

Material Safety Data Sheet



N-Butyl Alcohol (n-Butanol)

Section 1. Chemical product and company identification

Product name	: N-Butyl Alcohol (n-Butanol)
Supplier	: AIRGAS INC., on behalf of its subsidiaries 259 North Radnor-Chester Road Suite 100 Radnor, PA 19087-5283 1-610-687-5253
Synonym	: Butyl alcohol; n-Butan-1-ol; n-Butanol; n-Butyl alcohol; Butyl hydroxide; CCS 203; Hemostyp; Methylolpropane; Propylcarbinol; n-C ₄ H ₉ OH; Butanol; Butan-1-ol; 1-Hydroxybutane; n-Butanolbutanolen; Alcool butylique; Butanolo; Butylowy alkohol; Butyric alcohol; Propylmethanol; Butanolen; 1-Butyl alcohol; NA 1120; Rcra waste number U031; UN 1120; NBA; Tebol 88, 99; Butanol-1
Material uses	: Other non-specified industry: PREPARATION OF ESTERS, ESPECIALLY BUTYL ACETATE; SOLVENT FOR RESINS AND COATINGS; PLASTICIZERS; DYEING ASSISTANT; HYDRAULIC FLUIDS; DETERGENT FORMULATIONS; DEHYDRATING AGENT (BY AZEOTROPIC DISTILLATION); INTERMEDIATE; "BUTYLATED" MELAMINE RESINS; GLYCOL ETHERS; BUTYL ACRYLATE.
MSDS #	: 001157
Date of Preparation/Revision	: 4/28/2010.
In case of emergency	: 1-866-734-3438

Section 2. Hazards identification

Physical state	: Liquid. [COLORLESS, WATERY LIQUID WITH ALCOHOL ODOR]
Emergency overview	: WARNING! FLAMMABLE LIQUID AND VAPOR. MAY BE HARMFUL IF SWALLOWED. MAY CAUSE TARGET ORGAN DAMAGE, BASED ON ANIMAL DATA. Flammable liquid. May be harmful if swallowed. Keep away from heat, sparks and flame. Do not ingest. Avoid breathing vapor or mist. Avoid contact with eyes, skin and clothing. May cause target organ damage, based on animal data. Use only with adequate ventilation. Keep container tightly closed and sealed until ready for use. Wash thoroughly after handling.
Target organs	: May cause damage to the following organs: mucous membranes, upper respiratory tract, skin, eyes, central nervous system (CNS).
Routes of entry	: Inhalation.
Potential acute health effects	
Eyes	: Irritating to eyes.
Skin	: May cause skin irritation.
Inhalation	: No known significant effects or critical hazards.
Ingestion	: Harmful if swallowed.
Potential chronic health effects	: CARCINOGENIC EFFECTS: Not available. MUTAGENIC EFFECTS: Not available. TERATOGENIC EFFECTS: Not available.
Medical conditions aggravated by over-exposure	: Pre-existing disorders involving any target organs mentioned in this MSDS as being at risk may be aggravated by over-exposure to this product.

See toxicological information (section 11)

Section 3. Composition, Information on Ingredients

United States

butan-1-ol 71-36-3 100

Exposure limits

ACGIH TLV (United States, 1/2009).

TWA: 20 ppm 8 hour(s).

NIOSH REL (United States, 6/2009).

Absorbed through skin.

CEIL: 150 mg/m³

CEIL: 50 ppm

OSHA PEL (United States, 11/2006).

TWA: 300 mg/m³ 8 hour(s).

TWA: 100 ppm 8 hour(s).

OSHA PEL 1989 (United States, 3/1989).

Absorbed through skin.

CEIL: 150 mg/m³

CEIL: 50 ppm

Section 4. First aid measures

- Eye contact** : Check for and remove any contact lenses. Immediately flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical attention immediately.
- Skin contact** : In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. Clean shoes thoroughly before reuse. Get medical attention immediately.
- Inhalation** : Move exposed person to fresh air. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. Loosen tight clothing such as a collar, tie, belt or waistband. Get medical attention immediately.
- Ingestion** : Wash out mouth with water. Do not induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Get medical attention immediately.

Section 5. Fire-fighting measures

- Flammability of the product** : Flammable.
- Auto-ignition temperature** : 342.85°C (649.1°F)
- Flash point** : Closed cup: 28.85°C (83.9°F).
- Flammable limits** : Lower: 1.4% Upper: 11.2%
- Products of combustion** : Decomposition products may include the following materials:
carbon dioxide
carbon monoxide

Extinguishing media

- Suitable** : Use dry chemical, CO₂, water spray (fog) or foam.
- Not suitable** : Do not use water jet.

- Special exposure hazards** : Promptly isolate the scene by removing all persons from the vicinity of the incident if there is a fire. No action shall be taken involving any personal risk or without suitable training. Move containers from fire area if this can be done without risk. Use water spray to keep fire-exposed containers cool.

Flammable liquid. In a fire or if heated, a pressure increase will occur and the container may burst, with the risk of a subsequent explosion. The vapor/gas is heavier than air and will spread along the ground. Vapors may accumulate in low or confined areas or travel a considerable distance to a source of ignition and flash back. Runoff to sewer may create fire or explosion hazard.

- Special protective equipment for fire-fighters** : Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode.

Section 6. Accidental release measures

- Personal precautions** : No action shall be taken involving any personal risk or without suitable training. Evacuate surrounding areas. Keep unnecessary and unprotected personnel from entering. Do not touch or walk through spilled material. Shut off all ignition sources. No flares, smoking or flames in hazard area. Avoid breathing vapor or mist. Provide adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Put on appropriate personal protective equipment (see section 8).
- Environmental precautions** : Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers. Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air).
- Methods for cleaning up** : Stop leak if without risk. Move containers from spill area. Approach release from upwind. Prevent entry into sewers, water courses, basements or confined areas. Wash spillages into an effluent treatment plant or proceed as follows. Contain and collect spillage with non-combustible, absorbent material e.g. sand, earth, vermiculite or diatomaceous earth and place in container for disposal according to local regulations (see section 13). Use spark-proof tools and explosion-proof equipment. Dispose of via a licensed waste disposal contractor. Contaminated absorbent material may pose the same hazard as the spilled product. Note: see section 1 for emergency contact information and section 13 for waste disposal.

Section 7. Handling and storage

- Handling** : Put on appropriate personal protective equipment (see section 8). Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. Do not ingest. Avoid contact with eyes, skin and clothing. Avoid breathing vapor or mist. Use only with adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Do not enter storage areas and confined spaces unless adequately ventilated. Keep in the original container or an approved alternative made from a compatible material, kept tightly closed when not in use. Store and use away from heat, sparks, open flame or any other ignition source. Use explosion-proof electrical (ventilating, lighting and material handling) equipment. Use non-sparking tools. Take precautionary measures against electrostatic discharges. To avoid fire or explosion, dissipate static electricity during transfer by grounding and bonding containers and equipment before transferring material. Empty containers retain product residue and can be hazardous. Do not reuse container.
- Storage** : Store in accordance with local regulations. Store in a segregated and approved area. Store in original container protected from direct sunlight in a dry, cool and well-ventilated area, away from incompatible materials (see section 10) and food and drink. Eliminate all ignition sources. Separate from oxidizing materials. Keep container tightly closed and sealed until ready for use. Containers that have been opened must be carefully resealed and kept upright to prevent leakage. Do not store in unlabeled containers. Use appropriate containment to avoid environmental contamination.

Section 8. Exposure controls/personal protection

- Recommended monitoring procedures** : If this product contains ingredients with exposure limits, personal, workplace atmosphere or biological monitoring may be required to determine the effectiveness of the ventilation or other control measures and/or the necessity to use respiratory protective equipment.
- Engineering measures** : Use only with adequate ventilation. Use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure to airborne contaminants below any recommended or statutory limits. The engineering controls also need to keep gas, vapor or dust concentrations below any lower explosive limits. Use explosion-proof ventilation equipment.
- Hygiene measures** : Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period. Appropriate techniques should be used to remove potentially contaminated clothing. Wash contaminated clothing before reusing. Ensure that eyewash stations and safety showers are close to the workstation location.

Personal protection

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- Eyes** : Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists or dusts.
- Skin** : Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.
- Respiratory** : Use a properly fitted, air-purifying or air-fed respirator complying with an approved standard if a risk assessment indicates this is necessary. Respirator selection must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected respirator.
- Hands** : Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary.
- Personal protection in case of a large spill** : Self-contained breathing apparatus (SCBA) should be used to avoid inhalation of the product.

Product name

Exposure limits

United States

- butan-1-ol
- ACGIH TLV (United States, 1/2009).**
TWA: 20 ppm 8 hour(s).
- NIOSH REL (United States, 6/2009). Absorbed through skin.**
CEIL: 150 mg/m³
CEIL: 50 ppm
- OSHA PEL (United States, 11/2006).**
TWA: 300 mg/m³ 8 hour(s).
TWA: 100 ppm 8 hour(s).
- OSHA PEL 1989 (United States, 3/1989). Absorbed through skin.**
CEIL: 150 mg/m³
CEIL: 50 ppm

Section 9. Physical and chemical properties

- Physical state** : Liquid. [COLORLESS, WATERY LIQUID WITH ALCOHOL ODOR]
- Odor** : CHARACTERISTIC; MILDLY ALCOHOLIC, NON RESIDUAL
- Molecular weight** : 74.14 g/mole
- Molecular formula** : C4-H10-O
- Boiling/condensation point** : 117.8°C (244°F)
- Melting/freezing point** : -88.9°C (-128°F)
- Critical temperature** : 289.9°C (553.8°F)
- Specific gravity** : 0.81 (Water = 1)
- Vapor pressure** : 0.5 kPa (4 mm Hg) (at 20°C)
- Vapor density** : 2.6 (Air = 1)
- Evaporation rate** : 0.44 compared with butyl acetate
- VOC** : 100 % (w/w)

Section 10. Stability and reactivity

- Stability and reactivity** : The product is stable.
- Incompatibility with various substances** : Highly reactive or incompatible with the following materials: oxidizing materials.
- Hazardous decomposition products** : Under normal conditions of storage and use, hazardous decomposition products should not be produced.
- Hazardous polymerization** : Under normal conditions of storage and use, hazardous polymerization will not occur.

Section 11. Toxicological information**Toxicity data**

Product/ingredient name	Result	Species	Dose	Exposure
butan-1-ol	LD50 Dermal	Rabbit	3400 mg/kg	-
	LD50 Intraperitoneal	Rat	200 mg/kg	-
	LD50 Intravenous	Rat	310 mg/kg	-
	LD50 Oral	Rat	0.79 g/kg	-
	LD50 Oral	Rat	790 mg/kg	-
	LD50 Oral	Rat	4.36 g/kg	-
	LDLo Dermal	Rabbit	5 mL/kg	-
	TDL _o Intraperitoneal	Rat	400 mg/kg	-
	LC50 Inhalation Vapor	Rat	24000 mg/m ³	4 hours
	LC50 Inhalation Gas.	Rat	16000 ppm	1 hours
	LC50 Inhalation Gas.	Rat	>8000 ppm	4 hours

IDLH : 1400 ppm

Chronic effects on humans : May cause damage to the following organs: mucous membranes, upper respiratory tract, skin, eyes, central nervous system (CNS).

Other toxic effects on humans : Very hazardous by the following route of exposure: of eye contact (irritant).
Hazardous by the following route of exposure: of skin contact (irritant), of inhalation (lung irritant).

Specific effects

Carcinogenic effects : No known significant effects or critical hazards.

Mutagenic effects : No known significant effects or critical hazards.

Reproduction toxicity : No known significant effects or critical hazards.

Section 12. Ecological information**Aquatic ecotoxicity**

butan-1-ol	-	Acute EC50 1983000 to 2072000 ug/L Fresh water	Daphnia - Water flea - Daphnia magna - 6 to 24 hours	48 hours
	-	Acute LC50 2250000 to 2400000 ug/L Marine water	Fish - Bleak - Alburnus alburnus - 8 cm	96 hours
	-	Acute LC50 100 to 500 mg/L Fresh water	Fish - Bluegill - Lepomis macrochirus - 0.1 g	96 hours
	-	Acute LC50 1940000 ug/L Fresh water	Fish - Fathead minnow - Pimephales promelas - Juvenile (Fledgling, Hatchling, Weanling) - 4 to 8 weeks - 1.1 to 3.1 cm	96 hours
	-	Acute LC50 1910000 ug/L Fresh water	Fish - Fathead minnow - Pimephales promelas - Juvenile (Fledgling, Hatchling, Weanling) - 4 to 8 weeks - 1.1 to 3.1 cm	96 hours

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-	Acute LC50 1730000 to 1840000 ug/L Fresh water	cm Fish - Fathead minnow - Pimephales promelas - 33 days - 20.6 mm - 0.119 g	96 hours
-	Acute LC50 2300000 ug/L Marine water	Fish - Bleak - Alburnus alburnus - 8 to 10 cm	96 hours




Products of degradation : Products of degradation: carbon oxides (CO, CO₂) and water.

Section 13. Disposal considerations

Waste disposal : The generation of waste should be avoided or minimized wherever possible. Empty containers or liners may retain some product residues. This material and its container must be disposed of in a safe way. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers.

Product removed from the cylinder must be disposed of in accordance with appropriate Federal, State, local regulation. Return cylinders with residual product to Airgas, Inc. Do not dispose of locally.

Section 14. Transport information

Regulatory information	UN number	Proper shipping name	Class	Packing group	Label	Additional information
DOT Classification	UN1120	Butanols (butan-1-ol)	3	II		Reportable quantity 5000 lbs. (2270 kg)
TDG Classification	UN1120	Butanols (butan-1-ol)	3	II		Explosive Limit and Limited Quantity Index 1 Passenger Carrying Road or Rail Index 5
Mexico Classification	UN1120	Butanols (butan-1-ol)	3	II		Reportable quantity 5000 lbs. (2270 kg)

“Refer to CFR 49 (or authority having jurisdiction) to determine the information required for shipment of the product.”

Section 15. Regulatory information

United States

- HCS Classification** : Flammable liquid
Target organ effects
- U.S. Federal regulations** : **United States inventory (TSCA 8b)**: This material is listed or exempted.
SARA 302/304/311/312 extremely hazardous substances: No products were found.
SARA 302/304 emergency planning and notification: No products were found.
SARA 302/304/311/312 hazardous chemicals: butan-1-ol
SARA 311/312 MSDS distribution - chemical inventory - hazard identification:
butan-1-ol: Fire hazard, Immediate (acute) health hazard, Delayed (chronic) health hazard
Clean Water Act (CWA) 307: No products were found.
Clean Water Act (CWA) 311: No products were found.
Clean Air Act (CAA) 112 accidental release prevention: No products were found.
Clean Air Act (CAA) 112 regulated flammable substances: No products were found.
Clean Air Act (CAA) 112 regulated toxic substances: No products were found.

SARA 313

	<u>Product name</u>	<u>CAS number</u>	<u>Concentration</u>
Form R - Reporting requirements	: butan-1-ol	71-36-3	100
Supplier notification	: butan-1-ol	71-36-3	100

SARA 313 notifications must not be detached from the MSDS and any copying and redistribution of the MSDS shall include copying and redistribution of the notice attached to copies of the MSDS subsequently redistributed.

- State regulations** : **Connecticut Carcinogen Reporting**: This material is not listed.
Connecticut Hazardous Material Survey: This material is not listed.
Florida substances: This material is not listed.
Illinois Chemical Safety Act: This material is not listed.
Illinois Toxic Substances Disclosure to Employee Act: This material is not listed.
Louisiana Reporting: This material is not listed.
Louisiana Spill: This material is not listed.
Massachusetts Spill: This material is not listed.
Massachusetts Substances: This material is listed.
Michigan Critical Material: This material is not listed.
Minnesota Hazardous Substances: This material is not listed.
New Jersey Hazardous Substances: This material is listed.
New Jersey Spill: This material is not listed.
New Jersey Toxic Catastrophe Prevention Act: This material is not listed.
New York Acutely Hazardous Substances: This material is listed.
New York Toxic Chemical Release Reporting: This material is not listed.
Pennsylvania RTK Hazardous Substances: This material is listed.
Rhode Island Hazardous Substances: This material is not listed.

Canada

- WHMIS (Canada)** : Class B-2: Flammable liquid
Class D-2B: Material causing other toxic effects (Toxic).
CEPA Toxic substances: This material is not listed.
Canadian ARET: This material is not listed.
Canadian NPRI: This material is listed.
Alberta Designated Substances: This material is not listed.
Ontario Designated Substances: This material is not listed.
Quebec Designated Substances: This material is not listed.

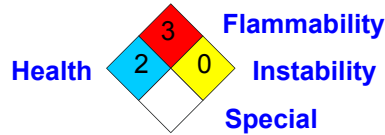
Section 16. Other information

Label requirements : FLAMMABLE LIQUID AND VAPOR. MAY BE HARMFUL IF SWALLOWED. MAY CAUSE TARGET ORGAN DAMAGE, BASED ON ANIMAL DATA.

Hazardous Material Information System (U.S.A.) :

Health	*	1
Flammability		3
Physical hazards		0

National Fire Protection Association (U.S.A.) :



Notice to reader

To the best of our knowledge, the information contained herein is accurate. However, neither the above-named supplier, nor any of its 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 materials may present unknown hazards and should be used with caution. Although certain hazards are described herein, we cannot guarantee that these are the only hazards that exist.