoid breathing dust, fume, gas, mist, spray, vapors
P264 - Wash Both hands thoroughly after handling
P271 - Use only outdoors or in a well-ventilated area
P280 - Wear protective clothing, protective gloves

GHS-US labeling

Hazard pictograms (GHS-US) :



Signal word (GHS-US) :

Danger

Hazard statements (GHS-US) :

H225 - Highly flammable liquid and vapor
H319 - Causes serious eye irritation
H332 - Harmful if inhaled
H335 - May cause respiratory irritation
H336 - May cause drowsiness or dizziness

Precautionary statements (GHS-US) :

P210 - Keep away from heat, hot surfaces, open flames, sparks. - No smoking
P233 - Keep container tightly closed
P240 - Ground/bond container and receiving equipment
P241 - Use explosion-proof electrical, lighting, ventilating equipment
P242 - Use only non-sparking tools
P243 - Take precautionary measures against static discharge
P261 - Avoid breathing dust, fume, mist, gas, spray, vapors
P264 - Wash Both hands thoroughly after handling
P271 - Use only outdoors or in a well-ventilated area
P280 - Wear protective clothing, protective gloves
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 victim to fresh air and keep at rest in a position comfortable for breathing
P305+P351+P338 - If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
P312 - Call a POISON CENTER/doctor/physician if you feel unwell
P337+P313 - If eye irritation persists: Get medical advice/attention
P370+P378 - In case of fire: Use Alcohol resistant foam., Carbon dioxide., Water spray for extinction
P403+P233 - Store in a well-ventilated place. Keep container tightly closed
P403+P235 - Store in a well-ventilated place. Keep cool
P405 - Store locked up
P501 - Dispose of contents/container to Comply with applicable regulations.

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2.3. Other hazards

No additional information available

SECTION 3: Composition/information on ingredients

3.1. Substances

Name	Product identifier	%	Classification according to Directive 67/548/EEC
TERT-BUTANOL (ANHYDROUS) (OD, 99%) (Main constituent)	(CAS No) 3972-25-6 (EC no) 200-889-7 (Unlabeled) (EC index no) 603-005-00-1 (Unlabeled) (REACH-no) 01-2119444321-51	100	F: R11 Xi; R36/37 Xn; R20 R67

Name	Product identifier	%	Classification according to Regulation (EC) No. 1272/2008 [CLP]
TERT-BUTANOL (ANHYDROUS) (OD, 99%) (Main constituent)	(CAS No) 3972-25-6 (EC no) 200-889-7 (Unlabeled) (EC index no) 603-005-00-1 (Unlabeled) (REACH-no) 01-2119444321-51	100	Flam. Liq. 2, H225 Acute Tox. 4 (Inhalation:dust,mist), H332 Eye Irrit. 2, H319 STOT SE 3, H335 STOT SE 3, H336

Full text of R-, H- and EUH-phrases: see section 16

Name	Product identifier	%	Classification (GHS-US)
TERT-BUTANOL (ANHYDROUS) (OD, 99%) (Main constituent)	(CAS No) 3972-25-6	100	Flam. Liq. 2, H225 Acute Tox. 4 (Inhalation), H332 Eye Irrit. 2A, H319 STOT SE 3, H336 STOT SE 3, H335

Full text of H-phrases: see section 16

3.2. Mixtures

Not applicable

SECTION 4: First aid measures

4.1. Description of first aid measures

First-aid measures general	: Consult a physician. Show this safety data sheet to the doctor in attendance. Move out of dangerous area.
First-aid measures after inhalation	: If breathed in, move person to fresh air. If not breathing, give artificial respiration. Consult a physician.
First-aid measures after skin contact	: Wash off with soap and plenty of water. Consult a physician.
First-aid measures after eye contact	: Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.
First-aid measures after ingestion	: Do NOT induce vomiting. 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

Symptoms/injuries after inhalation	: May be harmful if inhaled. Causes respiratory tract irritation.
Symptoms/injuries after skin contact	: May be harmful if absorbed through skin. Causes skin irritation.
Symptoms/injuries after eye contact	: Causes eye irritation.
Symptoms/injuries after ingestion	: May be harmful if swallowed.

4.3. Indication of any immediate medical attention and special treatment needed

No additional information available

SECTION 5: Firefighting measures

5.1. Extinguishing media

suitable extinguishing media : Use water spray, alcohol-resistant foam, dry chemical, or carbon dioxide.

5.2. Special hazards arising from the substance or mixture

Explosion hazard	: Flash back possible over considerable distance. Container explosion may occur under fire conditions.
Reactivity	: Vapors may form explosive mixture with air.

5.3. Advice for firefighters

Firefighting instructions	: Wear self contained breathing apparatus for fire fighting if necessary.
Protection during firefighting	: Do not enter fire area without proper protective equipment, including respiratory protection.
Other information	: In case of fire: Evacuate area. Fight fire remotely due to the risk of explosion. Use water spray to cool unopened containers.

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SECTION 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

6.1.1. For non-emergency personnel

Emergency procedures : Use personal protective equipment. Avoid breathing vapors, mist or gas. Ensure adequate ventilation. Remove all sources of ignition. Evacuate personnel to safe areas. Beware of vapours accumulating to form explosive concentrations. Vapours can accumulate in low areas.

6.1.2. For emergency responders

No additional information available

6.2. Environmental precautions

Prevent further leakage or spillage if safe to do so. Do not let product enter drains.

6.3. Methods and material for containment and cleaning up

For containment : Contain spillage, and then collect with an electrically protected vacuum cleaner or by wet-brushing and place in container for disposal according to local regulations.

6.4. Reference to other sections

No additional information available

SECTION 7: Handling and storage

7.1. Precautions for safe handling

Additional hazards when processed : Avoid contact with skin and eyes. Avoid inhalation of vapour or mist. Keep away from sources of ignition - No smoking. Take measures to prevent build up of electrostatic charge.

Hygiene measures : Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

7.2. Conditions for safe storage, including any incompatibilities

Technical measures : 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.

Storage conditions : Store at room temperature away from light and moisture.

7.3. Specific end use(s)

No additional information available

SECTION 8: Exposure controls/personal protection

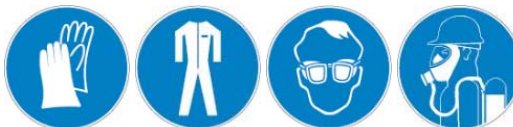
8.1. Control parameters

TERT-BUTANOL (ANHYDROUS) (OD, 99%) (3972-25-6)		
Italy - Portugal - USA ACGIH	ACGIH TWA (ppm)	100.0000000000 ppm Central Nervous System impairment. Not classifiable as a human carcinogen.
USA OSHA	OSHA PEL (TWA) (ppm)	100.0000000000 ppm
USA OSHA	OSHA PEL (STEL) (ppm)	150.0000000000 ppm

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.

Personal protective equipment : Gloves. Protective clothing. Protective goggles. Self-contained breathing apparatus.



Hand protection : Wear suitable protective clothing and gloves.

Eye protection : Wear safety glasses with side shields (or goggles) and a face shield.

Skin and body protection : Choose body protection according to the amount and concentration of the dangerous substance at the work place.

Respiratory protection : When appropriate, use NIOSH/CEN approved respirator.

SECTION 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties

Physical state : Liquid
Appearance : Liquid.
Molecular mass : 75.13 g/mol (Labeled)
Color : Clear to pale yellow.
Odor : No data available.
Odor threshold : No data available

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pH	: No data available
Relative evaporation rate (butyl acetate=1)	: No data available
Melting point	: 23 - 26 °C (73 - 79 °F)
Freezing point	: No data available
Boiling point	: 83 °C (181 °F)
Flash point	: 11 °C (52 °F) - closed cup
Self ignition temperature	: No data available
Decomposition temperature	: No data available
Flammability (solid, gas)	: No data available
Vapor pressure	: 41 hPa (31 mmHg) at 20 °C (68 °F); 59 hPa (44 mmHg) at 26 °C (79 °F)
Relative vapor density at 20 °C	: 2.56 (Air = 1.0)
Relative density	: No data available
Density	: 0.775 g/ml at 25 °C (77 °F)
Solubility	: Water: Completely miscible
Log Pow	: No data available
Log Kow	: No data available
Viscosity, kinematic	: No data available
Viscosity, dynamic	: No data available
Explosive properties	: No data available
Oxidizing properties	: No data available
Explosive limits	: 2.4 - 8 %

9.2. Other information

No additional information available

SECTION 10: Stability and reactivity

10.1. Reactivity

Vapors may form explosive mixture with air.

10.2. Chemical stability

Stable if stored under recommended conditions.

10.3. Possibility of hazardous reactions

No additional information available

10.4. Conditions to avoid

Heat, flames and sparks.

10.5. Incompatible materials

Strong oxidizing agents, Copper, Alkali metals, Aluminum.

10.6. Hazardous decomposition products

carbon oxides.

SECTION 11: Toxicological information

11.1. Information on toxicological effects

Acute toxicity : Harmful if inhaled.

TERT-BUTANOL (ANHYDROUS) (OD, 99%) (3972-25-6)	
LD50 oral rat	2743 mg/kg Remarks: Sense Organs and Special Senses (Nose, Eye, Ear, and Taste): Eye: Lacrimation. Respiratory disorder. Gastrointestinal: Other changes.
LD50 dermal rabbit	> 2000 mg/kg Remarks: prolonged skin contact may cause skin irritation and/or dermatitis. Behavioral: Ataxia.
LC50 inhalation rat (ppm)	> 1000 ppm/4h Remarks: Behavioral: Ataxia. Lungs, Thorax, or Respiration: Dyspnea. Lungs, Thorax, or Respiration: Pulmonary emboli.
ATE (oral)	2743.000 mg/kg body weight
ATE (dust, mist)	1.500 mg/l/4h

Skin corrosion/irritation	: Not classified Skin - rabbit - Mild skin irritation - 24 h
Serious eye damage/irritation	: Causes serious eye irritation. Eyes - Rabbit Result: Irritating to eyes - 24 h
Respiratory or skin sensitization	: Maximisation Test - guinea pig - OECD Test Guideline 406 - Did not cause sensitization on laboratory animals. No data available

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Germ cell mutagenicity	: Not available
Carcinogenicity	: This product is or contains a component that is not classifiable as to its carcinogenicity on its IARC, ACGIH, NTP, or EPA classification.
Reproductive toxicity	: Not available
Specific target organ toxicity (single exposure)	: May cause respiratory irritation. May cause drowsiness or dizziness. Inhalation - May cause respiratory irritation. May cause drowsiness or dizziness.
Specific target organ toxicity (repeated exposure)	: Not classified No data available
Aspiration hazard	: Not classified
Potential Adverse human health effects and symptoms	: Skin dryness or cracking. Skin irritation. Liver - Irregularities - Based on Human Evidence.
Symptoms/injuries after inhalation	: May be harmful if inhaled. Causes respiratory tract irritation.
Symptoms/injuries after skin contact	: May be harmful if absorbed through skin. Causes skin irritation.
Symptoms/injuries after eye contact	: Causes eye irritation.
Symptoms/injuries after ingestion	: May be harmful if swallowed.

SECTION 12: Ecological information

12.1. Toxicity

TERT-BUTANOL (ANHYDROUS) (OD, 99%) (3972-25-6)	
LC50 fish 1	6140 mg/l Pimephales promelas (fathead minnow) - 96 h
EC50 Daphnia 1	933 mg/l Daphnia magna (Water flea) - 48 h

12.2. Persistence and degradability

TERT-BUTANOL (ANHYDROUS) (OD, 99%) (3972-25-6)	
Biodegradation	> 99.9 % Readily biodegradable. Zahn-Wellens Test - Exposure time 19 d

12.3. Bioaccumulative potential

TERT-BUTANOL (ANHYDROUS) (OD, 99%) (3972-25-6)	
Bioaccumulative potential	Does not bioaccumulate.

12.4. Mobility in soil

TERT-BUTANOL (ANHYDROUS) (OD, 99%) (3972-25-6)	
Ecology - soil	Not available.

12.5. Results of PBT and vPvB assessment

No additional information available

12.6. Other adverse effects

Other adverse effects : Not available.

SECTION 13: Disposal considerations

13.1. Waste treatment methods

Regional legislation (waste)	: Waste materials should be disposed of under conditions which meet Federal, State, and Local environmental control regulations.
Waste disposal recommendations	: Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material.
Ecology - waste materials	: Dispose of as unused product.

SECTION 14: Transport information

In accordance with ADR / RID / ADN R / IMDG / ICAO / IATA

14.1. UN number

UN-No.(DOT)	: 1120
DOT NA no.	UN1120

14.2. UN proper shipping name

DOT Proper Shipping Name	: Butanol
Department of Transportation (DOT) Hazard Classes	: 3 - Class 3 - Flammable and combustible liquid 49 CFR 173.120

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Hazard labels (DOT) : 3 - Flammable liquid



Packing group (DOT) : II - Medium Danger

DOT Special Provisions (49 CFR 172.102) : IB2 - Authorized IBCs: Metal (31A, 31B and 31N); Rigid plastics (31H1 and 31H2); Composite (31HZ1). Additional Requirement: Only liquids with a vapor pressure less than or equal to 110 kPa at 50 C (1.1 bar at 122 F), or 130 kPa at 55 C (1.3 bar at 131 F) are authorized.
T4 - 2.65 178.274(d)(2) Normal..... 178.275(d)(3)
TP1 - The maximum degree of filling must not exceed the degree of filling determined by the following: Degree of filling = $97 / 1 + a (tr - tf)$ Where: tr is the maximum mean bulk temperature during transport, and tf is the temperature in degrees celsius of the liquid during filling.
TP29 - A portable tank having a minimum test pressure of 1.5 bar (150.0 kPa) may be used provided the calculated test pressure is 1.5 bar or less based on the MAWP of the hazardous materials, as defined in 178.275 of this subchapter, where the test pressure is 1.5 times the MAWP.

DOT Packaging Exceptions (49 CFR 173.xxx) : 150

DOT Packaging Non Bulk (49 CFR 173.xxx) : 202

DOT Packaging Bulk (49 CFR 173.xxx) : 242

Marine pollutant : No

14.3. Additional information

Other information : No supplementary information available.

Overland transport

Packing group (ADR) : II

Class (ADR) : 3 - Flammable liquid

Hazard identification number (Kemler No.) : 33

Classification code (ADR) : F1

Danger labels (ADR) : 3 - Flammable liquids



Orange plates : An orange rectangular plate with a black border. It contains the hazard number '33' in the top half and the identification number '1120' in the bottom half, both in black text.

Tunnel restriction code : D/E

Limited quantities (ADR) : 1L

EAC : •2YE

Excepted quantities (ADR) : E2

Transport by sea

DOT Vessel Stowage Location : B - (i) The material may be stowed "on deck" or "under deck" on a cargo vessel and on a passenger vessel carrying a number of passengers limited to not more than the larger of 25 passengers, or one passenger per each 3 m of overall vessel length; and (ii) "On deck only" on passenger vessels in which the number of passengers specified in paragraph (k)(2)(i) of this section is exceeded.

MFAG-No : 129

Air transport

DOT Quantity Limitations Passenger aircraft/rail (49 CFR 173.27) : 5 L

DOT Quantity Limitations Cargo aircraft only (49 CFR 175.75) : 60 L

Civil Aeronautics Law : Flammable liquids

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14.4. Environmental hazards

Other information : No supplementary information available.

14.5. Special precautions for user

14.6. Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code

Not applicable

SECTION 15: Regulatory information

15.1. US Federal regulations

TERT-BUTANOL (ANHYDROUS) (OD, 99%) (3972-25-6)

Listed on SARA Section 313 (Specific toxic chemical listings)

SARA Section 311/312 Hazard Classes

Fire hazard
Immediate (acute) health hazard
Delayed (chronic) health hazard

15.2. International regulations

CANADA

TERT-BUTANOL (ANHYDROUS) (OD, 99%) (3972-25-6)

Listed on the Canadian DSL (Domestic Substances List) inventory.

15.2.1. National regulations

No additional information available

15.3. US State regulations

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State or local regulations

U.S. - Massachusetts - Right To Know List
U.S. - Pennsylvania - RTK (Right to Know) List
U.S. - New Jersey - Right to Know Hazardous Substance List
This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

SECTION 16: Other information

Other information : This product is not radioactive. The data given for this product are those of the corresponding unlabeled compound, unless specifically indicated otherwise. Health and safety data for labeled compounds are generally not available, but are assumed to be similar or identical to the corresponding unlabeled compound.

Full text of R-, H- and EUH-phrases::

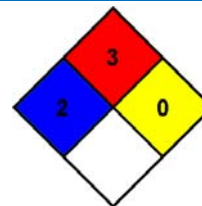
Acute Tox. 4 (Inhalation:dust,mist)	Acute toxicity (inhalation:dust,mist) Category 4
Eye Irrit. 2	Serious eye damage/eye irritation Category 2
Flam. Liq. 2	Flammable liquids Category 2
STOT SE 3	Specific target organ toxicity (single exposure) Category 3
STOT SE 3	Specific target organ toxicity (single exposure) Category 3
H225	Highly flammable liquid and vapor
H319	Causes serious eye irritation
H332	Harmful if inhaled
H335	May cause respiratory irritation
H336	May cause drowsiness or dizziness
R11	Highly flammable
R20	Harmful by inhalation
R36/37	Irritating to eyes and respiratory system
R67	Vapors may cause drowsiness and dizziness
F	Highly flammable
Xi	Irritant
Xn	Harmful

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- NFPA health hazard : 2 - Intense or continued exposure could cause temporary incapacitation or possible residual injury unless prompt medical attention is given.
- NFPA fire hazard : 3 - Liquids and solids that can be ignited under almost all ambient conditions.
- NFPA reactivity : 0 - Normally stable, even under fire exposure conditions, and are not reactive with water.



HMIS III Rating

- Health : 2 Moderate Hazard - Temporary or minor injury may occur
- Flammability : 3 Serious Hazard
- Physical : 0 Minimal Hazard

CIL Multi-Solvent Mixture SDS

This information is based on our current knowledge and is intended to describe the product for the purposes of health, safety and environmental requirements only. It should not therefore be construed as guaranteeing any specific property of the product