SAFETY DATA SHEET

TEDIA®
High Purity Solvents

1000 Tedia Way
Fairfield, Ohio 45014
USA
Email: tedia@tedia.com
Web: www.tedia.com

24-Hour Emergency Number (CHEMTREC)
USA: 800-424-9300
International: 703-527-3887

All non-emergency numbers should be directed to Customer Service at 800-PURITY1

N-BUTYL ALCOHOL

SDS No. M0022

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Name: n-Butyl Alcohol
Synonyms: 1-Butanol; Propyl Carbinol; Butanol; 1-Butyl Alcohol
Recommended Use: This product is recommended for laboratory and manufacturing use only. It is not recommended for drug, food or household use.

2. HAZARDS IDENTIFICATION

Classification:
Flammable Liquids: GHS Category 3
Skin Irritation: GHS Category 2
Eye Irritation: GHS Category 2
Target Organ System Toxicity, single exposure; GHS Category 3

Label Elements
Signal Word: DANGER!
Hazard Statements:

H226 – Flammable liquid and vapor.
H302 – Harmful if swallowed..
H305 – May be harmful if swallowed and enters airway.
H312 – Harmful in contact with skin.
H319 – Causes serious eye irritation.
H332 – Harmful if inhaled.
H336 – May cause drowsiness and dizziness.

Precautionary Statements:

P210 – Keep away from heat/sparks/open flames/hot surfaces. – No smoking.
P280 – Wear protective gloves/protective clothing/eye protection/face protection.
P301+P310 – If SWALLOWED: Immediately call or POISON CENTER or a doctor/physician.
P303+P361+P353 – If on skin or hair: Remove/take off immediately all contaminated clothing. Rinse skin with water/shower.

P304+P341 – If inhaled: If breathing is difficult, remove victim to fresh air and keep at rest in a position comfortable for breathing.

Emergency Overview

Causes severe eye injury and possible eye damage. Causes irritation to the respiratory tract. Breathing vapors may cause drowsiness and dizziness. Aspiration hazard. May be harmful if swallowed. Can enter lungs and cause damage. May cause central nervous system effects. Flammable liquid and vapor. Target Organs: Central nervous system, respiratory system, eyes, and skin.

HMIS Rating:

Health – 2 Flammability – 2 Physical Hazard – 1 PPE – User supplied

NOTE: HMIS ratings use a numbering scale that ranges from 0 - 4 to indicate the degree of hazard. A value of zero means the chemical presents no hazard while a value of four indicates a high hazard. These ratings are based on the inherent properties of this chemical under expected conditions of normal use and are not intended to be used in emergency situations. PPE is determined by the user based on their needs and conditions.

3. COMPOSITION AND INFORMATION ON INGREDIENTS

Ingredient	CAS No	Percent	Hazardous
n-Butyl Alcohol	71-36-3	>99%	Yes

4. FIRST-AID MEASURES

Inhalation: Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical aid.

Ingestion: Potential aspiration hazard if swallowed. Get medial help immediately. Do not induce vomiting unless directed by medical personnel. If vomiting occurs naturally, have victim lean forward. Never give anything by mouth to an unconscious person.

Skin Contact: Remove any contaminated clothing. Wash skin with soap or mild detergent and water for at least 15 minutes. Get medical attention if irritation persists.

Eye Contact: Check for and remove contact lenses. Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention.

Notes to Physician: Alcoholic beverage consumption may affect the toxic effects of this product. Persons with liver, kidney, and central nervous system diseases may be at increased risk from exposure to this product. Butanol is especially toxic if aspirated. Treat symptomatically and supportively.

5. FIRE FIGHTING MEASURES

Flammability: Flammable liquid and vapor (GHS Category 3)

Auto-ignition Temperature: 343° C (649° F)

Flash Point: 35° C (95° F)

Flammable Limits: Lower Limit – 1.4 vol %, Upper Limit – 11.2 vol %

Products of Combustion: May decompose into irritating and highly toxic gases under fire conditions (carbon monoxide and carbon dioxide).

Specific Fire Hazards: As in any fire, always wear self-contained breathing apparatus in pressure-demand (MSA/NIOSH approved or equivalent), and full protective gear. Vapors may form explosive mixtures with air. Use water spray to keep fire exposed containers cool. Approach fire from upwind to avoid hazardous vapors and toxic decomposition products. Vapors are heavier than air and may travel to a source of ignition and flash back. Vapors can spread along the ground and collect in low or confined areas.

Fire Fighting Media: Use water spray, dry chemical, carbon dioxide, or appropriate foam.

National Fire Protective Association: Health - 2, Flammability - 3, Reactivity - 0

NOTE: NFPA ratings use a numbering scale that ranges from 0 - 4 to indicate the degree of hazard. A value of zero means the chemical presents no hazard while a value of four indicates a high hazard. They are for use by emergency personnel to address the hazards that

are presented by short term, acute exposure to this product under fire, spill, or similar emergencies. Ratings involve data and interpretations that may vary from company to company.

6. ACCIDENTAL RELEASE MEASURES

Use water spray to reduce vapors. Water spray may reduce vapors but still not prevent ignition in closed spaces. Absorb spilled liquid with sorbent pads, socks, or other inert material such as vermiculite, sand, or earth. Do not use sawdust or any combustible material. Use spark-proof tools. Provide ventilation to the affected area and remove all ignition sources. Approach the spill from upwind and pick up absorbed material and place it in a suitable container. Always use proper personal protective equipment as described in section 8.

7. HANDLING AND STORAGE

Precautions: Always use proper personal protective equipment as described in section 8. Wash thoroughly after handling. Ground and bond containers when transferring material. Use spark-proof tools and explosion proof equipment. Avoid contact with eyes, skin, and clothing. Remove contaminated clothing and wash before reuse. Empty containers contain product residue (liquid and vapor) and can be dangerous. Keep container tightly closed and away from heat, spark, and flame. Do not pressurize, cut, weld, braze, solder, drill, grind, or expose empty containers to heat, sparks, or open flames. Use with adequate ventilation. Avoid breathing vapor or mist.
Storage: Keep in a flammables area away in a tightly closed container. Store in a cool, dry, well-ventilated area away from incompatible substances. Keep away from sources of ignition.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering Controls: Use explosion-proof ventilation equipment. Facilities storing or using the material should be equipped with eyewash station and a safety shower. Use adequate general or local exhaust ventilation to keep airborne concentrations below the permissible exposure limits.
Personal Protection: Wear protective chemical goggles or other appropriate eye protection. Use butyl rubber gloves and protective clothing to prevent skin exposure. A respiratory protection program that meets OSHA 29 CFR 1910.134 and ANSI Z88.2 requirements or European Standard EN 149 must be followed whenever possible. Always use a NIOSH or European Standard EN 149 approved respirator when necessary.
Exposure Limits:
ACGIH – 20 ppm TWA
NIOSH – 1400 ppm IDLH
OSHA Final PELs – 100 ppm TWA; 300 mg/m^3 TWA
OSHA Vacated PELs: None

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical State and Appearance: Clear, colorless liquid.
Odor: Various or wine-like
Odor Threshold: Not available
Molecular Formula: $C_4H_{10}O$
Molecular Weight: 74.12
Auto-ignition Temperature: 343° C (649° F)
Flash Point: 35° C (95° F)
Flammable Limits: Lower Limit – 1.4 vol %, Upper Limit – 11.2 vol %
pH: Not available.
Boiling Point: 116° C @ 760 mm Hg
Freezing/Melting Point: -89.5° C
Decomposition Temperature: Not available
Specific Gravity: 0.810 g/cm^3
Vapor Density (Air=1): 2.6
Vapor Pressure: 6.7 mm Hg @ 25° C.

Evaporation Rate (Butyl acetate = 1): 0.46
Viscosity: 2.94 cP 20° C
Solubility: Slightly soluble

10. STABILITY AND REACTIVITY

Stability: Stable under normal temperature and pressure.
Conditions to Avoid: Ignition sources, excess heat, confined spaces.
Incompatibility With Various Substances: Strong oxidizing agents, strong acids, alkali metals, halogens.
Hazardous Decomposition Products: Carbon monoxide, carbon dioxide.
Hazardous Polymerization: Will not occur.

11. TOXICOLOGICAL INFORMATION

Routes of Entry: Inhalation, skin absorption, skin contact
Acute Exposure Hazards:

INHALATION HAZARD: Causes respiratory tract irritation. May cause cardiovascular disturbances, hearing abnormalities, central nervous system depression, muscle weakness, and possible death due to respiratory failure. May be absorbed through the lungs.

INGESTION HAZARD: May cause kidney damage. May cause central nervous system depression with excitement followed by headache, drowsiness, nausea, and vomiting. Advanced stages may cause collapse, unconsciousness, coma, and possible death. Aspiration into lungs may cause chemical pneumonitis, which may be fatal. May be harmful if swallowed.

SKIN CONTACT HAZARD: Causes skin irritation. Skin absorption is slight. Repeated or prolonged exposure may cause drying and cracking of skin. Although n-butanol can enter the circulation after topical application, the absorbed dose is insignificant to that from other routes.

EYE CONTACT HAZARD: Causes severe eye irritation. May cause corneal edema and inflammation. May cause lacrimation (tearing), blurred vision, and photophobia. Vapors appear to cause special vacuolar keratopathy in humans.

Chronic Exposure Hazards: Repeated or prolonged exposure may cause dermatitis and defatting of skin. May cause to the auditory nerve (some hearing loss) and vestibular injury. Animal evidence suggests that fetotoxicity and teratogenicity may be observed at doses that also cause harm to the mother. The systemic toxicity of n-butanol is low, although it may potentiate the hepatic (liver) toxicity of other inhaled compounds, such as carbon tetrachloride.
Animal Toxicity:

Draize test, rabbit, eye: 2 mg Severe;
Draize test, rabbit, eye: 2 mg/24H Severe;
Draize test, rabbit, skin: 405 mg/24 hr Moderate;
Draize test, rabbit, skin: 20 mg/24 hr Moderate;
Inhalation, rat: LC50 = 8000 ppm/8 hr/4H;
Inhalation, rat: LC50 = 24,000 mg/m^3/4H;
Oral, mouse: LD50 = 100 mg/kg;
Oral, rabbit: LD50 = 3400 mg/kg;
Oral, rabbit: LD50 = 3484 mg/kg;
Oral, rat: LD50 = 790 mg/kg;
Oral, rat: LD50 = 800 mg/kg;
Skin, rabbit: LD50 = 3400 mg/kg;

Carcinogenicity: Not listed as a carcinogen by ACGIH, IARC, NTP, or CA Prop 65
Epidemiology: No information available.
Teratogenicity: Some effects indicated.
Reproductive Effects: Some effects have been reported in animals.
Mutagenicity: Some effects indicated.
Neurotoxicity: No information available.

12. ECOLOGICAL INFORMATION

Ecotoxicity:
Fish: Fathead minnow: LC50 = 1510-1730 mg/L, 96H, static bioassay at 24.7° C (pH 7.64)
Water flea: Daphnia: EC50 = 2817-3710 mg/L; 48 Hr; unspecified
Bacteria: Phytobacterium phosphoreum: EC50 = 1980-1983 mg/L; 5,30M; Microtox test
Release of n-butanol to the soil may result in volitization from the soil surface and biodegradation is expected to be significant. N-Butanol should not bind strongly to soil and is expected to leach into groundwater. Release of n-butanol to water is expected to result in biodegradation and volatization from the water surface. Photooxidation by hydroxyl radicals is expected to be slow.
Environmental Fate: When released to soil, product is expected to biodegrade and leach into groundwater, or volatilize. In water, product is expected to biodegrade and volatilize. Bioconcentration potential is expected to be low. n-Butanol is moderately to highly mobile in soil (log octanol/water partition coefficient = 0.88).
Physical: Substance reacts in air with hydroxyl radicals (half-life = 2.3 days).

13. DISPOSAL CONSIDERATIONS

Material that cannot be saved for recovery or recycling should be managed in an appropriate and approved waste facility. Processing, use or contamination of this product may change the waste management options. Waste generators must decide if discarded material is a hazardous waste. State and local disposal regulations may differ from federal disposal definitions found in 40 CFR 261.3. Dispose of container and unused contents in accordance with federal, state and local requirements. This material is a "U" listed waste (U031 – ignitable waste).

14. TRANSPORT INFORMATION

US DOT, IATA, IMO
Proper Shipping Name: Butanols
Hazard Class: 3
UN Number: UN1120
Packing Group: III

Canada TDG
Additional Information: Flashpoint 29 C

15. REGULATORY INFORMATION

US Federal Regulations:
TSCA: CAS# 71-36-3 is listed on the TSCA Inventory.
Health and Safety Reporting List: Not listed.
Chemical Test Rules: CAS# 71-36-3: Not listed.
Section 12b: Not listed.
TSCA Significant New Use Rule: Does not have an SNUR under TSCA.
CERCLA Hazardous Substances: CAS# 71-36-3; 5000 lbs/2270 kg final RQ
SARA Section 302: Does not have a TPQ
SARA Codes: CAS# 71-36-3 – immediate, fire
Section 313: n-butanol (CAS# 71-36-3) is subject to SARA Title III Section 313 and 40 CFR 373 reporting requirements.
Clean Air Act: CAS# 71-36-3 is not listed as a hazardous air pollutant (HAP). It is not a Class 1 Ozone Depleter. It is not a Class 2 Ozone Depleter.
Clean Water Act: CAS# 71-36-3 is not listed as a Hazardous Substance. It is not a Priority Pollutant. It is not a Toxic Pollutant.
OSHA: Not considered highly hazardous by OSHA.
US State Regulations:

CAS# 71-36-3 is on the following state right-to-know lists: California, New Jersey, Pennsylvania, Minnesota, and Massachusetts

California Prop 65: California No Significant Risk Level: Not listed

Canada:

DSL/NDSL: CAS# 71-36-3 is listed on Canada's DSL list.

WHMIS: Not available. This product has been classified in accordance with hazard criteria of the Controlled Products Regulations and this MSDS contains all the information required by those regulations.

Ingredient Disclosure List: CAS# 71-36-3 is listed on Canada's Ingredient Disclosure List.

DSCL (EEC):

Hazard Symbols: Xn, F

Risk Phrases: R10 – Flammable; R22 – Harmful if swallowed; R37/38 – Irritating to respiratory system and skin; R41 – Risk of serious damage to eyes; R67 – vapors may cause drowsiness and dizziness.

Safety Phrases: S7/9 – Keep container tightly closed and in a well-ventilated place; S13 – Keep away food, drinks, and animal feeding stuffs; S26 – In case of contact with eyes, rinse immediately with plenty of water and seek medical advice; S37/39 – Wear suitable gloves and eye/face protection; S46 – If swallowed, seek medical advice immediately and show this container or label.

WGK (Water Danger/protection): CAS# 71-36-3: 1

16. OTHER INFORMATION

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The information contained herein is based on current knowledge and experience; no responsibility is accepted that the information is sufficient or correct in all cases. Users should consider these data only as a supplement to other information gathered by them and must make independent determinations of suitability and completeness of information from all sources to assure proper use and disposal of these materials and the safety and health of employees and customers and the protection of the environment.

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