



INTERNATIONAL DIOL COMPANY

Safety Data Sheet

According to Regulation (EC) No. 1272/2008, Regulation (EC) 1907/2006

1. Identification of the substance/mixture and of the responsible company

1.1. Product Identifier: 1,4 Butanediol (BDO) CAS NO: 110-63-4

BUTYLENE GLYCOL; 1,4-BUTYLENE GLYCOL; 1,4-DIHYDROXYBUTANE; TETRAMETHYLENE 1,4-DIOL; TETRAMETHYLENE GLYCOL; 1,4-TETRAMETHYLENE GLYCOL; BUTANEDIOL; BUTANE-1,4-DIOL; 1,4-TETRAMETHYL GLYCOL; DIOL 14B; SUCOL B; C₄H₁₀O₂

1.2. Relevant identified uses of the substance or mixture and uses advised against:

Identified uses: chemical intermediate for tetrahydrofuran and gammabutyrolactone synthesis, reactant polybutylene terephthalate resins, chain extender for polyurethane (PU) resins.

Uses advised against: cosmetics, personal care products, coatings on children's toys, other chemical uses other than as a reactive chemical product

1.3. Details of the supplier of the safety data sheet:

International Diol Company
PO Box 12021
Jubail Industrial City - 31961
Kingdom Of Saudi Arabia.

Website: www.sipchem.com/en/affiliates2.htm

1.4. Emergency telephone number: 00966-359 9985 (24 hours)

2. Hazards Identification

1,4 Butane diol CAS 110-63-4 Purity: >99%

Trace Impurities: 1-Butanol, acidic materials, acetals and aldehydes

2.1 Classification of the substance or mixture:

Classification of Labeling in accordance with the CLP Regulations:

Index No	International Chemical Identification	EC No	CAS No	Classification		Labeling			Specific Conc. Limits, M-factors	Notes
				Hazard Class and Category Code(s)	Hazard statement Code(s)	Pictogram Signal Word Code(s)	Hazard Statement Code(s)	Suppl. Hazard statement Code(s)		
	1,4 butanediol	203-786-5	110-63-4	Xn, R22	H302 H433	GHS07			100	

Classification according to Regulation 1272/2008/EC (CLP)

Basis for Classification This substance is classified based on Directive 1272/2008/EC and its amendments (CLP Regulation, GHS)

1,4-BUTANEDIOL (110-63-4) Symbol(s):

Signal Word: Warning

Hazard(s):

H302: Harmful if swallowed

H433: Harmful to terrestrial vertebrates

Prevention:

P264: Wash ... thoroughly after handling.

P270: Do not eat, drink or smoke when using this product.

Response:

P301+P312: IF SWALLOWED: Call a POISON CENTER or doctor/physician if you feel unwell.

P330: Rinse mouth.

Disposal:

P501: Dispose of contents/container to all governmental regulations. Incineration is a preferred method.

SAFETY DATA SHEET**Emergency overview: WARNING**

Combustible liquid. May be harmful if ingested or inhaled. Avoid skin contact.

Potential chronic health effects:

CARCINOGENIC EFFECTS: No carcinogenic effects reported

MUTAGENIC EFFECTS: Negative (Mammalian cell)

REPRODUCTION TOXICITY: Negative (Mammalian cell and chromosome aberration) See Section 11.

2.1. Label: See table above.

2.2. Other hazards: None known.

3. Composition/information on ingredients

Formula	C4H10O2
CAS-No.	110-63-4
EC-No.	203-786-5
Mol Wt.	90.12 g/mol

4. First Aid Measures

4.1. Description of first aid measures

Eye Contact: Check for and remove any contact lenses. Immediately flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical attention immediately.

Skin Contact: In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. Clean shoes thoroughly before reuse. Get medical attention immediately.

Inhalation: Move exposed person to fresh air. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. Loosen tight clothing such as a collar, tie, belt or waistband. Get medical attention immediately.

Ingestion: Wash out mouth and water. Do not induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Get medical attention immediately.

4.2. Most important symptoms and effects, both acute and delayed:

At high levels CNS disorders, headache, dizziness, unconsciousness. Potential damage to liver and kidneys.

4.3. Indication of immediate medical attention and special treatment needed:

Treat symptomatically and supportively. 1,4 Butanediol is metabolized in vitro to succinic acid and 4—hydroxybutyric acid.

5. Firefighting measures

5.1. Extinguishing media

Suitable extinguishing media: Water spray (fog), dry chemical, CO₂, foams

Unsuitable extinguishing media: Do not use a water jet.

5.2. Special hazards arising from the substance or mixture:

Vapors are heavier than air and may spread along floor surfaces.

5.3. Advice for fire fighters:

Special protective equipment for fire fighters: Fire fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode. Prevent mixing with alkali and amines materials.

Further information: Promptly isolate the scene by removing all persons from the vicinity of the incident if there is a fire. No action shall be taken involving an personal risk or without suitable training. Move containers from fire area if this can be done without risk. Use water spray to keep fire-exposed containers cool. Do not allow fire extinguishing water to contaminate surface or groundwater systems.

6. Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures:

Advice for non-emergency personnel: Evacuate the danger zone; follow emergency precautions. Secure emergency assistance immediately. Avoid contact with the material; do not breath dusts. If possible, provide additional ventilation.

Advice for emergency responders: Do not take action without proper training and emergency equipment. See Section 8 for additional information. Evacuate surrounding areas. Eliminate all ignition sources including flares and all open flames. Avoid all contact with spilled material. Maintain adequate ventilation and wear appropriate respiratory protection.

6.2. Environmental precautions:

Avoid dispersal of spilled material, runoff and contact with soil, waterways, drains and sewers. Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air).

6.3. Methods and materials for containment:

Stop leak or spill if without risk. Move containers from spill area. Approach release from upwind. Prevent entry into sewers, surface waters, basements or confined areas. Wash spillage into effluent treatment plant. Contain and collect spillage using appropriate personal protective equipment. Chemical-resistant, impervious gloves complying

with an approved standard should be worn at all times when handling chemical products or if a risk assessment indicates this is necessary. Collect and contain spillage with non-combustible, absorbent material (e.g. sand, earth, vermiculite or diatomaceous earth) and place in a container for disposal according to local regulations. Use spark-proof tools and explosion proof equipment if flammable gasses, liquids or vapors are present in the spill area. Contaminated absorbent material may pose the same hazard(s) as the spilled product.

6.4. Reference to other sections:

See disposal instruction 13 and exposure controls Section 8.

7. Handling and storage

7.1. Precautions for safe handling:

Observe all label precautions. Use appropriate personal protective equipment (see section 8). Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. Do not get in eyes or on skin or clothing. Do not ingest. Avoid breathing vapor or mist. Use only with adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Do not enter storage areas and confined spaces unless adequately ventilated. Keep in the original container or an approved alternative made from a compatible material, kept tightly closed when not in use. Store and use away from heat, sparks, open flame or any other ignition source. To avoid fire or explosion, dissipate static electricity during transfer by grounding and bonding containers and equipment before transferring material. Empty containers retain product residue and can be hazardous. Do not reuse container.

Advice on protection against fire and explosion: Keep away from flames and sources of ignition – including static.

7.2. Conditions for safe storage, including any incompatibilities:

Store in accordance with local regulations. Store in a segregated and approved area. Store in original or bulk storage container protected from direct sunlight in a dry, cool and well-ventilated area, away from incompatible materials (see section 10) and food and drink. Eliminate all ignition sources. Separate from oxidizing materials, amines and alkalis.

Bulk storage should be in approved vessels, preferably stainless steel that is grounded and vented. Keep use containers tightly closed and sealed until ready for use. Containers that have been opened must be carefully resealed and kept upright to prevent leakage. Do not store in unlabeled containers. Use appropriate containment to avoid environmental contamination. Do not store in mild steel containers.

7.3. Specific end uses:

No other additional special end uses are anticipated.

8. Exposure controls/personal protection

8.1. Control parameters:

Personal, workplace or environmental monitoring may be necessary to ensure exposures are below recommended and legal limits.

Exposure limits:

ACGIH, NIOSH, OSHA (US), Mexico, and EU have not developed exposure limits for 1,4 butanediol. Use recommended safe handling practices to minimize unnecessary exposure.

Exposure Limits for Chemicals which may be generated during processing

This material has no components listed.

8.2. Exposure controls:

Engineering measures: Use only with adequate ventilation. Use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure to airborne contaminants below any recommended or statutory limits. The engineering controls also need to keep gas, vapor or dust concentrations below any lower explosive limits. Use explosion-proof ventilation equipment.

Individual protection measures:

Hygiene measures: Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period. Appropriate techniques should be used to remove potentially contaminated clothing. Discard contaminated clothing or wash thoroughly before reusing. Ensure that eyewash stations and safety showers are close to the workstation location.

Eye/face protection: Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to product dusts, liquid splashes or mists. Goggles should be worn where eye contact is possible.

Hand protection: Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is required.

Glove material: nitrile, butyl rubber or PVC
 Glove thickness: 0.7 mm or thicker
 Break through time: > 240 minutes

Other protective equipment: Flame retardant antistatic protective clothing may be required if used in areas where flammables are processed.

Respiratory protection: A properly fitted air purifying respirator or air supply respirator should be worn if a risk assessment indicates that respiratory protection is necessary. Respirator selection must be based upon known or measured levels of exposure.

Environmental exposure controls: Ventilation and engineering controls to protect workers and ventilate work area to at or below recommended employee exposure levels. Technical measures are preferred over use of personal protective equipment. Environmental controls, such as scrubber or thermal oxidizer may be required to prevent process releases to the atmosphere. Do not empty or flush into drains.

9. Physical and chemical properties

9.1. Information on basic physical and chemical properties:

Physical State: Liquid	Appearance: clear
Color: colorless	Physical Form: liquid
Odor: faint odor	Odor Threshold: Not available
Texture: viscous	pH: neutral
Melting Point: 19 - 20 °C	Boiling Point: 228 °C
Evaporation Rate: <1 butyl acetate=1	Flash Point: >121 °C OC
LEL: 1.95 %	OSHA Flammability Class: IIIB
UEL: 18.3 %	Autoignition: 350 °C
Vapor Pressure: <1 mmHg 38 °C	Vapor Density (air = 1): 3.1
Density: Not available	Specific Gravity (water = 1): 1.017
Water Solubility: soluble	Coeff. Water/Oil Dist: Not available
Viscosity: 84.9 cP 20 °C	Volatility: 0 %
Molecular Weight: 90.12	Molecular Formula: H-O-(C-H ₂) ₄ -O-H

Solvent Solubility**Soluble: alcohols, slightly soluble ethers****10. Stability and reactivity**

- 10.1. Reactivity:
No hazardous reactivity.
- 10.2. Chemical stability:
Stable at normal temperatures and pressure
- 10.3. Possibility of hazardous reactions:
May polymerizes with evolution of heat. Avoid contact with heat, acids or amines.
- 10.4. Conditions to avoid:
Avoid heat, flames, sparks and other sources of ignition. Avoid contact with incompatible materials
- 10.5. Incompatible materials:
Acids, oxidizing materials, metal oxides, metal salts,
- 10.6. Hazardous decomposition products:
Thermal decomposition will yield oxides of carbon.

11. Toxicological information

- 11.1. Information on toxicological effects:

<u>Acute oral toxicity</u> LD50 rat:	1525 mg/kg (RTECS)
<u>Dermal LD50</u> rabbit:	>2000 mg/kg (RTECS)
<u>Acute inhalation toxicity:</u>	>5.1 mg/kg 4 hours (IUCLID)
<u>Skin irritation:</u>	Mild irritation on repeated exposure. (RTECS)
<u>Eye irritation (rabbit):</u>	May cause eye irritation (RTECS)
<u>Sensitization (guinea pig):</u>	Negative
<u>Genotoxicity and Reproductive Effects:</u>	No impairment of reproductive performance expected (Lit)
Ames test:	negative (IUCLID)
<u>Specific target organ toxicity - single exposure:</u>	May cause respiratory irritation.
<u>Specific target organ toxicity - repeated exposure:</u>	This substance is not classified as a specific target organ toxicant, repeated exposure.
<u>Aspiration hazard:</u>	No information available

- 11.2. Additional information:

After uptake of large quantities:

Systemic effects: May aggravate existing skin disorders and allergies. Ingestion: May cause nausea and vomiting. Central nervous system effects may include excitation, euphoria, headache, dizziness, drowsiness, dullness, blurred vision, fatigue, tremors, convulsions, unconsciousness, severe narcosis, coma, respiratory arrest, and death, a result of collapse of the sympathetic and parasympathetic nervous system. May also affect renal

function and cause renal damage. Animal studies also noted constriction of pupils and total loss of reflexes. One study using rats showed a weight loss during the first 8 of 29 weeks. Another study using rats given 30 mg/kg/day, for 6 months, showed blood cholinesterase depression, changes in protein fraction of the serum, and decrease in sh-groups of the blood. The no effect level was 25 mg/kg/day.

Further data: Handle using good occupational and environmental health practices.

12. Ecological information

12.1. Toxicity

Toxicity in fish LC50: >10000 mg/L (96 hr Static, *Leuciscus idus*)

Toxicity to daphnia and other aquatic invertebrates: 813 mg/L (48hr, *Daphnia magna*)

Toxicity to algae >500 mg/L (96hr, *Desmodesmus subspicatus*)

12.2. Persistence and degradability:

Expected to be readily biodegradable

12.3. Bio accumulative potential:

Bioaccumulation not expected.

Mobility in soil:

No information available.

12.4. Results of PBT and vPvB assessment:

Assessment not available.

12.5. Other adverse effects:

No additional environmental adverse effects are known.

Additional ecological information: Do not allow product to enter surface waters, wastewater or soil.

13. Disposal considerations

Waste treatment methods: The generation of waste should be avoided or minimized wherever possible. Empty containers or liners may retain some product residues. This material and its container must be disposed of in a safe way. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers.

14. Transport Information

The transport regulations are cited according to international and/or harmonized transport regulations. Possible national deviations and country specific requirements are not considered.

US DOT Information:	No Classification assigned.
TDG Information:	No Classification assigned.
ADR Information:	No Classification assigned.
RID Information:	No Classification assigned.
IATA Information:	No Classification assigned.
ICAO Information:	No Classification assigned.
IMDG Information:	No Classification assigned.

15. Regulatory information

15.1. Safety, health and environmental regulations/legislation specific for the substance or mixture:

U.S. Federal Regulations

None of this products components are listed under SARA Section 302 (40 CFR 355 Appendix A), SARA Section 311/312 (40 CFR 370.21), SARA Section 313 (40 CFR 372.65), CERCLA (40 CFR 302.4), TSCA 12(b), or require an OSHA process safety plan.

SARA Section 311/312 (40 CFR 370 Subparts B and C)

Acute Health: No Chronic Health: No Fire: No Pressure: No Reactive: No

U.S. State Regulations

None of this product's components are listed on the state lists from CA, MA, MN, NJ or PA. Not listed under California Proposition 65

Germany Water Classification (110-63-4): ID Number 1338, hazard class 1 - low hazard to waters

Symbol(s): Xn Harmful

Risk Phrases

R22 Harmful if swallowed.

Safety Phrases

S2 Keep out of the reach of children.

S13 Keep away from food, drink and animal feedingstuffs.

S24 Avoid contact with skin.

S36 Wear suitable protective clothing.

S46 If swallowed, seek medical advice immediately and show this container or label.

Regulatory Inventory Status

Component	CAS	US	CA	EU	AU	PH	JP	KR	CN	NZ
1,4-BUTANEDIOL	110-63-4	Yes	DSL	EIN	Yes	Yes	Yes	Yes	Yes	Yes

Taiwan GHS Classifications

Information below presented according to Taiwan's Bureau of Standards, Metrology and Inspection (BSMI) of the Ministry of Economic Affairs. This agency has published a series of standards (CNS 15030 1-27 Chemical Classification and Labeling) which provide guidance on classification and labeling of chemicals according to GHS.

1,4-BUTANEDIOL (110-63-4)

Taiwan: Acute toxicity - Oral - Category 4 **H302** Harmful if swallowed.

Aspiration hazard - Category 2 **H305** May be harmful if swallowed and enters airways.

Taiwan GHS Labeling Information

Labeling information below according to classifications published by Taiwan's Bureau of Standards, Metrology and Inspection (BSMI) of the Ministry of Economic Affairs. This agency has published a series of standards (CNS 15030 1-27 Chemical Classification and Labeling) which provide guidance on classification and labeling of chemicals according to GHS.

Symbols:



Signal Word: Warning

Hazard(s):

H302: Harmful if swallowed

H305: May be harmful if swallowed and enters airways

Prevention:

P264: Wash ... thoroughly after handling.

P270: Do not eat, drink or smoke when using this product.

Response:

P301+P310: IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician.

P301+P312: IF SWALLOWED: Call a POISON CENTER or doctor/physician if you feel unwell.

P330: Rinse mouth.

P331: Do NOT induce vomiting.

Storage:

P405: Store locked up.

Disposal:

P501: Dispose of contents/container to ..

15.2. Chemical Safety Assessment:

Sipchem has not conducted a chemical safety assessment for this product.

16. Other information

16.1. Training Advice:

Provide safety information, instruction and training to operators handling tetrahydrofuran.

The information and recommendations herein are taken from data contained in independent, industry recognized references. Although reasonable care has been taken in the preparation of the information herein, Sipchem and International Diol Company make no guarantee, warranty (express or implied) or other representation and assume no responsibility as to the accuracy or suitability of such information for application of the information, since conditions of its use are beyond control of these companies. Sipchem and International Diol Company shall not bear any liability whatsoever for any loss or damage incurred in connection with the use of this substance.