Safety Data Sheet

1. PRODUCT IDENTIFICATION

Name: secondary Butyl Alcohol
Synonyms: 2-butanol, s-butyl alcohol, sec-butanol, 1-methylpropanol
CAS#: 78-92-2
Europe EC#: 201-158-5
Product Uses: solvent for paints, lacquers, resins, vegetable oils, etc

EMERGENCY INFORMATION
Canada: Call CANUTEC (collect) (613) 996-6666
U.S.A.: Call CHEMTREC (800) 424-9300

2. HAZARDS

GHS Class:
- Flammable: (3)
- Acute, oral: (5)
- Eye irritant: (2)
- STOT: (3)
- STOT: (3)

Signal Words:
- WARNING
- No Pictogram

Hazard Statements:
- Flammable liquid & vapour (H226)
- May be harmful if swallowed (H302)
- Causes serious eye irritation (H319)
- May cause respiratory tract irritation (H335)
- May cause dizziness or drowsiness (H336)

Canada – WHMIS
Key: B 2, D 2B
B 2 – Flash Point <38°C, B 3 – Flash Point >38°C & <93°C
D 1 – Immediately Toxic, D 2 – Chronic Toxicity
C – Oxidising Substance, E – Corrosive, F – Reactive Substance

3. COMPOSITION

<table>
<thead>
<tr>
<th>Component</th>
<th>%</th>
<th>TWAEV / TLV ppm / mg/m³</th>
<th>LD₅₀ (mg/kg) ORAL</th>
<th>LD₅₀ (mg/kg) SKIN</th>
<th>LC₅₀ inhalation ppm</th>
</tr>
</thead>
<tbody>
<tr>
<td>2-Butanol</td>
<td>100%</td>
<td>100 / 300</td>
<td>2190</td>
<td>&gt;2000</td>
<td>16,000</td>
</tr>
</tbody>
</table>

4. FIRST AID

SKIN: Wash with plenty of water. Remove contaminated clothing and do not reuse until thoroughly laundered.
EYES: Wash eyes with plenty of water, holding eyelids open. Seek medical assistance promptly if there is irritation.
INHALATION: Remove from contaminated area promptly. **CAUTION: Rescuer must not endanger himself!** If breathing stops, administer artificial respiration and seek medical aid promptly.
INGESTION: Give plenty of water to dilute product. Do not induce vomiting (NOTE below). Keep victim quiet. If vomiting occurs, lower victim’s head below hips to prevent inhalation of vomited material. Seek medical help promptly.

Inadvertent inhalation of vomited material may seriously damage the lungs. The danger of this is greater than the risk of poisoning through absorption of this relatively low-toxicity substance. The stomach should only be emptied under medical supervision, and after the installation of an airway to protect the lungs.

Please ensure that this MSDS is given to, and explained to people using this product.
5. **FIRE FIGHTING & FLAMMABILITY**

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flash Point</td>
<td>24°C / 75°F (closed cup)</td>
</tr>
<tr>
<td>Autoignition Temperature</td>
<td>406°C / 763°F</td>
</tr>
<tr>
<td>Flammable Limits</td>
<td>1.7% – 9.8%</td>
</tr>
<tr>
<td>Combustion Products</td>
<td>carbon monoxide, nitrogen oxides, smoke, part oxidised hydrocarbon fragments</td>
</tr>
<tr>
<td>Firefighting Precautions</td>
<td>alcohol-resistant foam, dry chemical, water fog or spray, product floats on water; firefighters must wear SCBA</td>
</tr>
<tr>
<td>Static Charge Accumulation</td>
<td>cannot accumulate a static charge on agitation or pumping</td>
</tr>
</tbody>
</table>

6. **ACCIDENTAL RELEASE MEASURES**

<table>
<thead>
<tr>
<th>Precaution</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Leak Prevention</td>
<td>dyke to control spillage and prevent environmental contamination</td>
</tr>
<tr>
<td>Handling Spill</td>
<td>ventilate contaminated area; recover free liquid with suitable pumps; absorb residue on an inert sorbent, sweep &amp; pick up using plastic or aluminium shovel, &amp; store in closed containers for recycling or disposal</td>
</tr>
</tbody>
</table>

7. **HANDLING & STORAGE**

Store in a cool, dry environment, away from sources of ignition, heat and oxidising agents. Use non-sparking bronze or aluminium hand tools. All electrical and mechanical equipment (including lighting, switchgear and forklift trucks) used with or around this product must be explosion-proof.

Although this product cannot retain a static charge on agitation or transfer from one container to another, its flash point is low & it is prudent to ground or electrically bond the source container, receiving container & transfer pump before transferring contents. Avoid splashing by ensuring that the product nozzle is below the surface in the receiving container.

Stored product may oxidise slowly (years) in air to create unstable peroxides. Keep containers full & well sealed. Empty containers may contain a flammable/explosive vapour.

Avoid breathing product vapour. Use with adequate ventilation. If dealing with a spill, and ventilation is impossible or impractical, wear an efficient respirator with an organic vapour cartridge. Never cut, drill, weld or grind on or near this container. Avoid contact with skin and wash work clothes frequently. An eye bath and safety shower must be available near the workplace.

8. **EXPOSURE CONTROL & PERSONAL PROTECTION**

<table>
<thead>
<tr>
<th>Exposure Control</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ontario TWAEV</td>
<td>100ppm / 303mg/m³</td>
</tr>
<tr>
<td>ACGIH TLV</td>
<td>100ppm / 303mg/m³</td>
</tr>
<tr>
<td>OSHA PEL</td>
<td>100ppm / 300mg/m³</td>
</tr>
<tr>
<td>Ontario STEV</td>
<td>150ppm / 454mg/m³</td>
</tr>
<tr>
<td>ACGIH STEL</td>
<td>150ppm / 454mg/m³</td>
</tr>
<tr>
<td>OSHA STEL</td>
<td>150ppm / 450mg/m³</td>
</tr>
<tr>
<td>Ventilation</td>
<td>mechanical ventilation may be required to maintain airborne titre below TWAEV</td>
</tr>
<tr>
<td>Hands</td>
<td>butyl rubber gloves recommended – other types may also protect; consult supplier to confirm suitability</td>
</tr>
<tr>
<td>Eyes</td>
<td>safety glasses with side shields – always protect the eyes</td>
</tr>
<tr>
<td>Clothing</td>
<td>no special protective clothing required</td>
</tr>
</tbody>
</table>

9. **PHYSICAL PROPERTIES**

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Odour &amp; Appearance</td>
<td>clear, colourless liquid with sweet, alcoholic odour</td>
</tr>
<tr>
<td>Odour Threshold</td>
<td>~3ppm</td>
</tr>
<tr>
<td>Vapour Pressure</td>
<td>12.9mmHg / 1.7kPa (20°C / 68°F)</td>
</tr>
<tr>
<td>Evaporation Rate</td>
<td>0.8</td>
</tr>
<tr>
<td>Vapour Density (air = 1)</td>
<td>2.6</td>
</tr>
<tr>
<td>Boiling Range</td>
<td>99.5°C / 211°F</td>
</tr>
<tr>
<td>Freezing Point</td>
<td>-115°C / -175°F</td>
</tr>
</tbody>
</table>

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9. PHYSICAL PROPERTIES, cont’d

Specific Gravity 0.807 (20/20°C)
Water Solubility 125 grams per litre (20°C / 68°F)
  Also soluble in most organic solvents
Log P octanol/water (Octanol/H₂O partition) 0.61 & 0.65
Viscosity 3.9 centipoise (20°C / 68°F)
pH none – (does not liberate hydrogen ions when dissolved)
Conversion Factor 1ppm = 3.03 mg/m³
Molecular Weight 74 grams per mole

10. REACTIVITY

Dangerously Reactive With strong oxidising agents; strong acids, acid anhydrides, acid chlorides, lithium aluminium hydrides, bromine or isocyanates react violently; sodium or potassium metal
Also Reactive With alkali metals or alkaline earth metals release flammable hydrogen gas & may cause explosion; reacts with aluminum at elevated temperature; attacks some elastomers
Stability stable; will not polymerize
Decomposes in Presence of oxygen – very prolonged storage in air creates unstable peroxides
Decomposition Products none apart from Hazardous Combustion Products and above
Sensitive to Mechanical Impact no

11. TOXICITY

Effects, Acute Exposure

Skin Contact slightly irritating
Skin Absorption slight; no toxic effects likely by this route
Eye Contact severely irritating, vapour may irritate
Inhalation respiratory irritant; headache, dizziness, drowsiness, intoxication
Ingestion headache, dizziness, drowsiness, intoxication – not a route of industrial exposure

Effects, Chronic Exposure

General prolonged or repeated exposure may cause dermatitis
Sensitising not a sensitiser in humans or animals (only two reports of human sensitisation)
Carcinogen/Tumorigen not considered a tumorigen or a carcinogen in humans or animals
Reproductive Effect no known effect in humans, effect in animals only at doses producing maternal toxicity
Mutagen no known effect on humans or animals
Synergistic With not known
LD₅₀ (oral) 2190¹, 6480 mg/kg (rat), 4900 mg/kg (rabbit), 6200 mg/kg (mouse)
LD₅₀ (skin) >2000 mg/kg (rat) – no mortality at this dose¹
LC₅₀ (inhalation) 16,000 ppm (rat) – 5/6 animals died during the 14 day post-testing observation period¹

12. ECOLOGICAL INFORMATION

Bioaccumulation highly water soluble; not a bioaccumulator
Biodegradation biodegrades readily & rapidly in the presence of oxygen; over 50% in 5 days; 86% in 5 days¹ in the absence of oxygen (anaerobic), biodegradation of 93% was seen in 52 days
Abiotic Degradation reacts with atmospheric hydroxyl radicals; estimated ½-life in air is 20 hours¹, 40 hours & others
Mobility in soil, water water soluble; moves readily in soil & water

Aquatic Toxicity

LC₅₀ (Fish, 96hr) 2993¹ & 3670 mg/litre (Pimephales promelas), 3520 mg/litre (Leuciscus idus, 48)
EC₅₀ (Crustacea, 48hr) 3750 mg/litre (Daphnia magna), 2300 mg/litre¹ (Daphnia magna, 24hr)
NOEC (Algae) 95 mg/litre (Scenedesmus quadricauda), 8900 mg/litre (Chlorella pyrenoidosa)
EC₅₀ (Bacteria) 1630 mg/litre (Bacillus subtilis),
NOEC (Bacteria) 500 mg/litre¹ (Pseudomonas putida)

NOEC = (No Observed Effect Concentration)

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13. **DISPOSAL**

Waste Disposal: do not flush to sewer, recycle solvent if possible, may be incinerated in approved facility. 

Contents: Drums should be reused. Recondition and pressure test by a licensed reconditioner prior to re-use. 

Pails must be vented and thoroughly dried prior to crushing and recycling. 

IBCs (intermediate bulk containers): polyethylene bottle must be pressure tested & recertified at 30 months. Replace at 60 months (5yrs). Steel containers must be inspected, pressure tested & recertified every 5 years.

Never cut, drill, weld or grind on or near this container, even if empty.

14. **TRANSPORT CLASSIFICATION**

- **Canada TDG** 
  - PIN: UN-1120 
  - Shipping Name: butanols 

- **U.S.A. 49 CFR** 
  - Class: 3 
  - Packing Group: III 

Marine Pollutant: not a marine pollutant

ERAP Required: NO

15. **REGULATIONS**

- **Canada DSL** on inventory 
- **U.S.A. TSCA** on inventory 
- **Europe EINECS** on inventory 

U.S.A. Regulations:

- Immediately Dangerous to Life or Health: 2000 ppm 
- OSHA Standards: Permissible Exposure Limit: Table Z-1 8-hr Time Weighted Avg: 150ppm (45mg/m³). Vacated 1989 OSHA PEL TWA 100ppm (30mg/m³) is still enforced in some states. 
- NIOSH Recommendations: Recommended Exposure Limit: 15 Min Short-Term Exposure Limit: 150 ppm (455 mg/m³) 
- Threshold Limit Values: 8 hr Time Weighted Avg (TWA): 100 ppm/sec-Butanol/ Excursion Limit Recommendation: Excursions in worker exposure levels may exceed five times the TLV-TWA for no more than a total of 30 min during a work day, and under no circumstances should they exceed five times the TLV-TWA, provided that the TLV-TWA is not exceeded./sec-Butanol/ 
- Atmospheric Standards: This action promulgates standards of performance for equipment leaks of Volatile Organic Compounds (VOC) in the Synthetic Organic Chemical Manufacturing Industry (SOCMI). The intended effect of these standards is to require all newly constructed, modified & reconstructed SOCMI process units to use the best demonstrated system of continuous emission reduction for equipment leaks of VOC, considering costs, non air quality health, environmental impact & energy requirements. sec-Butyl Alcohol is produced, as an intermediate or a final product, by process units covered under this subpart. 
- TSCA Requirements: Section 8(a) of TSCA requires manufacturers of this chemical substance to report preliminary assessment information concerning with production, use, and exposure to EPA as cited in the preamble in 51 FR 41329. Pursuant to section 8(d) of TSCA, EPA promulgated a model Health and Safety Data Reporting Rule. The section 8(d) model rule requires manufacturers, importers, and processors of listed chemical substances and mixtures to submit to EPA copies and lists of unpublished health and safety studies. sec-Butyl Alcohol is included on this list. 
- FDA Requirements: 2-Butanol is a food additive permitted for direct addition to food for human consumption, as long as 1) the quantity added to food does not exceed the amount reasonably required to accomplish its intended physical, nutritive, or other technical effect in food, and 2) when intended for use in or on food it is of appropriate food grade and is prepared and handled as a food ingredient.

16. **OTHER INFORMATION**

Prepared for Megaloid Laboratories by Peter Bursztyn, (705) 734-1577 
Data from RTECS, HSDB (Haz. Substance Data Base), Cheminfo (CCOHS), IUCLID Datasheets (ESIS – European Chem. Substance Info. System), & others. 
Preparation Date: November 2004 
Revision Date: December 2007, November 2010, November 2013 


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