



Scientific Documentation

B1197, Butyl Alcohol, NF

Not appropriate for regulatory submission.
Please visit www.spectrumchemical.com or
contact Tech Services for the most up-to-date
information contained in this information
package.

Spectrum Chemical Mfg Corp

769 Jersey Avenue
New Brunswick, NJ 08901
Phone 732.214.1300



Dear Customer,

Thank you for your interest in Spectrum's quality products and services.

Spectrum has been proudly serving our scientific community for over 45 years. It is our mission to manufacture and distribute fine chemicals and laboratory products with Quality and delivery you can count on every time.

To accomplish our mission, Spectrum utilizes our sourcing leverage and supplier qualification expertise in offering one of the industry's most comprehensive line of fine chemical products under one brand, in packaging configurations designed to meet your research and production requirements. Our product grades include: USP, NF, BP, EP, JP, FCC, ACS, KSA, Reagent grade, as well as DEA controlled substances. We operate facilities in the United States on the East Coast, West Coast, as well as in Shanghai, China in order to provide the best logistical support for our customers.

At Spectrum, Quality is priority number one. Suppliers with the best qualifications are preferred and we employ full-functioning in-house analytical laboratories at each of our facilities. Our facilities and systems are USFDA registered and ISO certified. We frequently host customer audits and cherish opportunities for improvements. Quality is engrained into our culture. Quality is priority number one.

In the following pages, we have designed and prepared documented scientific information to aid you in your initial qualification or your continual use of our products. Please do not hesitate to contact us if further information or the most up-to-date documentation is desired from any of the covered areas.

We appreciate your business and we look forward to hearing from you.

Sincerely,

A handwritten signature in black ink, appearing to read "Alan Wang", with a large, sweeping flourish at the end.

Alan Wang, MSQA, ASQ CQA
Senior Manager of Technical Services
techservices@spectrumchemical.com

10.May.2016

B1197, Butyl Alcohol, NF

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spectrum[®]
CHEMICAL MFG CORP

| | |
|-------------------|----------------------------------|
| Item Number | B1197 |
| Item | Butyl Alcohol, NF |
| CAS Number | 71-36-3 |
| Molecular Formula | C ₄ H ₁₀ O |
| Molecular Weight | 74.12 |
| MDL Number | |
| Synonyms | 1-Butanol ; n-Butyl Alcohol |

| Test | Specification | |
|--|---------------|---------|
| | Min | Max |
| ASSAY | 99.5 % | |
| ACIDITY | TO PASS TEST | |
| WATER | | 0.1 % |
| NONVOLATILE RESIDUE | | 0.004 % |
| LIMIT OF : | | |
| BUTYRALDEHYDE | TO PASS TEST | |
| 2-BUTANOL | TO PASS TEST | |
| ISOBUTYL ALCOHOL (2-METHYL-1-PROPANOL) | TO PASS TEST | |
| BUTYL ETHER | TO PASS TEST | |
| IDENTIFICATION | TO PASS TEST | |
| RETEST DATE | | |
| RESIDUAL SOLVENTS | TO PASS TEST | |

Spectrum Chemical Mfg Corp

Corporate Headquarters:
 769 Jersey Ave.
 New Brunswick, NJ 08901
 732.214.1300

West Coast Facility:
 14422 S. San Pedro St.
 Gardena, CA 90248
 310.516.8000

SAFETY DATA SHEET

Preparation Date: 1/17/2014

Revision Date: 1/17/2014

Revision Number: G1

1. IDENTIFICATION

Product identifier

Product code: B1197
Product Name: BUTYL ALCOHOL, NF

Other means of identification

Synonyms: 1-Butanol
1-Butyl alcohol
1-Hydroxybutane
Alcool butylique (French)
Butan-1-ol
Butanol
Butyl hydroxide
Butyric or normal primary butyl alcohol
Hemostyp
Methylolpropane
n-Butan-1-ol
n-Butanol
n-Butyl alcohol
Propylcarbinol
Propylmethanol

CAS #: 71-36-3
RTECS # EO1400000
CI#: Not available

Recommended use of the chemical and restrictions on use

Recommended use: Solvent. Chemical intermediate. Stabilizer.
Uses advised against No information available

Supplier: Spectrum Chemicals and Laboratory Products, Inc.
14422 South San Pedro St.
Gardena, CA 90248
(310) 516-8000

Order Online At: <https://www.spectrumchemical.com>

Emergency telephone number Chemtrec 1-800-424-9300
Contact Person: Martin LaBenz (West Coast)
Contact Person: Regina Wachenheim (East Coast)

2. HAZARDS IDENTIFICATION

Classification

This chemical is considered hazardous by the 2012 OSHA Hazard Communication Standard (29 CFR 1910.1200)

| | |
|-------------------------------------|------------|
| Acute toxicity - Oral | Category 4 |
| Acute toxicity - Inhalation (Gases) | Category 4 |

| | |
|--|-------------|
| Skin corrosion/irritation | Category 2 |
| Serious eye damage/eye irritation | Category 2A |
| Specific target organ toxicity (single exposure) | Category 3 |
| Specific target organ toxicity (repeated exposure) | Category 1 |
| Flammable liquids | Category 3 |

Label elements

Danger

Hazard statements

Harmful if swallowed
Harmful if inhaled
Causes skin irritation
Causes serious eye irritation
May cause respiratory irritation. May cause drowsiness or dizziness
Causes damage to organs through prolonged or repeated exposure
Flammable liquid and vapor



Hazards not otherwise classified (HNOC)

Not Applicable

Other hazards

May be harmful in contact with skin.

Precautionary Statements - Prevention

Wash face, hands and any exposed skin thoroughly after handling
Do not eat, drink or smoke when using this product
Avoid breathing dust/fume/gas/mist/vapors/spray
Use only outdoors or in a well-ventilated area
Wear protective gloves/protective clothing/eye protection/face protection
Keep away from heat/sparks/open flames/hot surfaces. — No smoking
Keep container tightly closed
Ground/bond container and receiving equipment
Use explosion-proof electrical/ventilating/lighting/./? /equipment
Use only non-sparking tools
Take precautionary measures against static discharge
Keep cool

Precautionary Statements - Response

Specific treatment (see .? on this label)
In case of fire: Use CO2, dry chemical, or foam to extinguish.
IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists: Get medical advice/attention.
If skin irritation occurs: Get medical advice/attention
IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower
Wash contaminated clothing before reuse

IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing. Call a POISON CENTER or doctor/physician if you feel unwell.

IF SWALLOWED: Call a POISON CENTER or doctor/physician if you feel unwell

Rinse mouth

Precautionary Statements - Storage

Store in a well-ventilated place. Keep container tightly closed

Store locked up

Precautionary Statements - Disposal

Dispose of contents/container to an approved waste disposal plant

3. COMPOSITION/INFORMATION ON INGREDIENTS

| Components | CAS-No. | Weight % | Trade Secret |
|--------------------------|---------|----------|--------------|
| Butyl Alcohol 71-36-3 | 71-36-3 | 100 | * |

4. FIRST AID MEASURES

First aid measures

General Advice:

Poison information centres in each State capital city can provide additional assistance for scheduled poisons (13 1126)

Skin Contact:

Wash off immediately with soap and plenty of water removing all contaminated clothes and shoes. Get medical attention. If skin irritation persists, call a physician.

Eye Contact:

Flush eye with water for 15 minutes. Get medical attention.

Inhalation:

Move to fresh air. If breathing is difficult, give oxygen. If not breathing, give artificial respiration. Get medical attention.

Ingestion:

Do not induce vomiting without medical advice. Never give anything by mouth to an unconscious person. Consult a physician if necessary.

Most important symptoms and effects, both acute and delayed

Symptoms

Irritating to eyes, respiratory system and skin. Central nervous system effects. Hearing impairment.

Indication of any immediate medical attention and special treatment needed

Notes to Physician:

Treat symptomatically

Protection of first-aiders

First-Aid Providers: Avoid exposure to blood or body fluids. Wear gloves and other necessary protective clothing. Dispose of contaminated clothing and equipment as bio-hazardous waste

5. FIRE-FIGHTING MEASURES

Extinguishing Media

Suitable Extinguishing Media:

Carbon dioxide (CO₂). Dry chemical. Alcohol-resistant foam. Water spray.

Unsuitable Extinguishing Media:

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

Specific hazards arising from the chemical

Hazardous Combustion Products:

Carbon monoxide; Carbon dioxide

Specific hazards:

Flammable. May be ignited by heat, sparks or flames. Material can burn with invisible flame. Vapor may travel considerable distance to source of ignition and flash back. Vapors may form explosive mixtures with air. Most vapors are heavier than air. They will spread along the ground and collect in low or confined areas (sewers, basements, tanks). Container explosion may occur under fire conditions or when heated. Fire may produce irritating, corrosive and/or toxic gases.

Special Protective Actions for Firefighters**Specific Methods:**

Water mist may be used to cool closed containers. For larger fires, use water spray or fog. Cool containers with flooding quantities of water until well after fire is out.

Special Protective Equipment for Firefighters:

As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear

| |
|---------------------------------------|
| 6. ACCIDENTAL RELEASE MEASURES |
|---------------------------------------|

Personal precautions, protective equipment and emergency procedures**Personal Precautions:**

Ensure adequate ventilation. Keep people away from and upwind of spill/leak. Avoid contact with skin, eyes and clothing. Use personal protective equipment. Remove all sources of ignition. Pay attention to flashback. Take precautionary measures against static discharges. All equipment used when handling the product must be grounded. Use spark-proof tools and explosion-proof equipment. In case of large spill, water spray or vapor suppressing foam may be used to reduce vapors, but may not prevent ignition in closed spaces.

Environmental precautions

Prevent further leakage or spillage if safe to do so. Prevent product from entering drains. Prevent entry into waterways, sewers, basements or confined areas. In case of large spill, dike if needed. Dike far ahead of liquid spill for later disposal.

Methods and material for containment and cleaning up**Methods for containment**

Stop leak if you can do it without risk. Absorb spill with inert material (e.g. vermiculite, dry sand or earth).

Methods for cleaning up

Use appropriate tools to put the spilled material in a suitable chemical waste disposal container. Use clean non-sparking tools to collect absorbed material. Clean contaminated surface thoroughly.

| |
|--------------------------------|
| 7. HANDLING AND STORAGE |
|--------------------------------|

Precautions for safe handling**Technical Measures/Precautions:**

Provide sufficient air exchange and/or exhaust in work rooms. Remove all sources of ignition. To avoid ignition of vapors by static electricity discharge, all metal parts of the equipment must be grounded. Keep away from incompatible materials.

Safe Handling Advice:

Wear personal protective equipment. Use only in well-ventilated areas. Avoid contact with skin, eyes and clothing. Keep away from heat and sources of ignition. Do not breathe vapors or spray mist. Do not ingest. When using do not smoke. Handle in accordance with good industrial hygiene and safety practice.

Conditions for safe storage, including any incompatibilities

Technical Measures/Storage Conditions:

Keep container tightly closed in a dry and well-ventilated place. Store at room temperature in the original container. Keep away from heat and sources of ignition. Store in a segregated and approved area. Store away from incompatible materials.

Incompatible Materials:

Oxidizing agents. Acids. Alkali Metals. Halogens. Aluminum. caustics. isocyanates.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Control parameters**National occupational exposure limits****United States**

| Components | OSHA | NIOSH | ACGIH | AIHA WHEEL |
|-------------------------|--|---|------------|------------|
| Butyl Alcohol - 71-36-3 | 100 ppm TWA 300 mg/m ³ TWA | 50 ppm Ceiling 150 mg/m ³ Ceiling | 20 ppm TWA | None |

Canada

| Components | Alberta | British Columbia | Ontario | Quebec |
|-------------------------|--|------------------------------|------------|---|
| Butyl Alcohol - 71-36-3 | 20 ppm TWA 60 mg/m ³ TWA | 15 ppm TWA 30 ppm Ceiling | 20 ppm TWA | 50 ppm Ceiling 152 mg/m ³ Ceiling |

Australia and Mexico

| Components | Australia | Mexico |
|--------------------------|-----------|---|
| Butyl Alcohol 71-36-3 | None | 50 ppm Peak 150 mg/m ³ Peak |

Appropriate engineering controls**Engineering measures to reduce exposure:**

Ensure adequate ventilation. Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapors and mist below their respective threshold limit value.

Individual protection measures, such as personal protective equipment**Personal Protective Equipment**

- Eye protection:** Goggles. Safety glasses with side-shields.
- Skin and body protection:** Chemical resistant apron. Long sleeved clothing. Gloves.
- Respiratory protection:** Vapor respirator. Be sure to use an approved/certified respirator or equivalent.
- Hygiene measures:** Avoid contact with skin, eyes and clothing. When using, do not eat, drink or smoke. Wash hands before breaks and immediately after handling the product.

9. PHYSICAL AND CHEMICAL PROPERTIES

9. PHYSICAL AND CHEMICAL PROPERTIES

| | | |
|--|---|---|
| Physical state: Liquid. | Appearance: No information available | Color: Clear. Colorless. |
| Odor: Rancid. Sweet. Strong. Characteristic. Mildly alcoholic. Similar to Amyl alcohol. | Taste Dry, burning taste. | Formula: CH ₃ (CH ₃) ₃ OH |
| Molecular/Formula weight: 74.12 | Flash point (°C): 37 | Flashpoint (°C/°F): 37 °C/98 °F |
| Flash Point Tested according to: Closed cup | Lower Explosion Limit (%): 1.4% | Upper Explosion Limit (%): 11.2% |
| Autoignition Temperature (°C/°F): 343 °C/650 °F | pH: No information available | Melting point/range(°C/°F): -89.8 °C/-129.64 °F |
| Boiling point/range(°C/°F): 117 °C/343 °F | Decomposition temperature(°C/°F): No information available | Specific gravity: 0.8-0.81 |
| Density (g/cm³): No information available | Bulk density: No information available | Vapor pressure @ 20°C (kPa): No information available |
| Evaporation rate: 0.46 (butyl acetate = 1) | Vapor density: 2.6 | VOC content (g/L): 800 |
| Odor threshold (ppm): 0.83 | Partition coefficient (n-octanol/water): 0.88 | Viscosity: No information available |
| Miscibility: Miscible with Ethanol Miscible with Ether Miscible with many organic solvents | Solubility: Soluble in Water Solubility in water: 63.2 g/L @ 25 °C | |

10. STABILITY AND REACTIVITY

Reactivity

It may react with aluminum at temperatures above 49 degrees C (120 degrees F)

Chemical stability

Stability: Stable at normal conditions

Possibility of Hazardous Reactions: Hazardous polymerization does not occur

Conditions to avoid: Heat. Ignition sources. Incompatible materials.

Incompatible Materials: Oxidizing agents. Acids. Alkali Metals. Halogens. Aluminum. caustics. isocyanates.

Hazardous decomposition products: Carbon monoxide. Carbon dioxide. When heated to decomposition it emits acrid smoke and irritating fumes.

Other Information

Corrosivity: No information available

Special Remarks on Corrosivity: No information available

11. TOXICOLOGICAL INFORMATION

Information on likely routes of exposure

Principal Routes of Exposure:

Ingestion. Skin. Eyes. Inhalation.

Acute Toxicity

Component Information

Butyl Alcohol - 71-36-3

LD50/oral/rat = 790 mg/kg Oral LD50 Rat (LOLI and RTECS)
4360 mg/kg (RTECS)

LD50/oral/mouse = 100 mg/kg (RTECS)

LD50/dermal/rabbit = 3400 mg/kg

LD50/dermal/rat = No information available

LC50/inhalation/rat = 8000 ppm Inhalation LC50 Rat 4 h

LC50/inhalation/mouse = No information available

Other LD50 or LC50 information =

3484 mg/kg Oral LD50 Rabbit (RTECS)

1200 mg/kg Oral LD50 Hamster (RTECS)

1782 mg/kg Oral LD50 Dog (RTECS)

Product Information

LD50/oral/rat =

VALUE- Acute Tox Oral = 790mg/kg

LD50/oral/mouse =

Value - Acute Tox Oral = 100mg/kg

LD50/dermal/rabbit

VALUE-Acute Tox Dermal = 3400mg/kg

LD50/dermal/rat

VALUE -Acute Tox Dermal = No information available

LC50/inhalation/rat

VALUE-Vapor = > 17.7mg/l (4-hr)

VALUE-Gas = 8000ppm (4-hr)

VALUE-Dust/Mist = 24mg/l (4-hr.)

LC50/Inhalation/mouse

VALUE-Vapor = No information available

VALUE - Gas = No information available

VALUE - Dust/Mist = No information available

Symptoms

Skin Contact:

Contact causes skin irritation. Moderately irritating to the skin. It may be absorbed through the skin. If absorbed through skin it may cause systemic effects with symptoms similar to those of ingestion.

Eye Contact:

Causes eye irritation. Severe eye irritation. Possible eye damage.

Inhalation Harmful by inhalation. Irritating to respiratory system. Symptoms may include coughing and shortness of breath. Symptoms may include coughing and wheezing. May affect respiration (respiratory depression). May cause conjunctival irritation. May cause nausea, vomiting. May cause headache. Inhalation of high concentrations of vapors may cause dizziness or suffocation. May affect behavior/central nervous system (dizziness, somnolence, muscle weakness, ataxia). It may affect the liver. It may affect the blood (changes in serum composition). It may affect the blood (changes in white blood cell count, changes in other cell count).

Ingestion Harmful if swallowed. Ingestion may cause gastrointestinal irritation, nausea, vomiting and diarrhoea. May cause gastritis. May affect the cardiovascular system (change in heart rate). It may affect the liver (fatty liver degeneration). May affect urinary system (kidneys). May affect the blood. May affect respiration (shortness of breath).

Aspiration hazard No information available

Delayed and immediate effects as well as chronic effects from short and long-term exposure

Chronic Toxicity Prolonged or repeated skin contact may cause dermatitis, and dryness and cracking of the skin.. Prolonged or repeated inhalation of high concentrations may cause hearing impairment, with auditory nerve damage and vestibular system injury, and severe vertigo (diagnosed as Meniere's disease). Prolonged or repeated inhalation may affect the brain. Prolonged or repeated inhalation may affect the liver. Prolonged or repeated inhalation may affect the kidneys. Prolonged or repeated ingestion may affect behavior/central nervous system (somnolence, ataxia, muscle weakness). Prolonged or repeated ingestion may affect the blood (changes in red blood cell count). Prolonged or repeated inhalation may affect the adrenal gland. Prolonged or repeated ingestion may affect the adrenal gland.

Sensitization: No information available

Mutagenic Effects: No information available

Carcinogenic effects: Not considered carcinogenic

| Components | ACGIH - Carcinogens | IARC | NTP | OSHA HCS - Carcinogens | Australia - Prohibited Carcinogenic Substances | Australia - Notifiable Carcinogenic Substances |
|---------------|---------------------|------------|------------|------------------------|--|--|
| Butyl Alcohol | Not listed | Not listed | Not listed | Not listed | Not listed | Not listed |

Reproductive toxicity No data is available

Reproductive Effects: No information available
Developmental Effects: May cause developmental effects based on animal data. Possible risk of harm to the unborn child. No information on developmental toxicity effects on humans was found.
Teratogenic Effects: There is limited and equivocal evidence that Butyl alcohol is a teratogen in animals. It has not been shown to cause teratogenic effects in humans.

Specific Target Organ Toxicity

STOT - single exposure respiratory system.
STOT - repeated exposure Causes damage to organs through prolonged or repeated exposure:. Skin. Eyes. Ears. central nervous system. kidney. liver.
Target Organs: Skin. Eyes. Central nervous system. Kidneys. Liver. Ears. Auditory nerve. Respiratory system.

12. ECOLOGICAL INFORMATION

Ecotoxicity

Ecotoxicity effects: Aquatic environment.

Butyl Alcohol - 71-36-3

Freshwater Algae Data: 500 mg/L EC50 *Desmodesmus subspicatus* 72 h

500 mg/L EC50 *Desmodesmus subspicatus* 96 h

Freshwater Fish Species Data: 100000-500000 µg/L LC50 *Lepomis macrochirus* 96 h static 1

1730-1910 mg/L LC50 *Pimephales promelas* 96 h static 1

1740 mg/L LC50 *Pimephales promelas* 96 h flow-through 1

1910000 µg/L LC50 *Pimephales promelas* 96 h static 1

Water Flea Data: 1897 - 2072 mg/L EC50 *Daphnia magna* 48 h

1983 mg/L EC50 *Daphnia magna* 48 h

Persistence and degradability: Readily biodegradable

Bioaccumulative potential: Potential for bioconcentration in aquatic organisms is low.

Mobility: It is expected to have high mobility in soil.

13. DISPOSAL CONSIDERATIONS

Disposal Methods

Waste from residues / unused products:

Waste must be disposed of in accordance with Federal, State and Local regulation.

Contaminated packaging:

Empty containers should be taken for local recycling, recovery or waste disposal

| Components | RCRA - F Series Wastes | RCRA - K Series Wastes | RCRA - P Series Wastes | RCRA - U Series Wastes |
|---------------|------------------------|------------------------|------------------------|------------------------|
| Butyl Alcohol | None | None | None | U031 Ignitable waste |

14. TRANSPORT INFORMATION

DOT

UN-No: UN1120

Proper Shipping Name: Butanols

Hazard Class: 3

Subsidiary Risk: Not applicable

Packing Group: III

Marine Pollutant: No data available

ERG No: 129

DOT RQ (lbs): No information available

Symbol(s): R5

TDG (Canada)

UN-No: UN1120

Proper Shipping Name: Butanols

Hazard Class: 3

Subsidiary Risk: No information available

Product code: B1197

Product name: BUTYL ALCOHOL, NF

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14. TRANSPORT INFORMATION

Packing Group: III
Description: No information available

ADR

UN-No: UN1120
Proper Shipping Name: Butanols
Hazard Class: 3
Packing Group: III
Subsidiary Risk: No information available
Classification Code: No information available
Description: No information available
CEPIC Tremcard No: No information available

IMO / IMDG

UN-No: UN1120
Proper Shipping Name: Butanols
Hazard Class: 3
Subsidiary Risk: No information available
Packing Group: III
Description: No information available
IMDG Page: No information available
Marine Pollutant: No information available
EMS: F-E
MFAG: No information available
Maximum Quantity: No information available

RID

UN-No: UN1120
Proper Shipping Name: Butanols
Hazard Class: 3
Subsidiary Risk: 3
Packing Group: III
Classification Code: No information available
Description: No information available

ICAO

UN-No: UN1120
Proper Shipping Name: Butanols
Hazard Class: 3
Subsidiary Risk: No information available
Packing Group: III
Description: No information available

IATA

UN-No: UN1120
Proper Shipping Name: Butanols
Hazard Class: 3
Subsidiary Risk: No information available
Packing Group: III
ERG Code: 3L
Description: No information available

15. REGULATORY INFORMATION

International Inventories

| Components | U.S. TSCA | Philippines (PICCS) | KOREA KECL | Japan ENCS | CHINA | Australia (AICS) | EINECS-No. |
|----------------------|-----------|---------------------|------------------|------------------|---------|------------------|-------------------|
| <i>Butyl Alcohol</i> | Present | Present | Present KE-03867 | Present (2)-3049 | Present | Present | Present 200-751-6 |

U.S. Regulations

Butyl Alcohol

Massachusetts RTK: Present
New Jersey RTK Hazardous Substance List: Present
New Jersey (EHS) List: Present
New Jersey - Discharge Prevention - List of Hazardous Substances: Present
Pennsylvania RTK: Present
Minnesota - Hazardous Substance List: Present
New York Release Reporting - List of Hazardous Substances:
 5000 lb RQ
 1 lb RQ
Louisiana Reportable Quantity List for Pollutants: Listed
California Directors List of Hazardous Substances: Present

California Prop. 65: Safe Drinking Water and Toxic Enforcement Act of 1986.

Chemicals Known to the State of California to Cause Cancer:

This product does not contain a chemical requiring a warning under California Prop. 65. (See table below)

Chemicals Known to the State of California to Cause Reproductive Toxicity:

This product does not contain a chemical requiring a warning under California Prop. 65. (See table below)

| Components | Carcinogen | Developmental Toxicity | Male Reproductive Toxicity | Female Reproductive Toxicity: |
|----------------------|------------|------------------------|----------------------------|-------------------------------|
| <i>Butyl Alcohol</i> | Not Listed | Not Listed | Not Listed | Not Listed |

CERCLA/SARA

| Components | CERCLA - Hazardous Substances and their Reportable Quantities | Section 302 Extremely Hazardous Substances and TPQs | Section 302 Extremely Hazardous Substances and RQs | Section 313 - Chemical Category | Section 313 - Reporting <i>de minimis</i> |
|----------------------|---|---|--|---------------------------------|---|
| <i>Butyl Alcohol</i> | 5000 lb final RQ 2270 kg final RQ | None | None | None | 1.0 % de minimis concentration |

U.S. TSCA

| Components | TSCA Section 5(a)2 - Chemicals With Significant New Use Rules (SNURS) | TSCA 8(d) -Health and Safety Reporting |
|----------------------|---|--|
| <i>Butyl Alcohol</i> | Not Applicable | Not Applicable |

Canada

WHMIS hazard class:

B2 Flammable liquid
D2B Toxic materials

Butyl Alcohol

B2 D2B

Canada Controlled Products Regulation:

This product has been classified according to the hazard criteria of the CPR (Controlled Products Regulation) and the MSDS contains all of the information required by the CPR.

| Components | WHMIS Ingredient Disclosure List - |
|----------------------|------------------------------------|
| <i>Butyl Alcohol</i> | 1 % |

Inventory

| Components | Canada (DSL) | Canada (NDSL) |
|---------------|--------------|---------------|
| Butyl Alcohol | Present | Not Listed |

| Components | CEPA Schedule I - Toxic Substances | CEPA - 2010 Greenhouse Gases Subject to Mandatory Reporting |
|---------------|------------------------------------|---|
| Butyl Alcohol | Not listed | Not listed |

EU Classification

R-phrase(s)

R10 - Flammable.
R22 - Harmful if swallowed.
R41 - Risk of serious damage to eyes.
R67 - Vapors may cause drowsiness and dizziness.
R37/38 - Irritating to respiratory system and skin.

S -phrase(s)

S 7 - Keep container tightly closed.
S 9 - Keep container in a well-ventilated place.
S13 - Keep away from food, drink and animal feedingstuffs.
S26 - In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.
S37 - Wear suitable gloves.
S39 - Wear eye/face protection.
S46 - If swallowed, seek medical advice immediately and show this container or label.

| Components | Classification | Concentration Limits: | Safety Phrases |
|---------------|--|-----------------------|-------------------------------|
| Butyl Alcohol | R10 Xn; R22 Xi; R37/38-41 R67 | No information | S2 S7/9 S13 S26 S37/39 S46 |

The product is classified in accordance with Annex VI to Directive 67/548/EEC

Indication of danger:

Xn - Harmful.
Xi - Irritant.



16. OTHER INFORMATION

16. OTHER INFORMATION

| | | |
|------|------|-------------------------------|
| NFPA | HMIS | Personal Protective Equipment |
|------|------|-------------------------------|



| | |
|---------------|---|
| Health Hazard | 2 |
| Fire Hazard | 3 |
| Reactivity | 0 |



See Section 8.

Preparation Date: 1/17/2014
Revision Date: 1/17/2014
Prepared by: Sonia Owen

Disclaimer:

All chemicals may pose unknown hazards and should be used with caution. This Safety Data Sheet (SDS) applies only to the material as packaged. If this product is combined with other materials, deteriorates, or becomes contaminated, it may pose hazards not mentioned in this SDS. The physical properties reported in this SDS are obtained from the literature and do not constitute product specifications. Information contained herein does not constitute a warranty, whether expressed or implied, as to the safety, merchantability or fitness of the goods for a particular purpose. Spectrum Chemicals & Laboratory Products, Inc. assumes no responsibility for results obtained or for incidental or consequential damages, including lost profits, arising from the use of these data. No warranty against infringement of any patent, copyright or trademark is made or implied. It shall be the user's responsibility to develop proper methods of handling and personal protection based on the actual conditions of use. While this SDS is based on technical data judged to be reliable, Spectrum assumes no responsibility for the completeness or accuracy of the information contained herein.

End of Material Safety Data Sheet



Manufacturer

Product Covered: B1197, Butyl Alcohol, NF

Spectrum takes ownership as the manufacturer for the Spectrum product listed above and provides full quality assurance, customer service, and technical product support.

While information concerning the raw material manufacturer of our starting materials is considered proprietary, such information can be made available upon request contingent on demonstration of business volume justification and successful execution of confidential disclosure agreement (CDA).

Requests for disclosure of proprietary raw material manufacturer information may be submitted to the assigned account representative for consideration.

Sincerely,

A handwritten signature in black ink, appearing to read "Alan Wang", is written over a light gray rectangular background.

Alan Wang, MSQA, ASQ CQA
Senior Manager of Technical Services
techservices@spectrumchemical.com

10.May.2016

Certificate of Registration



Intertek

This is to certify that the quality management system of

Spectrum Chemicals and Laboratory Products, Inc

Main Site: 14422 South San Pedro Street, Gardena, California, 90248, USA

Additional Sites: 13915 South Main Street, Los Angeles, California, 90061, USA

755 Jersey Avenue, New Brunswick, New Jersey, 08901, USA

769 Jersey Avenue, New Brunswick, New Jersey, 08901, USA

7400 North Oracle Road, Suite 221, Tucson, Arizona, 85704, USA

has been assessed and registered by Intertek as conforming to the requirements of

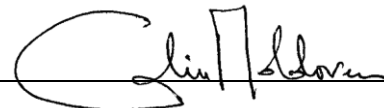
ISO 9001:2008

The quality management system is applicable to

California and New Jersey sites: The manufacture and distribution of specialty fine chemicals, solutions, equipment, supplies and products for the laboratory, pharmaceutical, food, healthcare, cosmetic, fragrance, biotechnology, environmental and process industries.

Arizona site: Supporting Spectrum's two manufacturing facilities by: selecting and qualifying distributors of Laboratory and Safety Equipment; processing bids and quotes to generate new sales opportunities; sourcing bulk chemicals in support of bulk bids and quotes; assisting production operations through order expediting and IT infrastructure support.

Certificate Number: 94-316m-01
Initial Certification Date: 27 December 1994
Certificate Issue Date: 29 January 2016
Certificate Expiry Date: 14 September 2018



Calin Moldovean, President
Intertek Testing Services NA, Inc.
900 Chelmsford Street, Suite 301-3, Lowell, MA, USA



In the issuance of this certificate, Intertek assumes no liability to any party other than to the Client, and then only in accordance with the agreed upon Certification Agreement. This certificate's validity is subject to the organization maintaining their system in accordance with Intertek's requirements for systems certification. Validity may be confirmed via email at certificate.validation@intertek.com or by scanning the code to the right with a smartphone.

The certificate remains the property of Intertek, to whom it must be returned upon request.

CT-ISO 9001-2008-ANAB-EN-LT-L-26.jun.15

Certificate of Registration

Intertek

This is to certify that the quality management system of

Spectrum China Ltd.

Building A20, No. 3802, Shengang Road, Songjiang District, Shanghai, China

has been assessed and registered by Intertek as conforming to the requirements of

ISO 9001: 2008

The quality management system is applicable to:

Provision of service of purchase, testing and sales for chemical products, repacking of non-hazardous chemical products.

Organization Code: 77762704-8
Certificate Number: 111310001-01
Certificate Issue Date: 17 November 2015
Certificate Expiry Date: 14 September 2018



014

A handwritten signature in black ink, appearing to read 'Calin Moldovean'.

*Authorised Signature: Calin Moldovean – President, Business Assurance
Intertek Certification Limited, 10A Victory Park, Victory Road, Derby DE24 8ZF, United Kingdom*
Intertek Certification Limited is a UKAS accredited body under schedule of accreditation no. 014.

In the issuance of this certificate, Intertek assumes no liability to any party other than to the client, and then only in accordance with the agreed upon Certification Agreement. This certificate's validity is subject to the organization maintaining their system in accordance with Intertek's requirements for systems certification. Validity may be confirmed via email at certificate.validation@intertek.com or by scanning the code to the right with a smartphone.
The annual validity of the certificate can also be checked through the website <http://www.cnca.gov.cn> of CNCA in China.



The certificate remains the property of Intertek, to whom it must be returned upon request.



March 28, 2016

Certificate of cGMP

Dear Valued Customer:

Spectrum Chemicals and Laboratory Products certify that our USP, NF, FCC, EP, BP, JP, and food grade products are produced, processed, packaged and held in compliance with current Good Manufacturing Practices (cGMP) in accordance with the applicable parts of 21 CFR, parts 210 and 211 of the Code of Federal Regulations.

Spectrum is an FDA registered and inspected drug establishment. Our United States Food and Drug Administration (USFDA) Registration numbers are as follows:

| | |
|-----------------------------|-------------------|
| Spectrum-Gardena, CA: | <u>2020632</u> |
| Spectrum-New Brunswick, NJ: | <u>2246824</u> |
| Spectrum -Shanghai, China: | <u>3006174778</u> |

Thank you for your interest with Spectrum products. Please feel free to contact the Quality Assurance department at 310-516-8000 or via email at qualityassurance@spectrumchemical.com if we may be of further assistance.

Sincerely,

A handwritten signature in cursive script that reads "Michelle Weston".

Michelle Weston
Quality Assurance Specialist



April 25, 2016

Certificate of cGMP

Dear Valued Customer:

Spectrum Chemicals and Laboratory Products certify that the following product(s) is produced, processed, packaged and held in compliance with current Good Manufacturing Practices (cGMP) in accordance with the applicable parts of 21 CFR, parts 210 and 211 of the Code of Federal Regulations.

| Catalog Number | Product Name |
|----------------|-------------------|
| B1197 | Butyl Alcohol, NF |

Spectrum is an FDA registered and inspected drug establishment. Our United States Food and Drug Administration (USFDA) Registration numbers are as follows:

Spectrum-Gardena, CA: 2020632
Spectrum-New Brunswick, NJ: 2246824
Spectrum-Shanghai, China: 3006174778

Thank you for your interest with Spectrum products. Please feel free to contact the Quality Assurance department at 310-516-8000 or via email at qualityassurance@spectrumchemical.com if we may be of further assistance.

Sincerely,

Michelle Weston
Quality Assurance Specialist



April 27, 2016

Re: Butyl Alcohol, NF-B1197

To Whom It May Concern:

Thank you for your interest in Spectrum high quality chemicals.

We at Spectrum Chemical Mfr. Corp. understand the concern regarding Bovine Spongiform Encephalopathy (BSE). Please be assured that the chemical

Butyl Alcohol, NF-B1197

is BSE/TSE free.

If you have any further questions, please contact Tech Services at (310) 516-8000 Extension 5471, or by email at techservices@spectrumchemical.com.

Sincerely,

Darlene Dagdag-Lyudmirskiy
Technical Services
Spectrum Chemical Mfr. Corp.

This document has been produced electronically and is valid without a signature



April 27, 2016

Re: Butyl Alcohol, NF-B1197

To Whom It May Concern:

Thank you for your interest in Spectrum high quality chemicals.

We at Spectrum Chemical Mfr. Corp. understand the concern regarding the presence of allergens in raw materials. Please be assured that the following chemical does not contain (Milk; Egg; Fish; Shellfish; Sulfur dioxide and sulfites at concentrations of more than 10 mg/kg or 10 mg/liter expressed as SO₂; Lupin; Tree nuts; Mollusks; Wheat; Peanuts; Soy; Cereals containing Gluten; Celery; Mustard; Sesame Seed).

Butyl Alcohol, NF-B1197

If you have any further questions, please contact Tech Services at (310) 516-8000 Extension 5471, or by email at techservices@spectrumchemical.com.

Sincerely,

Darlene Dagdag-Lyudmirskiy
Technical Services
Spectrum Chemical Mfr. Corp.

This document has been produced electronically and is valid without a signature



May 5, 2016

Re: Butyl Alcohol, NF-B1197

To Whom It May Concern:

Thank you for your interest in Spectrum high quality chemicals.

We at Spectrum Chemical Mfg. Corp. understand the concern regarding Aflatoxins in raw materials. To the best of our knowledge, the product listed below is not contaminated with Aflatoxins. Aflatoxins are not used in production. The following product does not come in contact with Aflatoxins at any stage of production.

Butyl Alcohol, NF-B1197

If you have any further questions, please contact Tech Services at (310) 516-8000 Extension 5471, or by email at techservices@spectrumchemical.com.

Sincerely,

Darlene Dagdag-Lyudmirskiy
Technical Services
Spectrum Chemical Mfr. Corp.

This document has been produced electronically and is valid without a signature

Label Information

The Spectrum label presents technical and safety information in an easily understood format. Our technical specialists stay abreast of the latest requirements of the Globally Harmonized System for Classification and Labelling of Chemicals (GHS), as well as the Occupational Safety and Health Administration (OSHA), the Food and Drug Administration (FDA) and other government regulatory agencies in order to ensure compliance, accuracy and concise hazard communication.

A **DANGER**

B

C • Flammable liquid and vapor • Harmful if swallowed or if inhaled • Causes serious eye irritation • Causes skin irritation • May cause respiratory irritation • May cause drowsiness or dizziness • Causes damage to organs through prolonged or repeated exposure • May be harmful in contact with skin.

• Keep away from heat, sparks, open flames, hot surfaces • No smoking • Take precautionary measures against static discharge • Do not eat, drink or smoke when using this product • Use personal protective equipment as required • Avoid breathing mist or vapors • Use only outdoors or in a well-ventilated area • Wash face, hands and any exposed skin thoroughly after handling.

FIRST AID: Call a POISON CENTER or physician if you feel unwell. IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists: Get medical attention. IF ON SKIN (or hair): Remove immediately all contaminated clothing. Rinse skin with water. Wash contaminated clothing before reuse. If skin irritation occurs: Get medical attention. IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing. IF SWALLOWED: Rinse mouth.

IN CASE OF FIRE: Use dry chemical, foam or CO₂ to extinguish.

L Retest Date: 03-31-2025

J **KEEP FROM CHILDREN**

SPECTRUM[®]

B1197 **D** **F** **4 LT**

E **Butyl Alcohol**
(1-Butanol; *n*-Butyl Alcohol)
N.F.

G CAS 71-36-3

H **CAUTION:** For manufacturing, processing or repacking.
Read and understand the label and Safety Data Sheet (SDS) prior to use.

I DOT: UN1120, Butanol, 3, PG III

Chemical Emergency: (800)424-9300

www.SpectrumChemical.com

K C₄H₁₀O — F.W. 74.12

Assay Min. 99.5%

Acidity To pass test

MAXIMUM LIMITS

Water 0.1%

Nonvolatile Residue 0.004%

Limit of Butyraldehyde, 2-Butanol, Isobutyl Alcohol (2-Methyl-1-Propanol), and Butyl Ether To pass test

Residual Solvents To pass test

M Lot No. 062233

R 8/D1GHS A **O**

SPECTRUM CHEMICAL MFG. CORP. Gardena, CA 90248 • New Brunswick, NJ 08901

- | | | |
|---|--|---|
| A Bar Code | F Size/Quantity | K Empirical Formula, Formula Weight and Technical Specifications Panel |
| B GHS Hazard Pictograms | G Chemical Abstracts Service (CAS) Registry Number | L Expiration Information |
| C Warning, Safety Data and Precautionary Information | H Caution Information | M Lot Number |
| D Product Catalog Number | I DOT Shipping Information | N Kosher Certified by Kosher Supervision of America (KSA). |
| E Item Name, Form, Grade | J Toll-Free 24-Hour Chemical Emergency Telephone Number | |
| O Storage Color Band | | |

This color-coded band indicates the hazard most likely to be posed by that material under storage conditions. The criteria used to assign band colors have been established by the Storage Code working group of the Society for Chemical Hazard Communication (SCHC). It is recommended that like colors be stored together, unless otherwise stated, based on the color codes indicated to the right. However, it is the responsibility of the customer to check with their local fire department for possible conflicts with our recommendations when storing hazardous chemicals.

- YELLOW:** Oxidizer
- RED:** Flammable
- GREEN:** General Storage
- BLUE:** Health Hazard
- WHITE:** Corrosive

Spectrum Chemical Mfg Corp

Corporate Headquarters:

769 Jersey Ave.
New Brunswick, NJ 08901

732.214.1300

West Coast Facility:

14422 S. San Pedro St.
Gardena, CA 90248

310.516.8000

| | | | |
|-------------------|----------------------------------|------------------|---------|
| Item Number | B1197 | Lot Number | 2FB0173 |
| Item | Butyl Alcohol, NF | | |
| CAS Number | 71-36-3 | | |
| Molecular Formula | C ₄ H ₁₀ O | Molecular Weight | 74.12 |

| Test | Specification | | Result |
|---|---------------|---------|------------------------------|
| | min | max | |
| ASSAY | 99.5 % | | 99.97 % |
| ACIDITY | TO PASS TEST | | PASSES TEST |
| WATER | | 0.1 % | 0.05 % |
| NONVOLATILE RESIDUE | | 0.004 % | <0.001 % |
| LIMIT OF : | | | . |
| BUTYRALDEHYDE | TO PASS TEST | | PASSES TEST |
| 2-BUTANOL | TO PASS TEST | | PASSES TEST |
| ISOBUTYL ALCOHOL (2-METHYL-1-PROPANOL) | TO PASS TEST | | PASSES TEST |
| BUTYL ETHER | TO PASS TEST | | PASSES TEST |
| IDENTIFICATION | TO PASS TEST | | PASSES TEST |
| RETEST DATE | | | 28-FEB-2019 |
| RESIDUAL SOLVENTS | TO PASS TEST | | . |
| CLASS 3 (solvent) / ETHANOL | | | <5000 ppm |
| CLASS 3 (solvent) / 2-METHYL-1-PROPANOL | | | <5000 ppm |
| CLASS 3 (solvent) / 1-PROPANOL | | | <5000 ppm |
| CLASS 3 (solvent) / 2-PROPANOL | | | <5000 ppm |
| APPEARANCE | | | CLEAR COLORLESS LIQUID |
| DATE OF MANUFACTURE | | | 18-JAN-2016 |

Spectrum Chemical Mfg Corp
755 Jersey Avenue
New Brunswick 08901 NJ

Certificate of Analysis Results Certified By:




Mulbah F. Dwanah
Laboratory Supervisor
Spectrum Chemicals & Laboratory Products

All pharmaceutical ingredients are tested using current edition of applicable pharmacopeia.

January 26, 2016

RE: Lot Numbering System

Dear Valued Customer:

This letter is to inform you of Spectrum Chemicals and Laboratory Products' Lot Numbering System. The system is based on an alpha-numerical sequence which provides the month, year and location of production.

The lot numbering system utilized until 2010 is a sequence of **six characters**, two letters followed by four numbers. The first letter represents the year, for example, Y denotes 2009 and Z denotes 2010. The second letter represents the month and site, for example, A-L denotes January through December at Spectrum's Gardena, CA facility, while M-X denotes January through December at the New Brunswick, NJ facility. The following four numbers are sequentially assigned.

Example: ZI0928 = The 928th material produced in California in September 2010

The lot numbering system utilized for 2011 and forward, is a sequence of **seven characters**. The first character, a number, represents the production facility:

- 1 = Gardena, CA Facility
- 2 = New Brunswick, NJ Facility
- 3 = China Facility

The second character, a letter, represents the year. For example, A denotes 2011 and B denotes 2012. The third character, a letter, represents the month, with A denoting January and L denoting December. The following four numbers are sequentially assigned.

Example: 2AA0706 = The 706th material produced in New Jersey in January 2011

Thank you for your interest with Spectrum products. Please feel free to contact us at 310-516-8000 or via email at qualityassurance@spectrumchemical.com if we may be of further assistance.

Sincerely,



Michael Dang
Manager, GMP Compliance



Stability – Shelf Life Guidance

Product Covered: B1197, Butyl Alcohol, NF

Spectrum Chemical's manufacturing partner has assigned the following shelf life guidance for the product listed above.

The product, B1197, Butyl Alcohol, NF, is assigned a 36 months shelf life from date of manufacturing. The quality and integrity of the chemical depends on the handling and storage conditions. Please refer to the Safety Data Sheet for proper storage and handling procedures.

Adan R. Hernandez
Quality Control Manager

A handwritten signature in black ink that reads "Adan R. Hernandez".

Corporate Headquarters
769 Jersey Avenue
New Brunswick, NJ 08901-3605