

# SAFETY DATA SHEETS

According to Globally Harmonized System of Classification and Labelling of Chemicals (GHS) - Sixth revised edition

Version: 1.0

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## 1. Identification

### 1.1 GHS Product identifier

Product name            tert-butanol

### 1.2 Other means of identification

Product number        -

Other names            2-Propanol, 2-methyl-

### 1.3 Recommended use of the chemical and restrictions on use

Identified uses        For industry use only. Food additives -> Flavoring Agents

Uses advised against   no data available

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## 2. Hazard identification

### 2.1 Classification of the substance or mixture

Flammable liquids, Category 2

Eye irritation, Category 2

Acute toxicity - Inhalation, Category 4

Specific target organ toxicity – single exposure, Category 3

### 2.2 GHS label elements, including precautionary statements

Pictogram(s)



Signal word

Danger

Hazard statement(s)

H225 Highly flammable liquid and vapour

H319 Causes serious eye irritation

H332 Harmful if inhaled

H335 May cause respiratory irritation

Precautionary statement(s)

Prevention

P210 Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.

P233 Keep container tightly closed.

P240 Ground and bond container and receiving equipment.

P241 Use explosion-proof [electrical/ventilating/lighting/...] equipment.

P242 Use non-sparking tools.

P243 Take action to prevent static discharges.

P280 Wear protective gloves/protective clothing/eye protection/face protection.

P264 Wash ... thoroughly after handling.

P261 Avoid breathing dust/fume/gas/mist/vapours/spray.

P271 Use only outdoors or in a well-ventilated area.

Response

P303+P361+P353 IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water [or shower].

P370+P378 In case of fire: Use ... to extinguish.

P305+P351+P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.

P337+P313 If eye irritation persists: Get medical advice/attention.

P304+P340 IF INHALED: Remove person to fresh air and keep comfortable for breathing.

P312 Call a POISON CENTER/doctor/...if you feel unwell.

#### Storage

P403+P235 Store in a well-ventilated place. Keep cool.

P403+P233 Store in a well-ventilated place. Keep container tightly closed.

P405 Store locked up.

#### Disposal

P501 Dispose of contents/container to ...

### 2.3 Other hazards which do not result in classification

none

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## 3. Composition/information on ingredients

### 3.1 Substances

Chemical name	Common names and synonyms	CAS number	EC number	Concentration
tert-butanol	tert-butanol	75-65-0	none	100%

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## 4. First-aid measures

### 4.1 Description of necessary first-aid measures

General advice

Consult a physician. Show this safety data sheet to the doctor in attendance.

If inhaled

Fresh air, rest. Refer for medical attention.

In case of skin contact

Remove contaminated clothes. Rinse skin with plenty of water or shower.

In case of eye contact

First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then refer for medical attention.

If swallowed

Rinse mouth. Give one or two glasses of water to drink. Do NOT induce vomiting. Refer for medical attention .

#### 4.2 Most important symptoms/effects, acute and delayed

Vapor is narcotic in action and irritating to respiratory passages. Liquid is irritating to skin and eyes. (USCG, 1999)

#### 4.3 Indication of immediate medical attention and special treatment needed, if necessary

Immediate first aid: Ensure that adequate decontamination has been carried out. If patient is not breathing, start artificial respiration, preferably with a demand-valve resuscitator, bag-valve-mask device, or pocket mask, as trained. Perform CPR as necessary. Immediately flush contaminated eyes with gently flowing water. Do not induce vomiting. If vomiting occurs, lean patient forward or place on left side (head-down position, if possible) to maintain an open airway and prevent aspiration. Keep patient quiet and maintain normal body temperature. Obtain medical attention. /Higher alcohols (>3 carbons) and related compounds/

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### 5. Fire-fighting measures

#### 5.1 Extinguishing media

Suitable extinguishing media

Flash back possible over considerable distance.

#### 5.2 Specific hazards arising from the chemical

This chemical is flammable.

#### 5.3 Special protective actions for fire-fighters

Wear self-contained breathing apparatus for firefighting if necessary.

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## 6. Accidental release measures

### 6.1 Personal precautions, protective equipment and emergency procedures

Use personal protective equipment. Avoid dust formation. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. Avoid breathing dust. For personal protection see section 8.

### 6.2 Environmental precautions

Remove all ignition sources. Evacuate danger area! Consult an expert! Personal protection: self-contained breathing apparatus. Ventilation. Collect leaking liquid in sealable containers. Absorb remaining liquid in sand or inert absorbent. Then store and dispose of according to local regulations. Wash away remainder with plenty of water.

### 6.3 Methods and materials for containment and cleaning up

Personal precautions: 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 vapors accumulating to form explosive concentrations. Vapors can accumulate in low areas. Environmental precautions: Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Methods and materials for containment and cleaning up: 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.

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## 7. Handling and storage

### 7.1 Precautions for safe handling

Avoid contact with skin and eyes. Avoid formation of dust and aerosols. Avoid exposure - obtain special instructions before use. Provide appropriate exhaust ventilation at places where dust is formed. For precautions see section 2.2.

### 7.2 Conditions for safe storage, including any incompatibilities

Fireproof. Separated from strong oxidants and strong acids. 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.

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## 8. Exposure controls/personal protection

### 8.1 Control parameters

#### Occupational Exposure limit values

Recommended Exposure Limit: 10 Hour Time-Weighted Average: 100 ppm (300 mg/cu m).

Recommended Exposure Limit: 15 Minute Short-Term Exposure Limit: 150 ppm (450 mg/cu m).

#### Biological limit values

no data available

### 8.2 Appropriate engineering controls

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

### 8.3 Individual protection measures, such as personal protective equipment (PPE)

#### Eye/face protection

Safety glasses with side-shields conforming to EN166. Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

#### Skin protection

Wear impervious clothing. The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace. 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. The selected protective gloves have to satisfy the specifications of EU Directive 89/686/EEC and the standard EN 374 derived from it.

#### Respiratory protection

Wear dust mask when handling large quantities.

#### Thermal hazards

no data available

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## 9. Physical and chemical properties

Physical state	colorless, non-corrosive liquid
Colour	A colorless liquid, which forms rhombic crystals melting at 25 to 25.5°C
Odour	Camphor-like odor
Melting point/ freezing point	23-26°C
Boiling point or initial boiling point and boiling range	83°C(lit.)
Flammability	Combustible Solid Class IB Flammable Liquid: Fl.P. below 22.78°C and BP at or above 37.78°C. Highly flammable.
Lower and upper explosion limit / flammability limit	Lower flammable limit: 2.4% by volume; Upper flammable limit: 8.0% by volume
Flash point	11°C
Auto-ignition temperature	480°C
Decomposition temperature	no data available
pH	no data available
Kinematic viscosity	no data available
Solubility	In water:soluble
Partition coefficient n-octanol/water (log value)	log Kow = 0.35
Vapour pressure	31 mm Hg ( 20 °C)
Density and/or relative density	0.775g/mL at 25°C(lit.)
Relative vapour density	2.55 (vs air)
Particle characteristics	no data available

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## 10. Stability and reactivity

### 10.1 Reactivity

no data available

## 10.2 Chemical stability

Heat /contributes to instability/

## 10.3 Possibility of hazardous reactions

Highly flammable liquid and vapor. The vapour mixes well with air, explosive mixtures are easily formed. Attacks plastics. [Handling Chemicals Safely 1980. p. 236]. Acetyl bromide reacts violently with alcohols or water [Merck 11th ed. 1989]. Mixtures of alcohols with concentrated sulfuric acid and strong hydrogen peroxide can cause explosions. Example: an explosion will occur if dimethylbenzylcarbinol is added to 90% hydrogen peroxide then acidified with concentrated sulfuric acid. Mixtures of ethyl alcohol with concentrated hydrogen peroxide form powerful explosives. Mixtures of hydrogen peroxide and 1-phenyl-2-methyl propyl alcohol tend to explode if acidified with 70% sulfuric acid [Chem. Eng. News 45(43):73 1967; J, Org. Chem. 28:1893 1963]. Alkyl hypochlorites are violently explosive. They are readily obtained by reacting hypochlorous acid and alcohols either in aqueous solution or mixed aqueous-carbon tetrachloride solutions. Chlorine plus alcohols would similarly yield alkyl hypochlorites. They decompose in the cold and explode on exposure to sunlight or heat. Tertiary hypochlorites are less unstable than secondary or primary hypochlorites [NFPA 491 M 1991]. Base-catalysed reactions of isocyanates with alcohols should be carried out in inert solvents. Such reactions in the absence of solvents often occur with explosive violence [Wischmeyer 1969].

## 10.4 Conditions to avoid

no data available

## 10.5 Incompatible materials

Incompatible with oxidizing materials, H<sub>2</sub>O<sub>2</sub>.

## 10.6 Hazardous decomposition products

Toxic gases & vapors (e.g., carbon monoxide & isobutylene) may be released in a fire involving tert-butyl alcohol.

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## 11. Toxicological information

Acute toxicity

- Oral: LD<sub>50</sub> Rats oral 3500 mg/kg bw
- Inhalation: no data available



- Dermal: no data available

Skin corrosion/irritation

no data available

Serious eye damage/irritation

no data available

Respiratory or skin sensitization

no data available

Germ cell mutagenicity

no data available

Carcinogenicity

A4; Not classifiable as a human carcinogen.

Reproductive toxicity

no data available

STOT-single exposure

no data available

STOT-repeated exposure

no data available

Aspiration hazard

no data available

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## 12. Ecological information

### 12.1 Toxicity

- Toxicity to fish: LC50; Species: Pimephales promelas (Fathead Minnow) age 32 days, length 20.0 mm, weight 0.114 g; Conditions: freshwater, flow through, 24.8°C, pH 7.7, hardness 45.9 mg/L CaCO<sub>3</sub>, alkalinity 42.5 mg/L CaCO<sub>3</sub>, dissolved oxygen 7.2 mg/L; Concentration: 6410000 ug/L for 96 hr (95% confidence interval: 6130000-6700000 ug/L) /99.5% putiy

- Toxicity to daphnia and other aquatic invertebrates: EC50; Species: Daphnia magna (Water Flea); Conditions: freshwater, static; Effect: equilibrium; Concentration: 5050000 ug/L for 24 hr /formulated product
- Toxicity to algae: no data available
- Toxicity to microorganisms: no data available

## 12.2 Persistence and degradability

AEROBIC: t-Butyl alcohol, present at 100 mg/L, achieved 2.5% of its theoretical BOD in 2 weeks using an activated sludge inoculum at 30 mg/L in the Japanese MITI test(1). The biodegradation half-life of t-butyl alcohol was reported to range from about 28 to 180 days in aerobic water and 100 to 500 days in anaerobic water(2). t-Butyl alcohol reached 1% of its theoretical BOD using a sewage sludge during a 5 day incubation period(3). Using a river die-away test, t-butyl alcohol achieved 4% of its theoretical BOD in 12 days(4). t-Butyl alcohol, present at 50 mg/L, achieved 7% of its theoretical BOD in 2 weeks using an activated sludge inoculum at 30 mg/L in the Japanese MITI test(5). Approximately 96% dissolved organic carbon was removed over a 6 day incubation period using the Zahn-Wellens test, meant to simulate degradation at an industrial sewage treatment plant(5). Using an activated sludge in a prolonged closed bottle biodegradation test, t-butyl alcohol was degraded 10, 63 and 67% in 28, 42 and 56 days, respectively(6). Biodegradation of t-butyl alcohol in unamended soils collected at different depths had rates of <0.01 to 0.15 mg/L/day/gram dry soil(7).

## 12.3 Bioaccumulative potential

BCF values of <5 were reported for carp exposed to 6 ug/L of t-butyl alcohol during a 6 week incubation period(1). According to a classification scheme(2), this BCF suggests bioconcentration in aquatic organisms is low(SRC).

## 12.4 Mobility in soil

The Koc of t-butyl alcohol has been reported as 37 (log Koc 1.57)(1-2). According to a classification scheme(3), this Koc value suggests that t-butyl alcohol is expected to have very high mobility in soil.

## 12.5 Other adverse effects

no data available

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## 13. Disposal considerations

## 13.1 Disposal methods

### Product

The material can be disposed of by removal to a licensed chemical destruction plant or by controlled incineration with flue gas scrubbing. Do not contaminate water, foodstuffs, feed or seed by storage or disposal. Do not discharge to sewer systems.

### Contaminated packaging

Containers can be triply rinsed (or equivalent) and offered for recycling or reconditioning. Alternatively, the packaging can be punctured to make it unusable for other purposes and then be disposed of in a sanitary landfill. Controlled incineration with flue gas scrubbing is possible for combustible packaging materials.

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## 14. Transport information

### 14.1 UN Number

ADR/RID: UN1120

IMDG: UN1120

IATA: UN1120

### 14.2 UN Proper Shipping Name

ADR/RID: BUTANOLS

IMDG: BUTANOLS

IATA: BUTANOLS

### 14.3 Transport hazard class(es)

ADR/RID: 3

IMDG: 3

IATA: 3

### 14.4 Packing group, if applicable

ADR/RID: III

IMDG: III

IATA: III

### 14.5 Environmental hazards

ADR/RID: no

IMDG: no

IATA: no

### 14.6 Special precautions for user

no data available

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

no data available

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## 15. Regulatory information

### 15.1 Safety, health and environmental regulations specific for the product in question

Chemical name	Common names and synonyms	CAS number	EC number
tert-butanol	tert-butanol	75-65-0	none
European Inventory of Existing Commercial Chemical Substances (EINECS)			Listed.
EC Inventory			Listed.
United States Toxic Substances Control Act (TSCA) Inventory			Listed.
China Catalog of Hazardous chemicals 2015			Listed.
New Zealand Inventory of Chemicals (NZIoC)			Listed.
Philippines Inventory of Chemicals and Chemical Substances (PICCS)			Listed.
Vietnam National Chemical Inventory			Listed.
Chinese Chemical Inventory of Existing Chemical Substances (China IECSC)			Listed.

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## 16. Other information

### Information on revision

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### Abbreviations and acronyms

- CAS: Chemical Abstracts Service
- ADR: European Agreement concerning the International Carriage of Dangerous Goods by Road
- RID: Regulation concerning the International Carriage of Dangerous Goods by Rail
- IMDG: International Maritime Dangerous Goods
- IATA: International Air Transportation Association
- TWA: Time Weighted Average
- STEL: Short term exposure limit

- LC50: Lethal Concentration 50%
- LD50: Lethal Dose 50%
- EC50: Effective Concentration 50%

## References

- IPCS - The International Chemical Safety Cards (ICSC), website:  
<http://www.ilo.org/dyn/icsc/showcard.home>
- HSDB - Hazardous Substances Data Bank, website:  
<https://toxnet.nlm.nih.gov/newtoxnet/hsdb.htm>
- IARC - International Agency for Research on Cancer, website:  
<http://www.iarc.fr/>
- eChemPortal - The Global Portal to Information on Chemical Substances by OECD, website:  
[http://www.echemportal.org/echemportal/index?pageID=0&request\\_locale=en](http://www.echemportal.org/echemportal/index?pageID=0&request_locale=en)
- CAMEO Chemicals, website:  
<http://cameochemicals.noaa.gov/search/simple>
- ChemIDplus, website:  
<http://chem.sis.nlm.nih.gov/chemidplus/chemidlite.jsp>
- ERG - Emergency Response Guidebook by U.S. Department of Transportation, website: <http://www.phmsa.dot.gov/hazmat/library/erg>
- Germany GESTIS-database on hazard substance, website:  
<http://www.dguv.de/ifa/gestis/gestis-stoffdatenbank/index-2.jsp>
- ECHA - European Chemicals Agency, website: <https://echa.europa.eu/>

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