

MATERIAL SAFETY DATA SHEET

MSDS No. 02-02
According to Regulation (EC) no.1907/2006 REACH



n-BUTANOL

Revision: 6 Last up date: July 17, 2008 Date issued: July 21, 1999 Page 1/10



Label No. 3
Flammable liquide

Xn



Harmful

1. IDENTIFICATION OF THE SUBSTANCE/PREPARATION AND OF THE COMPANY/UNDERTAKING

1.1. Identification of the substance/preparation

Trade Name	n-Butanol
Chemical Name	Butanol-1-ol
Chemical Family	Alcohols
Common Synonyms	1-Butanol, propyl carbinol
Chemical Formula	$\text{CH}_3(\text{CH}_2)_2\text{CH}_2\text{OH}$
Molecular Weight	74.12

1.2. Uses of the substance/preparation

Extraction agent for perfumes and oils
Solvent for laquers based on nitrocellulose and alkyd resins
Raw material for vitamins, hormones and plasticizers
Use as wax, oil and camphor solvent.
Raw material for preparation of resole and ether cellulose substance.

1.3. Company/undertaking identification

OLTCHIM S.A.

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Telephone	+40/250/701200
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1.4. Emergency telephone number +40 / 0250/ 738141

2. HAZARD IDENTIFICATION

EC Classification according to Directive 67/548/CEE, Annex I: R10; Xn R 22; Xi R 37/38-41; R 67

Combustible and flammable liquid.

Health effects: Inhalation of vapors may cause headache, nausea, vomiting, and dizziness, and drowsiness, irritation of respiratory tract and loss of consciousness. Affects the central nervous system. Prolonged exposure to the product causes eyes, nose and respiratory system irritation and headaches. A high level of noxes may cause liver kidney and hearing damage.

Environmental effects: 1-Butanol has a low water solubility and is biodegradable; is not expected to significantly bioaccumulate. The waters polluted with 1-butanol are treated in biological wastewater treatment units. In open spaces, at normal temperature, 1-butanol decomposes due to photolysis.

Emergency overview: 1-Butanol is a combustible and flammable liquid, sensible to static discharges. 1-Butanol is a colorless liquid with strong odour. Both vapours and liquid are flammable. Vapours keep above ground and spread fast into far distances. The substance is slowly soluble in water, float on the water level and form explosive mixture with air above the water level on hot days.

3. COMPOSITION/INFORMATION ON INGREDIENTS

Hazardous components /constituents	Concentration %wt.	CAS No.	EC No.	Annex I Index	Hazard Symbol	Risk phrases
n-Butanol	min. 99	71-36-3	200-751-6	603-004-00-6	Xn	R10 R22 R37/38 R41 R67

4. FIRST - AID MEASURES

Seek medical attention immediately in all cases of exposure!

Inhalation: 1-Butanol is irritant/narcotic. Inhalation of high concentrations of vapors may cause irritation of the respiratory tract with sore throat, coughing, shortness of breath, headaches, nausea, dizziness, dullness, narcosis. It is absorbed into the sanguine system with symptoms like those of ingestion.

Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult give oxygen. Keep person warm and at rest. Call a physician.

Skin contact: 1-Butanol has an irritating and deggreasing effect. May cause skin sensibilization and allergic reactions. Wash the contaminated skin with plenty of soap or mild detergent and water for at least 15 minutes while removing contaminated clothing and shoes. If irritation persists after washing, get medical attention.

Eye contact: Vapors are irritating for the eyes, causing tears and aches. Splashing causes eyes inflammation and visual rabblement. Wash the eyes immediately with large amount of water lifting the upper and lower lids, until no evidence of chemical remains at least 15-20 minutes. If irritation persists after washing get medical attention. Contact lenses should not worn with this product.

Ingestion: May cause abdominal pain, headache, nausea and diarrhoea. Large doses affect liver and kidnees. May have narcotic effect. Remove ingested material by gastric lavage or emesis. Get medical attention. Administration of gastric lavage is permitted by qualified medic personnel. Nothing will be orally administrated to person unconscious or in convulsions.

5. FIRE - FIGHTING MEASURES

Suitable extinguishing media: Large fire: foam.
Small fire: Dry chemical, carbon dioxide.
For maintaining the tanks cool, use sprayed water.

Unsuitable extinguishing media: Do not use water streams, since the streams will scatter and spread the fire.

Exposure hazards: 1-Butanol is a combustible and flammable liquid, sensible to static discharges. Dangerous fire hazard when exposed to heat and flame. Vapor-air mixtures are explosive above flash point. Vapours may travel considerable far distances.

In the event of a fire, move the containers from fire area, if you can do it without risks. Apply cooling water to sides of containers that are exposed to flames until well after fire is out. Stay away from ends of tanks. For massive fire in cargo area, use unmanned hose holder or monitor nozzles; if this is impossible, withdraw from the area and let fire burn. Withdraw immediately in case of rising sound from venting safety device or any discoloration of tank due to. Isolate for 1/2 mile in all directions if tank, rail car or tank truck is involved in fire.

Protection of fire-fighters: In the event of a fire, wear full protective clothing an approved self-contained breathing apparatus with full face piece operated in the pressure demand or other positive pressure mode.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions: Ventilate area of leak or spill. Persons performing clean-up work should wear adequate personal protective equipment and a self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode. Keep unnecessary and unprotected personnel from entering. Remove all sources of ignition.

Environmental precautions: Stop leak and use water spray to reduce vapors. Prevent from contamination the ground and the surface waters by isolating the hazard area. Contain and recover liquid when possible. Keep closed containers and dispose according to all applicable federal, state or local environment regulations

Methods of cleaning up: Contain and recover liquid when possible. Use water spray to reduce vapors. For small spills, take up with sand or other absorbent material (e.g. vermiculite, earth) and place in a chemical waste container. For large spills, dike for ahead of spill for later disposal.

Special precautions: Do not use combustible materials, such as saw dust. Do not flush to sewer! Use only non sparking tools and equipment.

7. HANDLING AND STORAGE

Handling: Protect against physical damage. Sources of ignition such as smoking and open flames are prohibited where 1-butanol is used, handled or stored in a manner that could create a potential fire or explosion hazard. Metal containers should be bonded and grounded for transfers to avoid static sparks. When handling this product use non-sparking type tools and equipment, including proof ventilation. Do not use compressed air or oxygen for filling, discharging or handling. The personnel which handling the product must wear protective equipment.

Storage: Store in a cool, dry well-ventilated location, away from any area where fire may be acute. Outside or detached storage is preferred. Separate from incompatibles. Storage and use area should be No Smoking areas. Drums must be equipped with self-closing valves, nitrogen blanket. Containers of this material may be hazardous when empty since they retain product residues (vapors, liquid); observe all warnings and precautions listed for the product.

8 . EXPOSURE CONTROLS / PERSONAL PROTECTION

Exposure limits

Long-term exposure limit (8-hour TWA reference period): -

Short-term exposure limit (15-minute reference period): 50 ppm

Exposure controls : A system of local and/or general exhaust is recommended to keep employee exposure as low as possible. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its sources, preventing dispersions of it into the general work area. Ventilation equipment should be explosion- proof if explosive concentration of vapors or fume are present.

Respiratory protection: If the exposure limit is exceeded, a full face piece respirator with organic vapor cartridge may be worn up to 50 times the exposure limit or the maximum use concentration specified by the appropriate regulator agency or respirator supplier, whichever is lowest. For emergencies or instances where the exposure levels are not known, use a full face piece positive pressure, air-supplied respirator. *WARNING! Air purifying respirators do not protect workers in oxygen-deficient atmospheres.*

Hand protection : Wear nitrilic rubber gloves.

Eye / Face protection : Use chemical safety goggles and/or a full face shield when is possible. Avoid using contacy lenses at work. The working area will be equipped with eyewash fountains.

Skin protection: Wear impervious protective clothing (full suit), including boots, lab coat, apron or coveralls, as appropriate, to prevent skin contact. The protective equipment contaminated with 1-butanol will be immediately took out and washed. The contaminated equipment will not be stored near clean clothings and in will not be took home because the family member must not be exposed.

Environmental Exposure Control: It is recommendable to develop a monitoring plan in order to maintain the releases in the environment below the maximum allowed concentrations, complying with local, regional, regional and national legislation.

Other precautions: Maintain shower, eye wash fountain and quick-drench facilities in work area.

9. PHYSICAL AND CHEMICAL PROPERTIES

General informations

Appearance	Clear colorless liquid
Odor	Alcohol like

Important health, safety and environmental informations

pH	7 (for 70 g/l solution at la 20°C)
Boiling point	117° C
Flash point	34°C (c.c.)
Flammability	Flammable
Explosive properties	Explosive under open flame Explosive limits in air: 1,4-11,25 % vol
Oxidizing properties	No oxidizing properties
Vapor pressure at 20 °C	0.6 kPa
Specific gravity (water=1) at 20° C	0,8098
Solubility - water	77 g/l
-ethanol, ether	freely soluble
Partition coefficient (log K_{ow})	0,88 la 25° C
Dynamic viscosity at 20° C	10 mPas
Vapor relative density (air=1)	2,55
Evaporation rate (BuAc=1)	0.01

Other informations

Melting point	340° C
Autoignition temperature	-88.3 °C

10. STABILITY AND REACTIVITY

Chemical stability: Stable under normal conditions of use and storage. It easily dehydrate at temperatures of 175-400°C in the presence of catalyzers (aluminum, magnesium chloride) forming butenes.

Conditions to avoid: Heat, flame, sources of ignition and incompatibles.

Materials to avoid

- oxidizers (strong): transforms 1-butanol in butyric acid;
- easily dehydrate in the presence of catalyzers (aluminium, magnesium chloride)
- inorganic acids: hazardous of explosion;
- metals are insensible to 1-butanol action.

Hazardous decomposition products : Thermal decomposition products include carbon monoxide and dioxide. May produce irritating and corrosive fumes when heated to decomposition.

11. TOXICOLOGICAL INFORMATION

Animal toxicity data:

LD50/Oral, rat	790 mg/kg
LC ₅₀ /Inhalation, rat	8000 mg/kg
LC ₅₀ /Dermal, rabbit	3400 mg/kg

Acute toxicity

- **Inhalation:** 1-butanol is irritant/narcotic. Inhalation of high concentrations of vapors may cause irritation of the respiratory tract with sore throat, coughing, shortness of breath, headaches, nausea, dizziness, dullness, narcosis. It is absorbed into the sanguine system with symptoms like those of ingestion.
- **Skin contact:** 1-Butanol has an irritating and deggreasing effect. May cause skin sensibilization and allergic reactions. Through repetitive and prolonged skin contact may cause dermatoses after the destruction of the lypo-acid dermal layer.
- **Eye contact:** Vapors are irrteing for the eyes, causing tears and aches. Splashing causes eyes inflammation and visual rabblement. Repetitive and prolonged contact leads to the forming of vacuoles on the superficial membrane of the cornea.
- **Ingestion:** May cause abdominal pain, headache, nausea and diarrhoea. Large doses affect liver and kidneys. May have narcotic effect.

Chronic effects: Prolonged inhalation has caused auditory nerve and vestibular injury resulting in severe vertigo and hearing loss in workers exposed to 1-butanol. Repeated or prolonged contact may degrease the skin resulting in drying, cracking and eczematoid dermatitis. Person with

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pre-existing skin disorders or eye problems or impaired liver, kidney or respiratory function may be more susceptible to the effects of the substance.

CMR effects (Carcinogenity, Mutagenicity, toxicity for Reproduction): It has no CMR effects.

12. ECOLOGICAL INFORMATION

Ecotoxicity

Fish	<i>L. idus</i>	LC ₅₀ =1200 mg/l/96 hours
Daphnia	<i>Daphnia magna</i>	EC ₅₀ =1983 mg/l/48 hours
Algae	<i>Desmodesmus subspicatus</i>	IC ₅₀ > 500 mg/l/72 hours
Bacteria	<i>Ps. putida</i>	EC ₁₀ = 2250 mg/l/72hours

Mobility: When release to water, this material is expected to quickly evaporate. When release in the soil, this material will both evaporate and leach into ground water due to its relatively high vapor pressure and low absorption to the soil. Due to its high volatility, the main exposure path is through the contaminated atmosphere.

Persistence and degradability: When reaching soil and surface waters, is rapidly in the presence of aerobic microorganisms (98% after 19 days). In the air, the product is easily degraded through photochemical reactions, realising hydroxyl radicals. Half time (in air) is 6.5 hour.

Bioaccumulative potential: Log K_{ow}=0.88 < 1; No bioaccumulation is to expected.

PBT assessment: Not applicable.

Other adverse effects: 1-Butanol is dangerous for aquatic organisms. Insufficient data regarding long term effects on plants, birds or land animals.

Do not allow to enter waters, waste water or soil!

13. DISPOSAL CONSIDERATIONS

Waste treatment: What ever cannot be saved for recovery or recycling should be handled as hazardous waste. Dispose the product, container residues and spill clean up materials in accordance with waste legislative regulations.

Recommended method: incineration.

Packaging treatment: The empty containers are treated with steam and rinsed with plenty of water. The resulted effluent are treated in the same way as waste. The empty and clean containers are to be reused in conformity with regulations.

14. TRANSPORT INFORMATION

1-Butanol can be shipped according to transport regulations for dangerous goods, hazard class 3, Flammable Liquids.

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EC Labeling

EC label name 1-Butanol
EC Number 200-751-6
Hazard symbol Xn Harmful

R- phrases

10	Flammable
22	Harmful if swallowed.
37/38	Irritating to respiratory system and skin.
41	Risk of serious damage to eyes.
67	Vapors may cause drowsiness and dizziness.

S-phrases

7/9	Keep container tightly closed and in a well-ventilated place.
13	Keep away from food, drink and animal feeding stuffs.
26	In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.
37/39	Wear suitable gloves and eye/face protection.
46	If swallowed, seek medical advice immediately and show this container or label.

16. OTHER INFORMATION

List of relevant R-phrases (see chapter 3)

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.

Precautions to be taken in handling and storing: Keep well ventilated the areas where n-butanol is stored and handled.

Work hygienic practices: Avoid direct contact of substance with skin/eyes. Avoid the exposure of personnel with liver affections.

Interdictions: Do not drink or eat in working area.
Do not smoke in or near working area.
The use of open flame in working areas is prohibited.

MSDS Revisions: This Material Safety Data Sheet is made in accordance to Regulation (EC) no.1907/2006 REACH and will replace the previous version 5 dated January 30, 2008.

Revised information:

TÜV mark for Quality-Environmental Integrated System was replaced with the new one, remitted by TÜV Management GmbH.

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Sources of key data uses to compile the data sheet:

EC Directive 67/548/EC resp. 99/45/EC as amended in each case.

EC Directive 2001/58/EC as amended in each case.

EC Directive 2000/39/EC as amended in each case.

National Threshold Limit Values of corresponding countries as amended in each case.

Transport regulations according to ADR, RID, IMDG, IATA as amended in each case.

*This MSDS has been elaborated in accordance with Regulation (EC) No. 1907/2006 REACH.
The information contained here in is based on the present state of our knowledge. It characterizes
the product with regard to the appropriate safety precautions. It does not represent a guarantee of
the properties of the product.*

*This MSDS cannot cover all possible situations which the user may experience during handling and
processing. Each aspect of the user's operation should be examined to determine if, or where,
additional precautions may be necessary. All health and safety information contained within this
MSDS should be provided to the user's employees or customers.*