1. Identification

Product identifier used on the label

1,4-Butanediol

Recommended use of the chemical and restriction on use

* The “Recommended use” identified for this product is provided solely to comply with a Federal requirement and is not part of the seller’s published specification. The terms of this Safety Data Sheet (SDS) do not create or infer any warranty, express or implied, including by incorporation into or reference in the seller’s sales agreement.

Details of the supplier of the safety data sheet

Company:
BASF CORPORATION
100 Park Avenue
Florham Park, NJ 07932, USA

Telephone: +1 973 245-6000

Emergency telephone number

CHEMTREC: 1-800-424-9300
BASF HOTLINE: 1-800-832-HELP (4357)

Other means of identification

Molecular formula: HOCH(2)CH(2)CH(2)CH(2)OH
Chemical family: diols
Synonyms: 1,4-Butanediol

2. Hazards Identification


Classification of the product

| Acute Tox. | 4 (oral) | Acute toxicity |
| STOT SE | 3 (Vapours may cause drowsiness and dizziness.) | Specific target organ toxicity — single exposure |

Label elements

Pictogram:
Signal Word:
Warning

Hazard Statement:
H302 Harmful if swallowed.
H336 May cause drowsiness or dizziness.

Precautionary Statements (Prevention):
P271 Use only outdoors or in a well-ventilated area.
P260 Do not breathe dust/gas/mist/vapours.
P270 Do not eat, drink or smoke when using this product.
P264 Wash with plenty of water and soap thoroughly after handling.

Precautionary Statements (Response):
P312 Call a POISON CENTER or doctor/physician if you feel unwell.
P304 + P340 IF INHALED: Remove person to fresh air and keep comfortable for breathing.
P301 + P330 IF SWALLOWED: rinse mouth.

Precautionary Statements (Storage):
P403 + P233 Store in a well-ventilated place. Keep container tightly closed.
P405 Store locked up.

Precautionary Statements (Disposal):
P501 Dispose of contents/container to hazardous or special waste collection point.

Hazards not otherwise classified

See section 12 - Results of PBT and vPvB assessment.

3. Composition / Information on Ingredients


<table>
<thead>
<tr>
<th>CAS Number</th>
<th>Weight %</th>
<th>Chemical name</th>
</tr>
</thead>
<tbody>
<tr>
<td>110-63-4</td>
<td>&gt;= 99.5 - &lt;= 100.0%</td>
<td>1,4-Butanediol</td>
</tr>
</tbody>
</table>

4. First-Aid Measures

Description of first aid measures

General advice:
Remove contaminated clothing.

If inhaled:
Remove the affected individual into fresh air and keep the person calm. Assist in breathing if necessary. Seek medical attention if necessary.
If on skin:
Wash affected areas thoroughly with soap and water. Remove contaminated clothing. Wash soiled clothing immediately. If irritation develops, seek medical attention.

If in eyes:
Wash affected eyes for at least 15 minutes under running water with eyelids held open. If irritation develops, seek medical attention.

If swallowed:
Rinse mouth and then drink plenty of water. Induce vomiting. Never induce vomiting or give anything by mouth if the victim is unconscious or having convulsions. Immediate medical attention required.

Most important symptoms and effects, both acute and delayed
Symptoms: Overexposure may cause: unconsciousness, lethargy

Indication of any immediate medical attention and special treatment needed
Note to physician
Treatment: Treat according to symptoms (decontamination, vital functions), no known specific antidote.

5. Fire-Fighting Measures

Extinguishing media
Suitable extinguishing media:
foam, dry powder, water spray, carbon dioxide

Special hazards arising from the substance or mixture
Hazards during fire-fighting:
carbon oxides, nitrogen oxides
The substances/groups of substances mentioned can be released in case of fire. Under certain conditions in case of fire other hazardous combustion products may be generated.

Advice for fire-fighters
Protective equipment for fire-fighting:
Firefighters should be equipped with self-contained breathing apparatus and turn-out gear.

Further information:
Collect contaminated extinguishing water separately, do not allow to reach sewage or effluent systems.

Impact Sensitivity:
Remarks: Based on the chemical structure there is no shock-sensitivity.

6. Accidental release measures

Personal precautions, protective equipment and emergency procedures
Wear appropriate respiratory protection. Use personal protective clothing. Ensure adequate ventilation.

Environmental precautions
Methods and material for containment and cleaning up
Spills should be contained, solidified, and placed in suitable containers for disposal.

7. Handling and Storage

Precautions for safe handling
See MSDS section 10 - Stability and reactivity. See MSDS section 5 - Fire fighting measures.

Protection against fire and explosion:
Prevent electrostatic charge - sources of ignition should be kept well clear - fire extinguishers should be kept handy.

Conditions for safe storage, including any incompatibilities
Suitable materials for containers: Stainless steel 1.4301 (V2), Stainless steel 1.4541, Stainless steel 1.4401, Stainless steel 1.4571, High density polyethylene (HDPE)
Unsuitable materials for containers: Paper/Fibreboard, board, Carbon steel (Iron), Aluminium

Further information on storage conditions: Containers should be stored tightly sealed in a dry place. Keep container tightly closed.

Storage stability:
Storage temperature: 20 °C
Storage duration: 24 Months
From the data on storage duration in this safety data sheet no agreed statement regarding the warrantee of application properties can be deduced.

8. Exposure Controls/Personal Protection

No occupational exposure limits known.

Advice on system design:
Provide local exhaust ventilation to control vapours/mists.

Personal protective equipment

Respiratory protection:
Wear respiratory protection if ventilation is inadequate. Wear a NIOSH-certified (or equivalent) organic vapour respirator. For emergency or non-routine, high exposure situations, use a NIOSH-certified full facepiece pressure demand self-contained breathing apparatus (SCBA) or a full facepiece pressure demand supplied-air respirator (SAR) with escape provisions. Observe OSHA regulations for respirator use (29 CFR 1910.134).

Hand protection:
Chemical resistant protective gloves, Consult with glove manufacturer for testing data.

Eye protection:
Wear face shield or tightly fitting safety goggles (chemical goggles) if splashing hazard exists.

Body protection:
Body protection must be chosen depending on activity and possible exposure, e.g. head protection, apron, protective boots, chemical-protection suit.
Body protection must be chosen depending on activity and possible exposure, e.g. apron, protecting boots, chemical-protection suit (according to EN 14605 in case of splashes or EN ISO 13982 in case of dust).

**General safety and hygiene measures:**
Eye wash fountains and safety showers must be easily accessible. Wear protective clothing as necessary to minimize contact. When using, do not eat, drink or smoke. Hands and/or face should be washed before breaks and at the end of the shift. Gloves must be inspected regularly and prior to each use. Replace if necessary (e.g. pinhole leaks). Take off immediately all contaminated clothing. Wash contaminated clothing before reuse. Store work clothing separately.

### 9. Physical and Chemical Properties

- **Form:** oily, liquid
- **Odour:** almost odourless
- **Odour threshold:** not determined
- **Colour:** colourless
- **pH value:** 7.2 - 7.9 (500 g/l, 20 °C) (DIN 19268)
- **Melting point:** 20.4 °C (1,013 hPa)
- **boiling temperature:** 230 °C (1,013 hPa)
- **Flash point:** 115 °C (DIN 51758, closed cup)
- **Flammability:** not flammable
- **Lower explosion limit:** For liquids not relevant for classification and labelling. The lower explosion point may be 5 - 15 °C below the flash point.
- **Upper explosion limit:** For liquids not relevant for classification and labelling.
- **Autoignition:** 385 °C (DIN 51794)
- **Vapour pressure:** 0.014 hPa (25 °C) negligible
- **Density:**
  - 1.02 g/cm³ (20 °C, 1,013 hPa) liquid
  - 1.0202 g/cm³ (15 °C, 1,013 hPa)
  - 0.9980 g/cm³ (50 °C, 1,013 hPa)
- **Relative density:** 1.02 (20 °C, 1,013 hPa) (in liquid state), Literature data.
- **Vapour density:** not relevant
- **Partitioning coefficient n-octanol/water (log Pow):** -0.88 (25 °C) (OECD Guideline 107)
  The data refers to the undissociated form of the substance.
- **Self-ignition temperature:** not self-igniting
- **Thermal decomposition:** 115 °C, 80 kJ/kg (DSC (DIN 51007))
  It is not a self-decompositionable substance.
10. Stability and Reactivity

Reactivity
No hazardous reactions if stored and handled as prescribed/indicated.

Corrosion to metals:
Not corrosive to: iron Aluminium Stainless steel

Oxidizing properties:
Based on its structural properties the product is not classified as oxidizing.

<table>
<thead>
<tr>
<th>Reactions with</th>
<th>Reaction with:</th>
<th>water</th>
</tr>
</thead>
<tbody>
<tr>
<td>water/air:</td>
<td>Flammable gases:</td>
<td>no</td>
</tr>
<tr>
<td></td>
<td>Toxic gases:</td>
<td>no</td>
</tr>
<tr>
<td></td>
<td>Corrosive gases:</td>
<td>no</td>
</tr>
</tbody>
</table>

Formation of flammable gases: Remarks: Forms no flammable gases in the presence of water.

Chemical stability
The product is stable if stored and handled as prescribed/indicated.

Possibility of hazardous reactions
The product is chemically stable.
Reacts with oxidizing agents.

Conditions to avoid
Avoid all sources of ignition: heat, sparks, open flame.

Incompatible materials
strong oxidizing agents

Hazardous decomposition products

Decomposition products:
Hazardous decomposition products: carbon monoxide, carbon dioxide
Possible decomposition products: tetrahydrofuran

Thermal decomposition:
115 °C (DSC (DIN 51007))
11. Toxicological information

Primary routes of exposure

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

Acute Toxicity/Effects

Acute toxicity
Assessment of acute toxicity: Of moderate toxicity after single ingestion. Virtually nontoxic after a single skin contact. Virtually nontoxic by inhalation.

Information on: 1,4-Butanediol

Information on: 1,4-Butanediol

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Oral
Type of value: LD50
Species: rat (male/female)
Value: 1,500 mg/kg (BASF-Test)

Inhalation
Type of value: LC50
Species: rat (male/female)
Value: > 5.1 mg/l (OECD Guideline 403)
Exposure time: 4 h
An aerosol was tested.
No mortality was observed. The value meets the highest applied test concentration.

Dermal
Type of value: LD50
Species: rat (male/female)
Value: > 2,000 mg/kg (BASF-Test)
The value meets the highest applied test concentration. No mortality was observed.

Assessment other acute effects
Assessment of STOT single:
Possible narcotic effects (drowsiness or dizziness).

Irritation / corrosion
Assessment of irritating effects: Not irritating to the skin. Not irritating to the eyes.

Information on: 1,4-Butanediol

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Skin
Species: rabbit
Result: non-irritant
Method: Draize test

Eye
Species: rabbit
Result: non-irritant
Method: Draize test

Sensitization
Assessment of sensitization: Skin sensitizing effects were not observed in animal studies. The substance did not cause skin sensitization in humans.

Guinea pig maximization test
Species: guinea pig
Result: Non-sensitizing.

Aspiration Hazard
not applicable

Chronic Toxicity/Effects

Repeated dose toxicity
Assessment of repeated dose toxicity: The substance may cause damage to the liver after repeated ingestion of high doses, as shown in animal studies.

Genetic toxicity
Assessment of mutagenicity: The substance was not mutagenic in bacteria. The substance was not mutagenic in mammalian cell culture.

Carcinogenicity
Assessment of carcinogenicity: The product has not been tested. The statement has been derived from substances/products of a similar structure or composition. In long-term animal studies in which the substance was given by gavage in high doses, a carcinogenic effect was not observed.

Reproductive toxicity
Assessment of reproduction toxicity: The results of animal studies gave no indication of a fertility impairing effect. The results were determined in a Screening test (OECD 421/422).

Teratogenicity
Assessment of teratogenicity: Animal studies gave no indication of a developmental toxic effect at doses that were not toxic to the parental animals. The product has not been fully tested. The statements have been derived in parts from products of a similar structure or composition.

Symptoms of Exposure

Overexposure may cause: unconsciousness, lethargy

Medical conditions aggravated by overexposure
Data available do not indicate that there are medical conditions that are generally recognized as being aggravated by exposure to this substance/product. See MSDS section 11 - Toxicological information.

12. Ecological Information

Toxicity

Aquatic toxicity
Assessment of aquatic toxicity:
There is a high probability that the product is not acutely harmful to aquatic organisms. The inhibition of the degradation activity of activated sludge is not anticipated when introduced to biological treatment plants in appropriate low concentrations.

**Toxicity to fish**
LC50 (96 h) > 30,000 mg/l, Pimephales promelas (OECD 203; ISO 7346; 84/449/EEC, C.1, static)
The details of the toxic effect relate to the nominal concentration.

**Aquatic invertebrates**
EC50 (48 h) 813 mg/l, Daphnia magna (OECD Guideline 202, part 1, static)
The statement of the toxic effect relates to the analytically determined concentration.

**Aquatic plants**
EC50 (72 h) > 500 mg/l (growth rate), Scenedesmus subspicatus (DIN 38412 Part 9)
Nominal concentration.

**Chronic toxicity to fish**
Study scientifically not justified.

**Chronic toxicity to aquatic invertebrates**
No observed effect concentration (21 d) > 85 mg/l, Daphnia magna (OECD Guideline 202, part 2, semistatic)

**Assessment of terrestrial toxicity**
Study scientifically not justified.

**Microorganisms/Effect on activated sludge**

**Toxicity to microorganisms**
other Protozoa/EC50 (40 h): > 15,000 mg/l

OECD Guideline 209 activated sludge, industrial/EC20 (30 min): > 788 mg/l
Nominal concentration.

**Persistence and degradability**

**Assessment biodegradation and elimination (H2O)**
Readily biodegradable (according to OECD criteria).

**Elimination information**
approx. 74 - 96 % BOD of the ThOD (14 d) (OECD 301C; ISO 9408; 92/69/EEC, C.4-F) (aerobic, activated sludge)
90 - 100 % DOC reduction (7 d) (OECD Guideline 302 B) (aerobic, activated sludge, industrial)

**Assessment of stability in water**
In contact with water the substance will hydrolyse slowly.

**Information on Stability in Water (Hydrolysis)**
0 % (25 °C), (OECD Guideline 111, pH 7)

**Bioaccumulative potential**

**Bioaccumulation potential**
Because of the n-octanol/water distribution coefficient (log Pow) accumulation in organisms is not to be expected.
Mobility in soil

Assessment transport between environmental compartments
The substance will not evaporate into the atmosphere from the water surface. Adsorption to solid soil phase is not expected.

Additional information

Sum parameter

Chemical oxygen demand (COD): (DIN 38409 Part 41) \( 1,892 \text{ mg/g} = 9,650 \text{ mg/l} \)

Biochemical oxygen demand (BOD) Incubation period 5 d: \( 102 \text{ mg/g} = 520 \text{ mg/l} \)

Ratio BOD/COD: 5%

Adsorbable organically-bound halogen (AOX):
This product contains no organically-bound halogen.

13. Disposal considerations

Waste disposal of substance:
Do not discharge substance/product into sewer system. Dispose of in a RCRA-licensed facility. Dispose of in accordance with national, state and local regulations.

Container disposal:
Dispose of in a licensed facility. Recommend crushing, puncturing or other means to prevent unauthorized use of used containers.

14. Transport Information

Land transport
USDOT
Not classified as a dangerous good under transport regulations

Sea transport
IMDG
Not classified as a dangerous good under transport regulations

Air transport
IATA/ICAO
Not classified as a dangerous good under transport regulations

15. Regulatory Information

Federal Regulations

Registration status:
Chemical TSCA, US released / listed

EPCRA 311/312 (Hazard categories): Acute;
NFPA Hazard codes:
Health : 2   Fire: 1   Reactivity: 0   Special:

Assessment of the hazard classes according to UN GHS criteria (most recent version):

<table>
<thead>
<tr>
<th>Acute Tox.</th>
<th>STOT SE</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 (oral)</td>
<td>3 (Vapours may cause drowsiness and dizziness.)</td>
</tr>
</tbody>
</table>

Acute toxicity
Specific target organ toxicity — single exposure

16. Other Information

SDS Prepared by:
BASF NA Product Regulations
SDS Prepared on: 2016/08/01

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