SAFETY DATA SHEET

1. Identification

<table>
<thead>
<tr>
<th>Product Name</th>
<th>1-Butanol (Certified ACS)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cat No. :</td>
<td>A399; A399-1; A399-4; A399-20; A399-500; A399J-4; A399S-4</td>
</tr>
<tr>
<td>Synonyms</td>
<td>n-Butanol; n-Butyl alcohol, Butan-1-ol</td>
</tr>
<tr>
<td>Recommended Use</td>
<td>Laboratory chemicals.</td>
</tr>
<tr>
<td>Uses advised against</td>
<td>No Information available</td>
</tr>
</tbody>
</table>

Details of the supplier of the safety data sheet:

- **Company**: Fisher Scientific
  - One Reagent Lane
  - Fair Lawn, NJ 07410
  - Tel: (201) 796-7100

- **Emergency Telephone Number**: CHEMTREC®, Inside the USA: 800-424-9300
  - CHEMTREC®, Outside the USA: 001-703-527-3887

2. Hazard(s) identification

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

<table>
<thead>
<tr>
<th>Hazard Category</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flammable liquids</td>
<td>Category 3</td>
</tr>
<tr>
<td>Acute oral toxicity</td>
<td>Category 4</td>
</tr>
<tr>
<td>Skin Corrosion/irritiation</td>
<td>Category 2</td>
</tr>
<tr>
<td>Serious Eye Damage/Eye Irritation</td>
<td>Category 1</td>
</tr>
<tr>
<td>Specific target organ toxicity (single exposure)</td>
<td>Category 3</td>
</tr>
<tr>
<td>Target Organs - Respiratory system, Central nervous system (CNS).</td>
<td></td>
</tr>
</tbody>
</table>

**Label Elements**

- **Signal Word**: Danger

**Hazard Statements**
- Flammable liquid and vapor
- Harmful if swallowed
- Causes skin irritation
- Causes serious eye damage
- May cause respiratory irritation
- May cause drowsiness or dizziness
Precautionary Statements

Prevention
Wash face, hands and any exposed skin thoroughly after handling
Do not eat, drink or smoke when using this product
Wear protective gloves/protective clothing/eye protection/face protection
Do not breathe dust/fume/gas/mist/vapors/spray
Use only outdoors or in a well-ventilated area
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

Response
Get medical attention/advice if you feel unwell

Inhalation
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

Skin
If skin irritation occurs: Get medical advice/attention
IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower
Wash contaminated clothing before reuse

Eyes
IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing immediately call a POISON CENTER or doctor/physician

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

Fire
In case of fire: Use CO2, dry chemical, or foam for extinction

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

Disposal
Dispose of contents/container to an approved waste disposal plant

Hazards not otherwise classified (HNOC)
None identified

3. Composition / information on ingredients

<table>
<thead>
<tr>
<th>Component</th>
<th>CAS-No</th>
<th>Weight %</th>
</tr>
</thead>
<tbody>
<tr>
<td>n-Butyl alcohol</td>
<td>71-36-3</td>
<td>99</td>
</tr>
</tbody>
</table>

4. First-aid measures

Eye Contact
Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. Immediate medical attention is required.

Skin Contact
Wash off immediately with plenty of water for at least 15 minutes. Get medical attention if symptoms occur.
Inhalation  Move to fresh air. If breathing is difficult, give oxygen. Do not use mouth-to-mouth resuscitation if victim ingested or inhaled the substance; induce artificial respiration with a respiratory medical device. Obtain medical attention.

Ingestion  Do not induce vomiting. Call a physician or Poison Control Center immediately.

Most important symptoms/effects  Breathing difficulties. Causes eye burns. Symptoms of overexposure may be headache, dizziness, tiredness, nausea and vomiting

Notes to Physician  Treat symptomatically

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**5. Fire-fighting measures**

**Suitable Extinguishing Media**  Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide. Cool closed containers exposed to fire with water spray.

**Unsuitable Extinguishing Media**  No information available

**Flash Point**  35 °C / 95 °F

**Method**  Closed cup

**Autoignition Temperature**  340 °C / 644 °F

**Explosion Limits**

- Upper 11.2 vol %
- Lower 1.4 vol %

**Sensitivity to Mechanical Impact**  No information available

**Sensitivity to Static Discharge**  No information available

**Specific Hazards Arising from the Chemical**

- Flammable. Risk of ignition. Vapors may form explosive mixtures with air. Vapors may travel to source of ignition and flash back. Containers may explode when heated. Thermal decomposition can lead to release of irritating gases and vapors. Keep product and empty container away from heat and sources of ignition.

**Hazardous Combustion Products**

- Carbon monoxide (CO)
- Carbon dioxide (CO₂)

**Protective Equipment and Precautions for Firefighters**

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

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**6. Accidental release measures**

**Personal Precautions**  Use personal protective equipment. Remove all sources of ignition. Take precautionary measures against static discharges. Avoid contact with skin, eyes and clothing.

**Environmental Precautions**  Avoid release to the environment. See Section 12 for additional ecological information.

**Methods for Containment and Clean Up**  Remove all sources of ignition. Soak up with inert absorbent material. Keep in suitable, closed containers for disposal. Use spark-proof tools and explosion-proof equipment.

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**7. Handling and storage**

**Handling**  Wear personal protective equipment. Ensure adequate ventilation. Do not get in eyes, on skin, or on clothing. Do not breathe vapors or spray mist. Do not ingest. Keep away from open flames, hot surfaces and sources of ignition. Use spark-proof tools and explosion-proof equipment. Take precautionary measures against static discharges.

**Storage**  Keep containers tightly closed in a dry, cool and well-ventilated place. Keep away from heat and sources of ignition. Flammables area.

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**8. Exposure controls / personal protection**

**Exposure Guidelines**
1-Butanol (Certified ACS)

1. **Physical and chemical properties**

<table>
<thead>
<tr>
<th>Component</th>
<th>ACGIH TLV</th>
<th>OSHA PEL</th>
<th>NIOSH IDLH</th>
</tr>
</thead>
<tbody>
<tr>
<td>n-Butyl alcohol</td>
<td>TWA: 20 ppm</td>
<td>(Vacated) Ceiling: 50 ppm</td>
<td>IDLH: 1400 ppm</td>
</tr>
<tr>
<td></td>
<td></td>
<td>TWA: 100 ppm</td>
<td>Ceiling: 50 ppm</td>
</tr>
<tr>
<td></td>
<td></td>
<td>TWA: 300 mg/m³</td>
<td>Ceiling: 150 mg/m³</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Component</th>
<th>Quebec</th>
<th>Mexico OEL (TWA)</th>
<th>Ontario TWA/VE</th>
</tr>
</thead>
<tbody>
<tr>
<td>n-Butyl alcohol</td>
<td>Ceiling: 50 ppm</td>
<td>Ceiling: 50 ppm</td>
<td>TWA: 20 ppm</td>
</tr>
<tr>
<td></td>
<td>Ceiling: 152 mg/m³</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

   **Legend**
   - ACGIH: American Conference of Governmental Industrial Hygienists
   - OSHA: Occupational Safety and Health Administration
   - NIOSH IDLH: The National Institute for Occupational Safety and Health Immediately Dangerous to Life or Health

   **Engineering Measures**
   - Ensure adequate ventilation, especially in confined areas. Use explosion-proof electrical/ventilating/lighting/equipment. Ensure that eyewash stations and safety showers are close to the workstation location.

   **Personal Protective Equipment**
   - **Eye/face Protection**
     - Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.
   - **Skin and body protection**
     - Wear appropriate protective gloves and clothing to prevent skin exposure.
   - **Respiratory Protection**
     - Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.
     - Handle in accordance with good industrial hygiene and safety practice.

   | Physical State | Liquid                      |
   | Appearance     | Colorless                   |
   | Odor           | Alcohol-like                |
   | Odor Threshold | No information available    |
   | pH             | No information available    |
   | Melting Point/Range | -89 °C / -128.2 °F        |
   | Boiling Point/Range | 117.6 °C / 243.7 °F       |
   | Flash Point    | 35 °C / 95 °F               |
   | Method -       | Closed cup                  |
   | Evaporation Rate | 0.46                      |
   | Flammability (solid,gas) | Not applicable          |
   | Flammability or explosive limits |
   | Upper          | 11.2 vol %                  |
   | Lower          | 1.4 vol %                   |
   | Vapor Pressure | 6.7 mbar @ 20 °C            |
   | Vapor Density  | 2.6                         |
   | Relative Density | 0.810                      |
   | Solubility     | Slightly soluble in water   |
   | Partition coefficient; n-octanol/water | No data available      |
   | Autoignition Temperature | 340 °C / 644 °F       |
   | Decomposition temperature | No information available |
   | Viscosity      | 2.95 mPa.s (20 °C)          |
   | Molecular Formula | C4 H10 O                  |
   | Molecular Weight | 74.12                      |
   | Refractive index | 1.390 - 1.400              |

   **10. Stability and reactivity**

   **Reactive Hazard**
   - None known, based on information available

   **Stability**
   - Stable under normal conditions.

   **Conditions to Avoid**
   - Keep away from open flames, hot surfaces and sources of ignition. Incompatible products.
1-Butanol (Certified ACS)

Revision Date: 25-Feb-2014

Incompatible Materials
Strong oxidizing agents, Reducing agents, Acid chlorides, copper, Copper alloys, Acid anhydrides

Hazardous Decomposition Products
Carbon monoxide (CO), Carbon dioxide (CO₂)

Hazardous Polymerization
Hazardous polymerization does not occur.

Hazardous Reactions
None under normal processing.

11. Toxicological information

Acute Toxicity

Product Information

<table>
<thead>
<tr>
<th>Component</th>
<th>LD50 Oral</th>
<th>LD50 Dermal</th>
<th>LC50 Inhalation</th>
</tr>
</thead>
<tbody>
<tr>
<td>n-Butyl alcohol</td>
<td>700 mg/kg (Rat)</td>
<td>3402 mg/kg (Rabbit)</td>
<td>8000 ppm (Rat) 4h</td>
</tr>
</tbody>
</table>

Toxicologically Synergistic Products
No information available

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

Irritation
Severe eye irritant; Irritating to respiratory system and skin

Sensitization
No information available

Carcinogenicity
The table below indicates whether each agency has listed any ingredient as a carcinogen.

<table>
<thead>
<tr>
<th>Component</th>
<th>CAS-No</th>
<th>IARC</th>
<th>NTP</th>
<th>ACGIH</th>
<th>OSHA</th>
<th>Mexico</th>
</tr>
</thead>
<tbody>
<tr>
<td>n-Butyl alcohol</td>
<td>71-36-3</td>
<td>Not listed</td>
<td>Not listed</td>
<td>Not listed</td>
<td>Not listed</td>
<td>Not listed</td>
</tr>
</tbody>
</table>

Mutagenic Effects
Mutagenic effects have occurred in experimental animals.

Reproductive Effects
Experiments have shown reproductive toxicity effects on laboratory animals.

Developmental Effects
Developmental effects have occurred in experimental animals.

Teratogenicity
Teratogenic effects have occurred in experimental animals.

STOT - single exposure
Respiratory system Central nervous system (CNS)

STOT - repeated exposure
None known

Aspiration hazard
No information available

Symptoms / effects, both acute and delayed
Symptoms of overexposure may be headache, dizziness, tiredness, nausea and vomiting

Endocrine Disruptor Information
No information available

Other Adverse Effects
The toxicological properties have not been fully investigated.

12. Ecological information

Ecotoxicity
This product contains the following substance(s) which are hazardous for the environment.

<table>
<thead>
<tr>
<th>Component</th>
<th>Freshwater Algae</th>
<th>Freshwater Fish</th>
<th>Microtox</th>
<th>Water Flea</th>
</tr>
</thead>
<tbody>
<tr>
<td>n-Butyl alcohol</td>
<td>500 mg/L EC50 &gt; 72 h 500 mg/L EC50 &gt; 96 h</td>
<td>1910000 μg/L LC50 96 h 100000 - 500000 μg/L LC50 96 h 1740 mg/L LC50 96 h 1730 - 1910 mg/L LC50 96 h</td>
<td>EC50 = 2041.4 mg/L 5 min EC50 = 2186 mg/L 30 min EC50 = 3980 mg/L 24 h EC50 = 4400 mg/L 17 h</td>
<td>1897 - 2072 mg/L EC50 48 h 1983 mg/L EC50 = 48 h</td>
</tr>
</tbody>
</table>

Persistence and Degradability
Soluble in water Persistence is unlikely based on information available.

Bioaccumulation/ Accumulation
No information available.

Mobility
Will likely be mobile in the environment due to its water solubility.
### 13. Disposal considerations

**Waste Disposal Methods**

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. Chemical waste generators must also consult local, regional, and national hazardous waste regulations to ensure complete and accurate classification.

<table>
<thead>
<tr>
<th>Component</th>
<th>log Pow</th>
</tr>
</thead>
<tbody>
<tr>
<td>n-Butyl alcohol</td>
<td>0.785</td>
</tr>
</tbody>
</table>

### 14. Transport information

**DOT**

<table>
<thead>
<tr>
<th>UN-No</th>
<th>Proper Shipping Name</th>
<th>Hazard Class</th>
<th>Packing Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>UN1120</td>
<td>BUTANOLS</td>
<td>3</td>
<td>III</td>
</tr>
</tbody>
</table>

**TDG**

<table>
<thead>
<tr>
<th>UN-No</th>
<th>Proper Shipping Name</th>
<th>Hazard Class</th>
<th>Packing Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>UN1120</td>
<td>BUTANOLS</td>
<td>3</td>
<td>III</td>
</tr>
</tbody>
</table>

**IATA**

<table>
<thead>
<tr>
<th>UN-No</th>
<th>Proper Shipping Name</th>
<th>Hazard Class</th>
<th>Packing Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>UN1120</td>
<td>BUTANOLS</td>
<td>3</td>
<td>III</td>
</tr>
</tbody>
</table>

**IMDG/IMO**

<table>
<thead>
<tr>
<th>UN-No</th>
<th>Proper Shipping Name</th>
<th>Hazard Class</th>
<th>Packing Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>UN1120</td>
<td>BUTANOLS</td>
<td>3</td>
<td>III</td>
</tr>
</tbody>
</table>

### 15. Regulatory information

**International Inventories**

<table>
<thead>
<tr>
<th>Component</th>
<th>TSCA</th>
<th>DSL</th>
<th>NDSL</th>
<th>EINECS</th>
<th>ELINCS</th>
<th>NLP</th>
<th>PICCS</th>
<th>ENCS</th>
<th>AICS</th>
<th>IECSC</th>
<th>KECL</th>
</tr>
</thead>
<tbody>
<tr>
<td>n-Butyl alcohol</td>
<td>X</td>
<td>X</td>
<td>-</td>
<td>200-751-6</td>
<td>-</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>

Legend:

- **X** - Listed
- **E** - Indicates a substance that is the subject of a Section 5(e) Consent order under TSCA.
- **F** - Indicates a substance that is the subject of a Section 5(f) Rule under TSCA.
- **N** - Indicates a polymeric substance containing no free-radical initiator in its inventory name but is considered to cover the designated polymer made with any free-radical initiator regardless of the amount used.
- **P** - Indicates a commenced PMN substance
- **R** - Indicates a substance that is the subject of a Section 6 risk management rule under TSCA.
- **S** - Indicates a substance that is identified in a proposed or final Significant New Use Rule
- **T** - Indicates a substance that is the subject of a Section 4 test rule under TSCA.
- **XU** - Indicates a substance exempt from reporting under the Inventory Update Rule, i.e. Partial Updating of the TSCA Inventory Data Base Production and Site Reports (40 CFR 710(B)).
- **Y1** - Indicates an exempt polymer that has a number-average molecular weight of 1,000 or greater.
- **Y2** - Indicates an exempt polymer that is a polyester and is made only from reactants included in a specified list of low concern reactants that comprises one of the eligibility criteria for the exemption rule.

**U.S. Federal Regulations**

**TSCA 12(b)**

Not applicable

**SARA 313**

<table>
<thead>
<tr>
<th>Component</th>
<th>CAS-No</th>
<th>Weight %</th>
<th>SARA 313 - Threshold Values %</th>
</tr>
</thead>
<tbody>
<tr>
<td>n-Butyl alcohol</td>
<td>71-36-3</td>
<td>99</td>
<td>1.0</td>
</tr>
</tbody>
</table>

**SARA 311/312 Hazardous Categorization**
1-Butanol (Certified ACS)  

Acute Health Hazard: Yes  
Chronic Health Hazard: No  
Fire Hazard: Yes  
Sudden Release of Pressure Hazard: No  
Reactive Hazard: No  

Clean Water Act: Not applicable  
Clean Air Act: Not applicable  
OSHA Occupational Safety and Health Administration: Not applicable  

CERCLA  
This material, as supplied, contains one or more substances regulated as a hazardous substance under the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) (40 CFR 302)  

<table>
<thead>
<tr>
<th>Component</th>
<th>Hazardous Substances RQs</th>
<th>CERCLA EHS RQs</th>
</tr>
</thead>
<tbody>
<tr>
<td>n-Butyl alcohol</td>
<td>5000 lb</td>
<td>-</td>
</tr>
</tbody>
</table>

California Proposition 65: This product does not contain any Proposition 65 chemicals  

State Right-to-Know  

<table>
<thead>
<tr>
<th>Component</th>
<th>Massachusetts</th>
<th>New Jersey</th>
<th>Pennsylvania</th>
<th>Illinois</th>
<th>Rhode Island</th>
</tr>
</thead>
<tbody>
<tr>
<td>n-Butyl alcohol</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>-</td>
<td>X</td>
</tr>
</tbody>
</table>

U.S. Department of Transportation  
Reportable Quantity (RQ): Y  
DOT Marine Pollutant: N  
DOT Severe Marine Pollutant: N  

U.S. Department of Homeland Security  
This product does not contain any DHS chemicals.  

Other International Regulations  

Mexico - Grade: Serious risk, Grade 3  

Canada  
This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all the information required by the CPR  

WHMIS Hazard Class:  
B2 Flammable liquid  
D1B Toxic materials  
D2B Toxic materials  

16. Other information  
Prepared By: Regulatory Affairs  
Thermo Fisher Scientific  
Email: EMSDS.RA@thermofisher.com  

Creation Date: 21-Jan-2009  
Revision Date: 25-Feb-2014  
Print Date: 25-Feb-2014  
Revision Summary: This document has been updated to comply with the US OSHA HazCom 2012 Standard replacing the current legislation under 29 CFR 1910.1200 to align with the Globally Harmonized System of Classification and Labeling of Chemicals (GHS)
Disclaimer
The information provided on this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guide for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered as a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other material or in any process, unless specified in the text.

End of SDS