

**SECTION 1: PRODUCT AND COMPANY IDENTIFICATION****SUPPLIER:**  
**Green Biologics, Inc.**1130 Gahanna Parkway  
Gahanna, OH 42320-6615  
Inquiry Phone: (804) 368-6136  
Emergency Phone: (800) 424-9300  
Date Prepared: 07/25/2014Use of the Substance / Preparation: Intermediate  
Solvent. Recommended for industrial use only.Product manufactured by Green Biologics, Inc.  
In Emmetsburg, IA, USA**CHEMICAL NAME:** n-Butanol  
**PRODUCT NAME:** GB nC4-OL  
**CAS #:** 71 - 36 - 3NFPA hazard codes: NFPA acute hazard rating:  
0 = Least 3 = High Health: 1  
1 = Slight 4 = Extreme Flammability: 3  
2 = Moderate Reactivity: 0

Molecular Formula: C(4)H(10)O

Molecular Weight: 74.14 g/mol  
Chemical Family: alcohols, aliphatic  
Synonyms: 1-Butanol

Health	1
Fire	3
Reactivity	0

**SECTION 2: HAZARDS IDENTIFICATION****EMERGENCY OVERVIEW****DANGER: FLAMMABLE LIQUID. THIS PRODUCT MAY CAUSE EYE, SKIN AND RESPIRATORY TRACT IRRITATION.**

Use with local exhaust ventilation.

Wear NIOSH-certified chemical goggles.

Wear protective clothing.

Eye wash fountains and safety showers must be easily accessible.

Wear full face shield if splashing hazard exists.

Wear a NIOSH-certified vapor respirator.

Vapors may cause drowsiness and dizziness.

Prolonged or repeated skin contact may cause drying, cracking or irritation.

**Potential Health Effects****Principle Routes of Exposure**

Routes of entry for solids and liquids are eye and skin contact, ingestion and inhalation. Routes of entry for gases include inhalation and eye contact. Skin contact may be a route of entry for liquefied gases.

**OSHA Regulatory Status**

This material is hazardous as defined by the American OSHA Hazard Communication Standard (29CFR 1910.1200)

**Main Symptoms**

Cough, headache, dizziness, drowsiness, nausea, vomiting, abdominal pain, unconsciousness, and diarrhea.

**Target Organ Effects**

Lung irritation; Pneumonia.

**Acute Toxicity:**

Acute overexposure to high vapor concentrations of n-butanol may produce central nervous system depression and irritation to the mucous membranes. Severe eye irritation with burning sensation, blurring of vision, lachrymation and photophobia has been known to occur in workers exposed up to 200 ppm. Overexposure in workers outside of the United States has been reported to produce effects like auditory nerve damage, vestibular injury and increased hearing loss. Acute dermal contact may produce skin irritation and dermatitis.

**SECTION 3: COMPOSITION/INFORMATION ON INGREDIENTS**

<b>INGREDIENT (chemical name)</b>	<b>CAS#</b>	<b>% Range</b>	<b>OSHA Status</b>
n-Butanol	71-36-3	>99.8%	Hazardous

**SECTION 4: FIRST AID MEASURES****General Advice**

Remove contaminated clothing immediately and dispose of safely. If unconscious, place in recovery position and seek medical advice. Those providing first aid should take protective measures themselves.

**If Inhaled**

If difficulties occur as a result of inhalation, remove to fresh air and seek medical advice. Keep the affected person in fresh air, and keep the person calm. Assist in breathing if necessary.

**Eyes**

In the case of contact with the eyes, rinse immediately with plenty of water for at least 15 minutes, including under the eyelids. Remove contact lenses. Seek immediate medical attention.

**Skin Contact**

Wash affected areas immediately and thoroughly with soap and plenty of water. Remove contaminated clothing and shoes. Seek medical attention.

**Ingestion (if Swallowed)**

Rinse mouth thoroughly and drink plenty of water. Do not induce vomiting without medical advice. Never induce vomiting or give anything by mouth if the victim is unconscious or having convulsions. Seek medical attention.

**Main Symptoms**

Cough, headache, dizziness, drowsiness, nausea, vomiting, abdominal pain, unconsciousness, and diarrhea.

**Notes to Physician**

Treat symptomatically. If ingested, irrigate the stomach using activated charcoal. Chemical pneumonitis could follow respiratory exposure.

**SECTION 5: FIRE-FIGHTING MEASURES****OSHA Flammability Classification**

Flammable liquids Class I C

**NPFA Hazard Codes**

Flash Point	28.9° C	(closed cup)
Auto ignition	345° C	(DIN 51794)
Lower explosion limit	1.4%(V)	
Upper explosion limit	11.2%(V)	

Health: 1      Fire: 3      Reactivity: 0      Special:

**Suitable Extinguishing Media**

Water spray, dry extinguishing media, alcohol-resistant foam, carbon dioxide (CO<sub>2</sub>)

**Extinguishing Media which must not be used for Safety Reasons**

Do not use a solid water stream as it may scatter and spread fire.

**Protective Equipment for Fire Fighters**

Firefighter protection should include self-contained breathing apparatus (NIOSH-approved) and full firefighting turn out gear.

**Unusual Fire and Explosion Hazards and Other Exposure Hazards Regarding Gases and Combustion**

Under conditions giving incomplete combustion, hazardous gases produced may consist of: carbon monoxide (CO), carbon dioxide (CO<sub>2</sub>). Combustion of gases of organic materials must in principle be graded as inhalation poisons. Vapor is heavier than air and

can travel long distances to a source of ignition and flashback. Vapors may form explosive mixtures with air. Prevent buildup of vapors or gases to explosive concentrations.

**Precautions for Fire Fighters**

Cool containers and tanks with water spray. Collect contaminated extinguishing water separately. Do not allow extinguishing water to reach sewage or effluent systems. Foam should be applied in large quantities as it is broken down to some extent by the product. Keep people away from and upwind of the fire.

**SECTION 6: ACCIDENTAL RELEASE MEASURES****Personal Precautions**

Avoid inhalation. Avoid contact with the skin, eyes and clothing. Avoid breathing vapors or mists. Keep people away from or upwind of spills and leaks. Ensure adequate ventilation, especially in confined areas. Keep away from heat and sources of ignition. For emergency responders: See Section 8 regarding personal protection.

**Environmental Precautions**

Substance/product is RCRA hazardous due to its properties.

Prevent further leakage or spillage using dikes or other containment methods. Do not discharge product into the sewage, effluent or aquatic water systems without pretreatment (via biological treatment plant).

**Methods for Containment**

Stop the flow of material if possible, without risking further injury. Dike or otherwise contain spilled material where possible.

**Methods for Clean Up**

Spills should be contained, solidified, and placed in suitable containers for disposal. Keep containers closed for disposal. For small amounts, pick up with inert absorbent material (e.g. sand, sawdust, general purpose binder). For large amounts, pump off product into closed containers, or clean up promptly by scoop or vacuum. Dispose of in accordance with local regulations. Take necessary action to avoid static electricity discharge (which may cause ignition of vapors).

**Authority Notification**

Within the United States, call the National Response Center (800-424-8802) and appropriate state and local authorities if the quantity released over 24 hours is equal to or greater than the reportable quantity listed below:

Reportable Quantity (RQ): 5,000 lbs. / 2270 kg (n-Butanol)

**SECTION 7: HANDLING AND STORAGE****Handling****General Advice**

Use antistatic tools. Ensure adequate ventilation. Avoid breathing high vapor concentrations. Wear splash goggles, lab coat, gloves, and vapor respirator when handling large volumes.

**Advice on Safe Handling**

Avoid contact with skin, eyes and clothing. Wash hands thoroughly before eating or taking breaks and immediately after handling the product. Provide sufficient air exchange and/or exhaust in work rooms. Use only with adequate ventilation.

**Advice on Protection against Fire and Explosion**

Prevent electrostatic charge. Sources of ignition should be kept well clear of the product. Fire extinguishers should be located near stored product. In case of fire, emergency cooling water should be readily available. Storage containers should be grounded to prevent electrostatic charge. Vapor is heavier than air and can travel considerable distance to a source of ignition and flashback. Vapors may form explosive mixture with air.

**Storage****General Advice**

Keep away from sources of ignition, including heat – No Smoking. Keep containers tightly closed in a cool, well ventilated place. Handle and open containers with care. Storage containers should be grounded, including when in transit. Keep away from oxidizing materials and reducing agents. Do not ingest.

Store in stainless steel or mild steel containers only. Product may dissolve some forms of plastic and rubber. Keep containers tightly closed and sealed until ready for use.

### Advice on Common Storage

n-Butanol is not compatible with: Strong oxidizing agents; acids, acid chlorides, alkali materials, and reducing agents.

## SECTION 8: EXPOSURE CONTROLS / PERSONAL PROTECTION

### Components with Workplace Control Parameters

n-Butanol	OSHA	PEL	100 ppm	300 mg/m <sup>3</sup> ;
CAS 71-36-3	ACGIH	TWA value:	20 ppm;	

### Components with Workplace Control Parameters

n-Butanol	US NIOSH Pocket Guide	CEILING:	50 ppm	152 mg/m <sup>3</sup> ;
CAS 71-36-3	US NIOSH IDHL	Concentration:	1400 ppm	

### Advice on System Design

Provide local exhaust ventilation to maintain recommended PEL. Typically 10 air changes per hour should be used.

### Engineering Advice

General ventilation is frequently insufficient as the only means of controlling employee exposure. Local ventilation is preferred. Explosion-proof equipment (such as switches, fans and grounded ducts) should be used in mechanical ventilation systems.

### Personal Protective Equipment

#### Respiratory Protection

Observe OSHA regulations for respirator use (29 CFR 1910.134). Wear a NIOSH-certified (or equivalent) respirator as necessary.

#### Hand Protection

Wear chemical resistant protective gloves. Suitable materials for gloves: chloroprene rubber (Neoprene), butyl-rubber, nitrile rubber.

#### Eye Protection

Tightly fitting safety goggles should be worn. Wear face shield if splashing hazard exists.

#### Skin and Body Protection

Wear impervious protective clothing. Wear face shield and protective suit for abnormal processing problems.

### General Safety and Hygiene Measures

Avoid contact with skin, eyes and clothing. Do not breathe vapors or spray mist. Work place should be equipped with eyewash stations and safety showers in close proximity to the product. When handling product, do not eat, drink or smoke. Wash hands before breaks and immediately after handling the product.

## SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

Form	Liquid
Odor	Alcohol / characteristic
Odor Threshold	0.83 ppm
Color	Clear
Molecular Weight	74, 12
Molecular Formula	C4 H10 O
Flash Point	96° F / 36° C (Tag open cup)
Auto ignition Temperature	650° F / 343° C
Boiling Temperature	118° C / 244° F
Evaporation Rate	0.5 (n-butyl acetate =1)
Vapor Pressure	7.3 mbar (20° C / 68° F)
Specific Gravity	0.81 (25° C / 77° F)
Freezing Point	- 89° C
Lower Explosion Limit	1.4 Vol %
Upper Explosion Limit	11.3 Vol %

Viscosity, dynamic . . . . . 3 mPa.s (20° C / 68° F)  
Solubility in water . . . . . Moderate  
Octanol/Water Partition Coefficient: P: 7.6; log P: 0.88  
Thermal Decomposition Temperature: (DTA) No exotherm to boiling

**SECTION 10: STABILITY AND REACTIVITY****Hazardous Reactions**

This product is chemically stable under recommended storage conditions.  
Product reacts violently with strong oxidizing agents.  
Avoid contact with acids, acid chlorides and reducing agents.  
Hazardous polymerization: will not occur.  
Product is non-corrosive in presence of glass.  
Avoid contact with heat, sparks, open flame, and static discharge. Avoid any source of ignition. Vapors may form explosive mixture with air.

**SECTION 11: TOXICOLOGICAL INFORMATION****Principle Routes of Exposure**

Inhalation, Eye contact, Skin contact, Ingestion.

**Acute Toxicity****Oral**

LD50/rat: 2,500 mg/kg  
LD50/rabbit: 3,400 mg/kg

**Inhalation**

LC50/rat: 4 h: > 8,000 ppm

**Dermal**

LD50/rabbit: 5,300 mg/kg

**Skin Irritation**

Rabbit: Slight Irritant

**Eye Irritation**

Rabbit: Risk of serious damage to eyes

**Chronic Toxicity****Experience in Humans**

Main symptoms include cough, dizziness, drowsiness, nausea, vomiting, abdominal pain, unconsciousness, and diarrhea.  
Based on viscosity, a potential aspiration hazard cannot be excluded.  
High concentrations have a narcotizing effect.

**Other information**

There is a possibility of liver damage.  
Handle in accordance with good industrial hygiene and safety practices.

**SECTION 12: ECOLOGICAL INFORMATION****Oxygen Demand Data**

BOD-5: 1,710 mg/g  
BOD-20: 1,890 mg/g  
COD: 2,460 mg/g

**Acute and Prolonged Toxicity to Fish**

Goldfish/LC 50: 1,000 – 1,400 mg/l  
Exposure time: 24 hours

Golden Orfe/LC 50: 1,770 mg/l  
Exposure time: 48 hours

**Acute toxicity to aquatic invertebrates**

Daphnid (water flea)/LC50: 1,855 mg/l  
Exposure time: 24 hours

**Other ecotoxicological advice:**

The inhibition of the degradation activity of activated sludge is not anticipated when introduced to biological treatment plants in appropriate low concentrations. Avoid release to the environment.

**SECTION 13: DISPOSAL CONSIDERATIONS****Waste Disposal of Substance**

Dispose of in an RCRA-licensed facility. Do not discharge into waterways or sewer systems without proper authorization. Disposal required in compliance with all waste management related state and local regulations. Choice of disposal depends on the product composition at the time of disposal as well as local statutes and options for disposal.

**Used Container Disposal**

Since emptied containers retain product residue, follow label warnings even after container is emptied. Empty containers with less than 1 inch of residue may be landfilled at a licensed facility. It is recommended to crush, puncture or use other means to render the container unusable and to prevent unauthorized use of used containers. Residual vapors may explode on ignition; do not cut, drill, grind or weld on or near used or empty containers. If containers are not empty (< 1 inch of residue), they must be disposed of in an RCRA-licensed facility.

**SECTION 14: TRANSPORT INFORMATION****Land transport**

USDOT (49CFR)

Proper Shipping Name: Butanols (contains n-butanol)  
Hazard Class: 3  
ID Number: UN 1120  
Packing Group: III  
Reportable Quantity: 5000 lbs. / 2270 kg (1-Butanol)  
Emergency Response Guide: 129

**Sea Transport**

IMDG

Proper Shipping Name: Butanols (contains n-butanol)  
Hazard Class: 3  
ID Number: UN 1120  
Packing Group: III  
Marine Pollutant: No

**Air Transport**

IATA/ICAO

Proper Shipping Name: Butanols (contains n-butanol)  
Hazard Class: 3  
ID Number: UN 1120  
Packing Group: III

**IBC Code**

Product Name: n-Butyl alcohol  
Pollution Category: Z

**TDG (Transport of Dangerous Goods) Canada**

Proper Shipping Name: Butanols (contains n-butanol)

Hazard Class: 3  
ID Number: UN 1120  
Packing Group: III

**SECTION 15: REGULATORY INFORMATION****OSHA Regulatory Status**

This material is hazardous as defined by the American OSHA Hazard Communication Standard (29CFR 1910.1200)

Recommended use: For industrial use only.

**Federal/State Regulations**

Components of this product are listed in the quoted regulations. For details, please refer to the regulations directly. This list is not exhaustive, so check carefully for other applicable regulations.

This product is listed on the TSCA inventory.

**State Regulations**

CA - Hazardous Substances (Director's) List

IL – Chemical Safety Act

MA – Hazardous Substances List

NJ – RTK List

PA – RTK List

RI – RTK List

**HMIS III rating**

Health: 1                      Flammability: 3                      Physical Hazard: 0

HMIS uses a numbering scale ranging from 0 to 4 to indicate the degree of hazard. A value of zero means that the substance possesses essentially no hazard; a rating of four indicates high hazard.

**SECTION 16: OTHER INFORMATION**

Local contact information: [product.reg@greenbiologics.com](mailto:product.reg@greenbiologics.com)

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**DISCLAIMER:**

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