

Safety Data Sheet

according to Federal Register / Vol. 77, No. 58 / Monday, March 26, 2012 / Rules and Regulations Issue date: 12/15/2010 Revision date: 7/10/2023 Supersedes: 5/10/2017 Version: 6.0

SECTION 1: Identification

1.1. Identification

Product form : Substance

Substance name : N-BUTANOL (D10, 98%)

CAS-No. : 71-36-3
Product code : DLM-1598
Formula : C4H10O

Synonyms : Butyl alcohol / n-Butanol

1.2. Recommended use and restrictions on use

No additional information available

1.3. Supplier

Cambridge Isotope Laboratories, Inc. 50 Frontage Rd 01810

ANDOVER, MA, 01810

USA

T 1-800-322-1174

cilsales@isotope.com - www.isotope.com

1.4. Emergency telephone number

Emergency number : 1-703-741-5970

Chemtrec 1-800-424-9300 24 hours

SECTION 2: Hazard(s) identification

2.1. Classification of the substance or mixture

GHS US classification

H226 Flammable liquids Category 3 Flammable liquid and vapor Acute toxicity (oral) Category 4 Harmful if swallowed H302 Skin corrosion/irritation Category 2 H315 Causes skin irritation Serious eye damage/eye irritation Category 1 H318 Causes serious eye damage Specific target organ toxicity – Single exposure, Category 3, Narcosis H336 May cause drowsiness or dizziness Specific target organ toxicity - Single exposure, Category 3, H335 May cause respiratory irritation

Respiratory tract irritation

Full text of H statements : see section 16

2.2. GHS Label elements, including precautionary statements

GHS US labeling

Hazard pictograms (GHS US)







Signal word (GHS US) : Danger

Hazard statements (GHS US) : H226 - Flammable liquid and vapor

H302 - Harmful if swallowed H315 - Causes skin irritation

H318 - Causes serious eye damage

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Precautionary statements (GHS US)

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H335 - May cause respiratory irritation

H336 - May cause drowsiness or dizziness

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

P233 - Keep container tightly closed.

P240 - Ground/Bond container and receiving equipment.

P241 - Use explosion-proof electrical equipment.

P242 - Use only non-sparking tools.

P243 - Take precautionary measures against static discharge.

P261 - Avoid breathing vapors, spray, gas, dust.

P264 - Wash hands thoroughly after handling.

P270 - Do not eat, drink or smoke when using this product.

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

P280 - Wear protective gloves, protective clothing.

P301+P312 - If swallowed: Call a doctor if you feel unwell.

P302+P352 - If on skin: Wash with plenty of water.

P303+P361+P353 - If on skin (or hair): 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 EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.

P310 - Immediately call a doctor.

P312 - Call a doctor if you feel unwell.

P321 - Specific treatment (see Hazardous component(s) for labeling on this label).

P330 - Rinse mouth.

P332+P313 - If skin irritation occurs: Get medical advice/attention.

P362+P364 - Take off contaminated clothing and wash it before reuse.

P370+P378 - In case of fire: Use carbon dioxide (CO2), D-powder, alcohol resistant foam to extinguish.

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 hazardous or special waste collection point, in accordance with local, regional, national and/or international regulation.

2.3. Other hazards which do not result in classification

No additional information available

2.4. Unknown acute toxicity (GHS US)

Not applicable

SECTION 3: Composition/Information on ingredients

3.1. Substances

Name	Product identifier	%	GHS US classification
N-BUTANOL (D10, 98%) (Main constituent)	CAS-No.: 71-36-3	100	Flam. Liq. 3, H226 Acute Tox. 4 (Oral), H302 Skin Irrit. 2, H315 Eye Dam. 1, H318 STOT SE 3, H336 STOT SE 3, H335

Full text of hazard classes and H-statements : see section 16

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3.2. Mixtures

Not applicable

SECTION 4: First-aid measures

4.1. Description of first aid measures

First-aid measures general

First-aid measures after inhalation

First-aid measures after skin contact

First-aid measures after eye contact

First-aid measures after ingestion

: If you feel unwell, seek medical advice (show the label where possible). Evacuate danger area.

: When symptoms occur: go into open air and ventilate suspected area. If not breathing, give artificial respiration. Get medical advice/attention.

: Wash with plenty of soap and water. Get immediate medical advice/attention. Remove/Take off immediately all contaminated clothing. Wash contaminated clothing before reuse. Specific treatment (see Hazard pictograms (CLP) on this label).

: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.

: Never give anything by mouth to an unconscious person. Rinse mouth out with water. Get medical advice/attention.

4.2. Most important symptoms and effects (acute and delayed)

Potential Adverse human health effects and symptoms

Symptoms/effects

Symptoms/effects after inhalation Symptoms/effects after skin contact Symptoms/effects after eye contact Symptoms/effects after ingestion : 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. Harmful if swallowed. Drying, cracking of the skin. Skin irritation. Stomach - Irregularities - Based on Human Evidence.

May cause damage to organs (Eyes, central nervous system, urinary bladder) (in contact with skin, if inhaled, if swallowed).

: May be harmful if inhaled. May cause respiratory irritation. May cause drowsiness or dizziness.

: May be harmful in contact with skin. Causes skin irritation.

: Causes serious eye damage.

Harmful if swallowed. Swallowing a small quantity of this material will result in serious health hazard.

4.3. Immediate medical attention and special treatment, if necessary

No additional information available

SECTION 5: Fire-fighting measures

5.1. Suitable (and unsuitable) extinguishing media

Suitable extinguishing media : Water spray. Dry chemical powder, alcohol-resistant foam, carbon dioxide (CO2).

5.2. Specific hazards arising from the chemical

Fire hazard : Flammable liquid and vapor.

Explosion hazard : May form flammable/explosive vapor-air mixture.

Hazardous decomposition products in case of fire : Carbon oxides (CO, CO2).

5.3. Special protective equipment and precautions for fire-fighters

Firefighting instructions : Fight fire with normal precautions from a reasonable distance. Wear a self contained breathing apparatus. Do not enter fire area without proper protective equipment, including respiratory

protection.

Protection during firefighting : Do not enter fire area without proper protective equipment, including respiratory protection. Wear recommended personal protective equipment.

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SECTION 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

General measures : Remove ignition sources. Use special care to avoid static electric charges. No open flames. No

smoking.

6.1.1. For non-emergency personnel

Emergency procedures : Use personal protective equipment as required. Avoid breathing vapors, mist, gas. Avoid dust

formation. Ensure adequate air ventilation. Remove all sources of ignition. Evacuate danger

area

6.1.2. For emergency responders

Protective equipment : Avoid breathing Dust, vapors.

6.2. Environmental precautions

Prevent entry to sewers and public waters. Do not allow to enter drains or water courses. Avoid release to the environment.

6.3. Methods and material for containment and cleaning up

For containment : Small quantities of liquid spill: take up in non-combustible absorbent material and shovel into container for disposal. This material and its container must be disposed of in a safe way, and as

per local legislation. For large spills, confine the spill in a dike and charge it with wet sand or

earth for subsequent safe disposal.

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 : Handle empty containers with care because residual vapors are flammable.

Precautions for safe handling : Provide adequate ventilation to minimize dust and/or vapor concentrations. No open flames. No smoking. Take precautionary measures against static discharge. Use only non-sparking tools

smoking. Take precautionary measures against static discharge. Use only non-sparking tools. Avoid breathing dust, Aerosols, gas, mist, vapors, spray. Use only outdoors or in a well-

ventilated are

Hygiene measures : Do not eat, drink or smoke when using this product. Wash hands, forearms and face thoroughly

after handling.

7.2. Conditions for safe storage, including any incompatibilities

Technical measures : Store in a well-ventilated place. Keep container tightly closed. Proper grounding procedures to

avoid static electricity should be followed.

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

Incompatible materials : Heat sources.

SECTION 8: Exposure controls/personal protection

8.1. Control parameters

N-BUTANOL (D10, 98%) (71-36-3)

USA - ACGIH - Occupational Exposure Limits

ACGIH OEL TWA [ppm] 20 ppm Remarks: Upper Respiratory Tract irritation;Eye irritation;USA. ACGIH Threshold Limit Values (TLV)

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N-BUTANOL (D10, 98%) (71-36-3)	
ACGIH OEL C	150 mg/m³ Remarks:Skin;California permissible exposure limits for chemical contaminants (Title 8, Article 107)
ACGIH OEL C [ppm]	50 ppm Remarks:Skin;California permissible exposure limits for chemical contaminants (Title 8, Article 107)
USA - OSHA - Occupational Exposure Limits	
OSHA PEL TWA [1]	300 mg/m³
OSHA PEL TWA [2]	100 ppm USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
OSHA PEL STEL [1]	The value in mg/m3 is approximate. USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
USA - NIOSH - Occupational Exposure Limits	
NIOSH REL C	150 mg/m³ Potential for dermal absorption; USA. NIOSH Recommended Exposure Limits
NIOSH REL C [ppm]	50 ppm Potential for dermal absorption; USA. NIOSH Recommended Exposure Limits

8.2. Appropriate engineering controls

Appropriate engineering controls : Wash hands and other exposed areas with mild soap and water before eating, drinking or

smoking and when leaving work.

Environmental exposure controls : Avoid release to the environment.

8.3. Individual protection measures/Personal protective equipment

Personal protective equipment:

Gloves. Protective clothing. Protective goggles. Self-contained breathing apparatus.

Materials for protective clothing:

Wear suitable protective clothing and gloves

Hand protection:

Wear suitable protective clothing and gloves

Eye protection:

Wear eye protection. Chemical goggles or face shield with safety glasses

Skin and body protection:

Wear suitable protective clothing, gloves and eye/face protection. Wear suitable protective clothing

Respiratory protection:

In case of inadequate ventilation wear respiratory protection. Approved supplied air respirator. Where exposure through inhalation may occur from use, respiratory protection equipment is recommended

Personal protective equipment symbol(s):









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SECTION 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties

Physical state : Liquid Liquid. clear. Appearance Color Colorless Odor No data available No data available Odor threshold рΗ : No data available Melting point : -90 °C (-130 °F) Freezing point : No data available

Boiling point : 116 - 118 (241 - 244 °F)Flash point : 35 °C (95 °F) - closed cup

Relative evaporation rate (butyl acetate=1) : No data available

Flammability (solid, gas) : Flammable liquid and vapor.

Vapor pressure : 5 hPa (4 mmHg) at 20 °C (68 °F)

Relative vapor density at 20°C : 2.56 - (Air = 1.0)
Relative density : No data available

Density 0.81 g/ml at 25 °C (77 °F) Molecular mass 84.18 g/mol (Labeled) Solubility : No data available Partition coefficient n-octanol/water (Log Pow) : No data available Auto-ignition temperature : No data available Decomposition temperature : No data available Viscosity, kinematic No data available Viscosity, dynamic No data available **Explosion limits** 1.4 - 11.2 vol % Explosive properties No data available Oxidizing properties No data available

9.2. Other information

No additional information available

SECTION 10: Stability and reactivity

10.1. Reactivity

No additional information available

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

Open flame. Overheating. Direct sunlight. Heat. Sparks.

10.5. Incompatible materials

Strong oxidizing agents.

10.6. Hazardous decomposition products

Carbon oxides (CO, CO2). May release flammable gases. Flash back possible over considerable distance, Container explosion may occur under fire conditions.

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SECTION 11: Toxicological information

11.1. Information on toxicological effects

Acute toxicity (oral) : Harmful if swallowed.

Acute toxicity (dermal) : Not classified

Acute toxicity (inhalation) : Not classified

N-BUTANOL (D10, 98%) (71-36-3)		
LD50 oral rat	790 mg/kg Remarks: Liver:Fatty liver degeneration. Kidney, Ureter, Bladder:Other changes. Blood:Other changes.	
LD50 dermal rabbit	3400 mg/kg	
LC50 Inhalation - Rat [ppm]	8000 ppm/4h	
ATE US (oral)	790 mg/kg body weight	
ATE US (dermal)	3400 mg/kg body weight	
ATE US (gases)	8000 ppmV/4h	

Skin corrosion/irritation : Causes skin irritation.
Serious eye damage/irritation : Causes serious eye damage.

Respiratory or skin sensitization : Not classified
Germ cell mutagenicity : Not classified
Carcinogenicity : Not classified
Reproductive toxicity : Not classified

STOT-single exposure : May cause drowsiness or dizziness. May cause respiratory irritation.

STOT-repeated exposure : Not classified
Aspiration hazard : Not classified
Viscosity, kinematic : No data available

Potential Adverse human health effects and

symptoms

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. Harmful if swallowed. Drying, cracking of the skin. Skin irritation. Stomach - Irregularities - Based on Human Evidence.

Symptoms/effects : May cause damage to organs (Eyes, central nervous system, urinary bladder) (in contact with

skin, if inhaled, if swallowed).

Symptoms/effects after inhalation : May be harmful if inhaled. May cause respiratory irritation. May cause drowsiness or dizziness.

Symptoms/effects after skin contact : May be harmful in contact with skin. Causes skin irritation.

Symptoms/effects after eye contact : Causes serious eye damage.

Symptoms/effects after ingestion : Harmful if swallowed. Swallowing a small quantity of this material will result in serious health

hazard.

SECTION 12: Ecological information

12.1. Toxicity

Ecology - general : The product is not considered harmful to aquatic organisms or to cause long-term adverse effects in the environment.

N-BUTANOL (D10, 98%) (71-36-3)	
LC50 - Fish [1]	1840 mg/l - Pimephales promelas (fathead minnow) - 96 h
EC50 - Crustacea [1]	1983 mg/l - Daphnia magna (Water flea) - 48 h

12.2. Persistence and degradability

No additional information available

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12.3. Bioaccumulative potential

N-BUTANOL (D10, 98%) (71-36-3)

Bioconcentration factor (BCF REACH) 0.38 ;Oncorhynchus mykiss (rainbow trout) - 24 h - 921 mg/l

12.4. Mobility in soil

No additional information available

12.5. Other adverse effects

Other adverse effects : Avoid release to the environment. Disposal must be done according to official regulations.

SECTION 13: Disposal considerations

13.1. Disposal methods

Regional legislation (waste) : Waste materials should be disposed of under conditions which meet Federal, State, and local

environmental control regulations.

Product/Packaging 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 DOT / TDG / IMDG / IATA

14.1. UN number

 DOT NA No
 : UN1120

 UN-No. (TDG)
 : UN1120

 UN-No. (IMDG)
 : 1120

 UN-No. (IATA)
 : 1120

14.2. UN proper shipping name

Proper Shipping Name (DOT) : Butanols
Proper Shipping Name (TDG) : BUTANOLS
Proper Shipping Name (IMDG) : BUTANOLS
Proper Shipping Name (IATA) : Butanols

14.3. Transport hazard class(es)

DOT

Transport hazard class(es) (DOT) : 3 Hazard labels (DOT) : 3



TDG

Transport hazard class(es) (TDG) : 3 Hazard labels (TDG) : 3

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IMDG

Transport hazard class(es) (IMDG) : 3
Hazard labels (IMDG) : 3



IATA

Transport hazard class(es) (IATA) : 3
Hazard labels (IATA) : 3



14.4. Packing group

Packing group (DOT) : III
Packing group (TDG) : III
Packing group (IMDG) : III
Packing group (IATA) : III

14.5. Environmental hazards

Other information : No supplementary information available.

14.6. Special precautions for user

Special transport precautions : Not classified as dangerous in the meaning of transport regulations

DOT

UN-No.(DOT) : UN1120

DOT Special Provisions (49 CFR 172.102) : B1 - If the material has a flash point at or above 38 C (100 F) and below 93 C (200 F), then the

bulk packaging requirements of 173.241 of this subchapter are applicable. If the material has a flash point of less than 38 C (100 F), then the bulk packaging requirements of 173.242 of this

subchapter are applicable.

IB3 - Authorized IBCs: Metal (31A, 31B and 31N); Rigid plastics (31H1 and 31H2); Composite (31HZ1 and 31HA2, 31HB2, 31HN2, 31HD2 and 31HH2). 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, except for UN2672 (also see Special Provision IP8 in Table

2 for UN2672).

T2 - 1.5 178.274(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.

DOT Packaging Exceptions (49 CFR 173.xxx) : 150
DOT Packaging Non Bulk (49 CFR 173.xxx) : 203
DOT Packaging Bulk (49 CFR 173.xxx) : 242
DOT Quantity Limitations Passenger aircraft/rail (49 : 60 L

CFK 173.21)

DOT Quantity Limitations Cargo aircraft only (49 : 220 L

CFR 175.75)

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DOT Vessel Stowage Location : A - The material may be stowed "on deck" or "under deck" on a cargo vessel and on a

passenger vessel.

TDG

UN-No. (TDG) : UN1120
Explosive Limit and Limited Quantity Index : 5 L
Excepted quantities (TDG) : E1
Passenger Carrying Road Vehicle or Passenger : 60 L

Carrying Railway Vehicle Index

Emergency Response Guide (ERG) Number : 129

IMDG

Special provision (IMDG) : 223
Limited quantities (IMDG) : 5 L

Excepted quantities (IMDG) : E1

Packing instructions (IMDG) : P001, LP01

IBC packing instructions (IMDG) : IBC03

Tank instructions (IMDG) : T2

Tank special provisions (IMDG) : TP1

EmS-No. (Fire) : F-E - FIRE SCHEDULE Echo - NON-WATER-REACTIVE FLAMMABLE LIQUIDS

EmS-No. (Spillage) : S-D - SPILLAGE SCHEDULE Delta - FLAMMABLE LIQUIDS

Stowage category (IMDG) : A Flash point (IMDG) : '

Properties and observations (IMDG) : Colourless liquids with a disagreeable odour. Explosive limits: normal-BUTANOL 1.4% to 11.2%.

secondary-BUTANOL 1.7% to 9.8%. tertiary-BUTANOL 2.4% to 8%. tertiary-BUTANOL solidifies at about 25°C. normal-BUTANOL is immiscible with water. secondary-BUTANOL is immiscible with water. tertiary-BUTANOL is miscible with water. Irritating to skin, eyes and mucous

membranes.

MFAG-No : 129

IATA

PCA Excepted quantities (IATA) : E1 PCA Limited quantities (IATA) : Y344 PCA limited quantity max net quantity (IATA) : 10L PCA packing instructions (IATA) : 355 : 60L PCA max net quantity (IATA) CAO packing instructions (IATA) 366 CAO max net quantity (IATA) 220L Special provision (IATA) : A3 ERG code (IATA) 3L

14.7. 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

N-BUTANOL (D10, 98%) (71-36-3)		
Subject to reporting requirements of United States SARA Section 313		
CERCLA RQ	5000 lb	
SARA Section 311/312 Hazard Classes	Fire hazard Immediate (acute) health hazard Delayed (chronic) health hazard	

Commercial status of components according to the United States Environmental Protection Agency's Toxic Substances Control Act (TSCA):

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Name	CAS-No.	Listing	Commercial status	Flags
N-BUTANOL (D10, 98%)	71-36-3	Not present	-	

15.2. International regulations

CANADA

N-BUTANOL (D10, 98%) (71-36-3)

Listed on the Canadian DSL (Domestic Substances List)

EU-Regulations

No additional information available

National regulations

N-BUTANOL (D10, 98%) (71-36-3)

Listed on INSQ (Mexican National Inventory of Chemical Substances)

CAUTION: This material is supplied for research and development purposes subject to the R&D exemption under TSCA, 40 CFR 720.36, and must meet the requirements of the exemption, including supervision by a "technically qualified individual" as defined by 40 CFR 720.3(ee). The use of this material for "commercial purposes" as defined by 40 CFR 720.3(r) is not permitted in the United States.

15.3. US State regulations

N-BUTANOL (D10, 98%) (71-36-3)	
	U.S Massachusetts - Right To Know List U.S New Jersey - Right to Know Hazardous Substance List U.S Pennsylvania - RTK (Right to Know) List

SECTION 16: Other information

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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 H-phrases		
H226	Flammable liquid and vapor	
H302	Harmful if swallowed	
H315	Causes skin irritation	
H318	Causes serious eye damage	
H335	May cause respiratory irritation	
H336	May cause drowsiness or dizziness	

Safety Data Sheet (SDS), USA

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