

Product Stewardship Summary

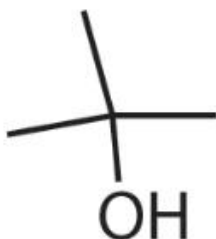
Tertiary Butyl Alcohol

General Statement

Tertiary butyl alcohol is a chemical used in coating products, washing & cleaning products, adhesives and sealants, fuels, lubricants and greases, fillers, putties, plasters, and modeling clay. Tertiary butyl alcohol is a low to moderate hazard material and risk of adverse health effects associated with both occupational and consumer use of this chemical is anticipated to be low.

Chemical Identity

Name: Tertiary Butyl Alcohol
Brand Names: Not Applicable
Chemical name (IUPAC): 2-methylpropan-2-ol
CAS number(s): 75-65-0
EC number: 200-889-7
Molecular formula: C₄H₁₀O
Structure:



Uses and Applications

Tertiary butyl alcohol is primarily utilized for its solvent power and fuel oxygenates. It is used for the removal of water from substances, in the extraction of drugs, in the manufacture of perfumes, in the recrystallization of chemicals, and as a chemical intermediate. It is an authorized denaturant for ethyl alcohol and for several specially denatured alcohols.



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Physical/Chemical Properties

Phys/Chem Safety Assessment

| Property | Value |
|--|------------------------------------|
| Form | Crystalline |
| Physical state | Liquid |
| Color | Colorless |
| Odor | Camphor-like odor |
| Density | 0.7825 g/cm ³ @ 26.00°C |
| Melting / boiling point | 25.7°C / 82.41°C |
| Flammability | No data available |
| Explosive properties | No data available |
| Self-ignition temperature | No data available |
| Vapor pressure | 5.426 kPa @ 25°C |
| Mol weight | 74.12 g/mol |
| Water solubility | 10 ⁶ mg/L @ 25°C |
| Flash point | 11.11°C |
| Octanol-water partition coefficient (Log _{k_{ow}}) | 0.35 |

Exposure, Hazard and Safety Assessment

The following section describes possible exposure scenarios and hazards associated with tertiary butyl alcohol. The exposure assessment describes both the amount of and the frequency with which a chemical substance reaches a person, a population of people, or the environment. Hazard refers to the inherent properties of a substance that make it capable of causing harm to human health or the environment. The safety assessments, below, report the possibility of a harmful event arising from exposure to a chemical or physical agent under specific conditions. Just because a substance may possess potentially harmful properties does not mean that it automatically poses a risk. It is not possible to make that determination without understanding the nature of the exposure.

Human Health Effects

Human Exposure Assessment

Consumer: Tertiary butyl alcohol is used in fuels and fuel additives, chemical intermediates, and laboratory chemicals. The most likely way for a consumer to be exposed to tertiary butyl alcohol is by breathing in vapors off-gassing from products or from using solvents that contain tertiary butyl alcohol.

Worker: In industrial settings, tertiary butyl alcohol is manufactured and handled in closed processes as much as possible, which ensures that worker exposure to tertiary butyl alcohol is minimized. The proper use of personal protective equipment during loading, unloading, sampling or during maintenance operations, will further minimize potential exposures to tertiary butyl alcohol.

Human Hazard Assessment:

Tertiary butyl alcohol has low potential to elicit both acute and repeat dose toxicity. It can cause mild skin and serious eye irritation. Inhalation can cause respiratory irritation, drowsiness or dizziness. Tertiary butyl alcohol is neither mutagenic or genotoxic, is not classifiable as to human carcinogenicity and is not associated with adverse effects on fertility or development.

| Effect Assessment | Result |
|--|---|
| Acute Toxicity Oral / inhalation / dermal | Low toxicity for oral, dermal and inhalation exposures. |
| Irritation / corrosion Skin / eye / respiratory test | Causes mild skin irritation. Causes serious eye irritation. Not a skin sensitizer. |
| Toxicity after repeated exposure Oral / inhalation / dermal | Inhalation - May cause respiratory irritation, drowsiness or dizziness. Chronic animal exposure studies have indicated adverse effects on the kidney, urinary bladder and thyroid gland. No chronic systemic effects have been reported in humans. |
| Genotoxicity / Mutagenicity | Neither mutagenic or genotoxic. |
| Carcinogenicity | Not classifiable as to human carcinogenicity. |
| Reproductive Toxicity | No adverse effect on fertility and development. |

Human Health Safety Assessment

Consumer: Consumers may be exposed to tertiary butyl alcohol when using fuels and fuel additives, chemical intermediates, laboratory chemicals and solvents that contain tertiary butyl alcohol. When working with formulations that contain appreciable concentrations of tertiary butyl alcohol, safety glasses should be worn and care should be taken to ensure sufficient ventilation exists. In addition, repeat or prolonged skin contact should be avoided. The use of appropriate handling and disposal methods will ensure that consumer exposure and subsequent risk associated with the use of products containing tertiary butyl alcohol is unlikely.

Worker: In industrial settings, tertiary butyl alcohol is manufactured and handled primarily in closed processes which limit exposure. Based on good manufacturing processes and industrial hygiene the occupational health risk associated with tertiary butyl alcohol is low.

Environmental Effects

Environmental Exposures

Tertiary butyl alcohol is inherently biodegradable and has low potential for bioaccumulation. It has a high water solubility and high potential for volatilization. Based on its physical and chemical properties, tertiary butyl alcohol is expected to have very high mobility in soil and volatilization from water or soil surfaces is expected to be an important fate and transport process.

Environmental Hazard Assessment

| Effect Assessment | Result |
|-------------------|---|
| Aquatic Toxicity | Low toxicity to fish, aquatic invertebrates, algae, and bacteria. |

| Fate and behavior | Result |
|---------------------------|---|
| Biodegradation | Inherently biodegradable. |
| Bioaccumulation potential | Not potentially bioaccumulative ($\log K_{ow} = 0.35$). |
| PBT / vPvB conclusion | Not considered to be either PBT or vPvB. |

Environmental Safety Assessment

If released into the environment, tertiary butyl alcohol is anticipated to have a minimal effect on the aquatic environment due to its low aquatic toxicity. It is inherently biodegradable and has a low potential for bioaccumulation.

Risk Management Recommendations

Exposure to tertiary butyl alcohol in the workplace can be controlled by sufficient ventilation, proper handling and storage techniques, and the use of appropriate personal protective equipment as recommended in the SDS. Consumer products that contain significant levels of tertiary butyl alcohol should include appropriate safety labeling and provide applicable handling and disposal methods.

A selection of occupational exposure limits are provided below:

- ACGIH TLV: (8h TWA): 100 ppm -central nervous system impairment
- NIOSH REL-TWA: 100ppm (300mg/m³)
- NIOSH REL ST: 150ppm (450 mg/m³)
- OSHA OEL TWA: 100ppm (300mg/m³)

Regulatory Agency Review

Tertiary butyl alcohol is on the following lists:

ACGIH - Threshold Limit Values (TLVs)

Alberta - Occupational Exposure Limits (OELs)

Argentina - Occupational Exposure Limits (OELs)

Arizona DOSH - Exposure Limits for Air Contaminants - Table Z-1

ATSDR - 2015 Priority List of Hazardous Substances - Exposure Points

ATSDR - 2015 Priority List of Hazardous Substances - Frequency Points

ATSDR - 2015 Priority List of Hazardous Substances - Rank and Summary

ATSDR - 2015 Priority List of Hazardous Substances - Source Contribution Points

ATSDR - 2015 Priority List of Hazardous Substances - Toxicity Points

ATSDR - Completed Exposure Pathway (CEP) Cumulative Site Count Report

Australia - Workplace Exposure Standards

Australian Inventory of Chemical Substances (AICS)

Austria - Occupational Exposure Limits (OELs)

Belgium - Occupational Exposure Limits (OELs)

British Columbia - Occupational Exposure Limits (OELs)

Bulgaria - Occupational Exposure Limits (OELs)

Cal/EPA - Safer Consumer Products Regulation - Candidate Chemicals and Chemical Groups

Cal/OSHA - Permissible Exposure Limits for Chemical Contaminants

Cal/OSHA - The Hazardous Substances List

Carcinogenic Potency Database (CPDB) - Summary of Carcinogenicity Results - Rats and Mice

China - Chemical Inventory of Existing Chemical Substances (IECSC) - CAS Numbers

Colombia - Occupational Exposure Limits (OELs)

Connecticut OSHA - Exposure Limits for Air Contaminants - Table Z-1

Denmark - Occupational Exposure Limits (OELs)

DOE Protective Action Criteria (PAC)

ECHA - Draft Community Rolling Action Plan (CoRAP) (2013-2015)

ECHA - List of Pre-registered Substances

Environment Canada - Chemical Management Plan - Status of Prioritized Substances

Environment Canada - Domestic Substances List (DSL)

Environment Canada - Domestic Substances List (DSL) - Persistent Categorization

Environment Canada - Domestic Substances List (DSL) - Priorities for Human Health Categorization

Environment Canada - Domestic Substances List (DSL) Categorization of Existing Substances

Environment Canada - Hazardous Products Act (HPA) - Ingredient Disclosure List (IDL)

Environment Canada - National Pollutant Release Inventory (NPRI) – 2001-2014/15

EPA - Acute Exposure Guideline Leves (AEGs) - Priority List 2

EPA - Chemical Update System (CUS) - 2002

EPA - Clean Air Act - Section 111 - Standards of Performance for New Stationary Sources of Air Pollutants

EPA - EPCRA - Section 313 - Toxic Chemicals

EPA - Fragrance Ingredient List

EPA - Inert Ingredients - Fragrance Use

EPA - Inert Ingredients in Pesticide Products
EPA - Inert Ingredients Permitted for Use In Nonfood Pesticide Products
EPA - Master Testing List
EPA - Master Testing List (1996)
EPA - Office of Pollution Prevention and Toxics (OPPT) High Production Volume (HPV) Program - 1990
EPA - Toxics Release Inventory (TRI) Chemicals
EPA - TSCA - 8(a) - Preliminary Assessment Information Rules (PAIR)
EPA - TSCA - 8D Health and Safety Data Rule (HSDR) (d) - Listed Members of Categories
EPA - TSCA - Inventory
EPA - TSCA - Test Submissions - Mega
EPA - TSCA - Test Submissions - Section 4
EPA - Volatile Organic Chemicals - Test Method 8260C
EU - Approved Flavouring Substances
EU - Cosmetic Ingredients and Fragrance Inventory
EU - European Inventory of Existing Commercial Substances (EINECS)
EU - Table 3.1 of Annex VI to the CLP Regulation
EU - Table 3.2 of Annex VI to the CLP Regulation
FDA - Inactive Ingredients List
FDA - List of Indirect Additives
Finland - Occupational Exposure Limits (OELs)
France - Occupational Exposure Limits (OELs)
Germany - Occupational Exposure Limits (OELs)
Hawaii - Department of Labor and Industrial Relations - Air Contaminants - Permissible Exposure Limits
Iceland - Occupational Exposure Limits (OELs)
Indiana OSHA - Exposure Limits for Air Contaminants - Table Z-1
International Council of Chemical Associations (ICCA) - High Production Volume (HPV) Initiative
Iowa OSHA - Exposure Limits for Air Contaminants - Table Z-1
Japan - Occupational Exposure Limits (OELs)
Jordan - Occupational Exposure Limits (OELs)
Korea - Occupational Exposure Limits (OELs)
Maryland OSH - Exposure Limits for Air Contaminants - Table Z-1
Massachusetts Department of Public Health - Massachusetts Substance List (MSL)
Massachusetts Toxics Use Reduction Act (TURA)
Mexico - National Inventory of Chemical Substances
Mexico - Occupational Exposure Limits (OELs)
Michigan - Exposure Limits for Air Contaminants - Table G-1-A
Mine Safety and Health Administration (MSHA) - Permissible Exposure Limits (PELs)
Minnesota - Department of Labor and Industry - Air Contaminants - Permissible Exposure Limits
Minnesota - List of Hazardous Substances
Nevada OSHA - Exposure Limits for Air Contaminants - Table Z-1
New Jersey - Right to Know List
New Mexico OHSB - Exposure Limits for Air Contaminants - Table Z-1
New Zealand - Inventory of Chemicals (NZIoC)
New Zealand - Workplace Exposure Standards
NFPA - Hazard Ratings
NIOSH - Immediately Dangerous to Life or Health (IDLH) Concentration Values
NIOSH - Pocket Guide - Chemicals Listed
NIOSH - Recommendations for Chemical Protective Clothing
NIOSH - Recommended Exposure Limits (RELs)
Norway - Occupational Exposure Limits (OELs)
OECD - High Production Volume (HPV) Chemicals - 2004
OECD - High Production Volume (HPV) Chemicals - 2007
Ontario - Current Occupational Exposure Limits (OELs)
OSHA - 29 CFR 1910.1000 - Table Z-1
OSHA - 29 CFR 1910.1000 - Table Z-1 - Annotated
OSHA - Permissible Exposure Limits (PELs) - Construction
OSHA - Permissible Exposure Limits (PELs) - Federal Contractors
OSHA - Permissible Exposure Limits (PELs) - Shipyards
OSHA - Vacated Permissible Exposure Limits (PELs)
Pennsylvania - Hazardous Substance List

Peru - Occupational Exposure Limits (OELs)
Philippine Inventory of Chemicals and Chemical Substances (PICCS)
Poland - Occupational Exposure Limits (OELs)
Puerto Rico OSHA - Exposure Limits for Air Contaminants - Table Z-1
Rhode Island - Hazardous Substance List
Russia - Occupational Exposure Limits (OELs)
Singapore - Occupational Exposure Limits (OELs)
South Carolina OSH - Exposure Limits for Air Contaminants - Table Z-1
Sweden - Occupational Exposure Limits (OELs)
Switzerland - Occupational Exposure Limits (OELs)
Technischen Regeln für Gefahrstoffe (TRGS) - TRGS900
Tennessee OSHA - Exposure Limits for Air Contaminants - Table Z-1
TETRATOX - Toxicity and Chemical Descriptor Data for 500 Aliphatic Chemicals
The Netherlands - Occupational Exposure Limits (OELs)
Turkey - Occupational Exposure Limits (OELs)
United Kingdom - Occupational Exposure Limits (OELs)
United Kingdom - Workplace Exposure Limits (WELs) - 2011
USGS - Health-Based Screening Levels (HBSLs)
Utah OSH - Exposure Limits for Air Contaminants - Table Z-1
Vermont - Department of Labor - Air Contaminants - Permissible Exposure Limits
Vietnam - Occupational Exposure Limits (OELs)
Virgin Islands DOSH - Exposure Limits for Air Contaminants - Table Z-1
Virginia OSH - Exposure Limits for Air Contaminants - Table Z-1
Washington State - Permissible Exposure Limits (PELs) for Airborne Contaminants
Wyoming OSHA - Exposure Limits for Air Contaminants - Table Z-1

Regulatory Information / Classification and Labeling

Under the Globally Harmonized System for classification and labeling (GHS), substances are classified according to their physical, health, and environmental hazards. The hazards are communicated via specific labels and the (Extended) SDS. GHS attempts to standardize hazard communication so that the intended audience (workers, consumers, transport workers, and emergency responders) can better understand the hazards associated with chemicals in use.

GHS Classification:

Flammable Liquid, Category 2
Eye Irritation, Category 2
Acute toxicity, Category 4
Specific Target Organ Toxicity - Single Exposure (STOT-SE), Category 3

Hazard Statements:

H225: Highly flammable liquid and vapor
H319: Causes serious eye irritation
H332: Highly flammable liquid and vapor
H335: May cause respiratory irritation

Signal Word: Danger

Precautionary Statements:

P243: Take precautionary measures against static discharge.
P210: Keep away from heat/sparks/open flames/hot surfaces - No smoking.
P262: Do not get in eyes, on skin, or on clothing.
P280: Wear protective gloves/protective clothing/eye protection/face protection.

P261: Avoid breathing dust/fume/gas/mist/vapors/spray.
P312: Call a POISON CENTER or doctor/physician if you feel unwell.
P309: IF exposed or if you feel unwell: call a poison center or doctor/physician
P304: IF INHALED: if breathing is difficult, 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.
P370: In case of fire: Use (measures specified by manufacturer/supplier) for extinction.
P403 + P233: Store in a well-ventilated place. Keep container tightly closed.

Hazard Pictograms:



Conclusion

Tertiary butyl alcohol is a useful chemical in fuels and fuel additives, chemical intermediates, and laboratory chemicals. When handled responsibly, the potential for irritation, drowsiness or dizziness can be minimized, allowing consumers and workers to use materials containing tertiary butyl alcohol safely.

Contact Information with Company

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Additional Information

For more information on GHS, visit <http://www.osha.gov/dsg/hazcom/ghsguideoct05.pdf> or http://live.unece.org/trans/danger/publi/ghs/ghs_welcome_e.html.

Ashland product stewardship summaries are located at <http://www.ashland.com/sustainability/product/product-stewardship>

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REACH registration is specific to Importers/Manufacturers that place the chemical on the EU market, and is specific to registered uses. Inclusion on the list of REACH Registered Substances does not automatically imply registration by Ashland.

Inclusion on the New Zealand Inventory of Chemicals applies only to the pure substance listed. The importer of record must determine whether or not their substances are in compliance.