SAFETY DATA SHEET

1,3 Butadiene

Section 1. Identification

GHS product identifier	1,3 Butadiene
Chemical name	1,3-Butadiene
Other means of identification	buta-1,3-diene; Butadiene; .alpha.,.gamma.-Butadiene; Biethylene; Bivinyl; Erythrene; Pyrrolylene; Vinylethylene; Butadiene (1,3-Butadiene); Divinyl
Product use	Industrial use
Supplier's details	TPC Group One Allen Center, Suite 2000 Houston, TX, 77002, USA T 713-627-7474
company web address	www.tpcgrp.com
Emergency telephone number (with hours of operation)	800-424-9300 (Chemtrec - U.S.) +1-703-527-3887 (Chemtrec - International)

Section 2. Hazards identification

OSHA/HCS status	This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200).
Classification of the substance or mixture	FLAMMABLE GASES - Category 1 GASES UNDER PRESSURE - Compressed gas GERM CELL MUTAGENICITY - Category 1B CARCINOGENICITY - Category 1A

GHS label elements

Hazard pictograms

Signal word	Danger
Hazard statements	Extremely flammable gas. Contains gas under pressure; may explode if heated. May cause genetic defects. May cause cancer.

Precautionary statements

General	Not applicable.
Prevention	Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Use personal protective equipment as required. Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.
Response	IF exposed or concerned: Get medical attention. Leaking gas fire: Do not extinguish, unless leak can be stopped safely. Eliminate all ignition sources if safe to do so.
Storage	Store locked up. Protect from sunlight. Store in a well-ventilated place.
Disposal	Dispose of contents and container in accordance with all local, regional, national and international regulations.

Section 2. Hazards identification

Supplemental label elements Protect container from physical shock. Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.

Hazards not otherwise classified Unstable. Sensitive to heat or shock. May become explosive.

Section 3. Composition/information on ingredients

Substance/mixture Substance

Chemical name 1,3-Butadiene

Other means of identification buta-1,3-diene; Butadiene; .alpha.,.gamma.-Butadiene; Biethylene; Bivinyl; Erythrene; Pyrrolylene; Vinylethylene; Butadiene (1,3-Butadiene); Divinyl

CAS number/other identifiers

CAS number 106-99-0

Product code Not available.

Ingredient name	%	CAS number
1,3-Butadiene	99.5	106-99-0

Any concentration shown as a range is to protect confidentiality or is due to batch variation.

There are no additional ingredients present which, within the current knowledge of the supplier and in the concentrations applicable, are classified as hazardous to health or the environment and hence require reporting in this section.

Occupational exposure limits, if available, are listed in Section 8.

Section 4. First aid measures

Description of necessary first aid measures

Eye contact Immediately flush eyes with plenty of water, occasionally lifting the upper and lower eyelids. Check for and remove any contact lenses. Continue to rinse for at least 10 minutes. Get medical attention.

Inhalation Remove victim to fresh air and keep at rest in a position comfortable for breathing. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Get medical attention. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband.

Skin contact Flush contaminated skin with plenty of water. Remove contaminated clothing and shoes. To avoid the risk of static discharges and gas ignition, soak contaminated clothing thoroughly with water before removing it. Continue to rinse for at least 10 minutes. Get medical attention. Wash clothing before reuse. Clean shoes thoroughly before reuse.

Ingestion As this product is a gas, refer to the inhalation section.

Most important symptoms/effects, acute and delayed

Potential acute health effects

Eye contact Contact with rapidly expanding gas may cause burns or frostbite.

Inhalation No known significant effects or critical hazards.

Skin contact Contact with rapidly expanding gas may cause burns or frostbite.

Ingestion As this product is a gas, refer to the inhalation section.

Over-exposure signs/symptoms

Eye contact No specific data.

Inhalation No specific data.

Skin contact No specific data.

Ingestion No specific data.

Section 4. First aid measures

Indication of immediate medical attention and special treatment needed, if necessary

Notes to physician Treat symptomatically. Contact poison treatment specialist immediately if large quantities have been ingested or inhaled.

Specific treatments No specific treatment.

Protection of first-aiders No action shall be taken involving any personal risk or without suitable training. If it is suspected that fumes are still present, the rescuer should wear an appropriate mask or self-contained breathing apparatus. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Wash contaminated clothing thoroughly with water before removing it, or wear gloves.

See toxicological information (Section 11)

Section 5. Fire-fighting measures

Extinguishing media

Suitable extinguishing media Use dry chemical, CO_2, alcohol-resistant foam or water spray (fog).

Unsuitable extinguishing media None known.

Specific hazards arising from the chemical Contains gas under pressure. Extremely flammable gas. Material will produce a vigorous reaction under conditions of shock, pressure or temperature. In a fire or if heated, a pressure increase will occur and the container may burst, with the risk of a subsequent explosion.

Hazardous thermal decomposition products Decomposition products may include the following materials:
carbon dioxide
carbon monoxide

Special protective actions for fire-fighters Promptly isolate the scene by removing all persons from the vicinity of the incident if there is a fire. First move people out of line-of-sight of the scene and away from windows. No action shall be taken involving any personal risk or without suitable training. Contact supplier immediately for specialist advice. Move containers from fire area if this can be done without risk. Use water spray to keep fire-exposed containers cool. If involved in fire, shut off flow immediately if it can be done without risk. If this is impossible, withdraw from area and allow fire to burn. Fight fire from protected location or maximum possible distance. Do not fight fire when it reaches the material. Withdraw from fire and let it burn. Eliminate all ignition sources if safe to do so.

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. Fire-fighters' protective clothing will only provide limited protection.

Section 6. Accidental release measures

Personal precautions, protective equipment and emergency procedures

For non-emergency personnel Accidental releases pose a serious fire or explosion hazard. No action shall be taken involving any personal risk or without suitable training. Evacuate surrounding areas. Keep unnecessary and unprotected personnel from entering. Shut off all ignition sources. No flares, smoking or flames in hazard area. Avoid breathing gas. Provide adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Put on appropriate personal protective equipment.

For emergency responders If specialized clothing is required to deal with the spillage, take note of any information in Section 8 on suitable and unsuitable materials.
See also the information in "For non-emergency personnel".

Environmental precautions Ensure emergency procedures to deal with accidental gas releases are in place to avoid contamination of the environment. Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air).

Section 6. Accidental release measures

Methods and materials for containment and cleaning up

Small spill

Immediately contact emergency personnel. Stop leak if without risk. Use spark-proof tools and explosion-proof equipment.

Large spill

Immediately contact emergency personnel. Stop leak if without risk. Use spark-proof tools and explosion-proof equipment. Note: see Section 1 for emergency contact information and Section 13 for waste disposal.

Section 7. Handling and storage

Precautions for safe handling

Protective measures

Put on appropriate personal protective equipment (see Section 8). Contains gas under pressure. Avoid exposure - obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Do not get in eyes or on skin or clothing. Avoid breathing gas. Use only with adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Do not enter storage areas and confined spaces unless adequately ventilated. Store and use away from heat, sparks, open flame or any other ignition source. Use explosion-proof electrical (ventilating, lighting and material handling) equipment. Use only non-sparking tools. Empty containers retain product residue and can be hazardous. Do not puncture or incinerate container.

Advice on general occupational hygiene

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. Remove contaminated clothing and protective equipment before entering eating areas. See also Section 8 for additional information on hygiene measures.

Conditions for safe storage, including any incompatibilities

Store in accordance with local regulations. Store in a segregated and approved area. Store away from direct sunlight in a dry, cool and well-ventilated area, away from incompatible materials (see Section 10). Store locked up. Eliminate all ignition sources. Keep container tightly closed and sealed until ready for use.

Section 8. Exposure controls/personal protection

Control parameters

Occupational exposure limits

Ingredient name	Exposure limits
1,3-Butadiene	**ACGIH TLV (United States, 4/2014).** TWA: 2 ppm 8 hours. TWA: 4.4 mg/m3 8 hours. **OSHA PEL (United States).** TWA: 1 ppm 8 hours. STEL: 5 ppm 15 minutes.

Appropriate engineering controls

Use only with adequate ventilation. Engineering controls may be required to control the primary or secondary risks associated with this product. 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.

Environmental exposure controls

Emissions from ventilation or work process equipment should be checked to ensure they comply with the requirements of environmental protection legislation. In some cases, fume scrubbers, filters or engineering modifications to the process equipment will be necessary to reduce emissions to acceptable levels.

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. Wash contaminated clothing before reusing. Ensure that eyewash stations and safety showers are close to the workstation location.

Section 8. Exposure controls/personal protection

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 liquid splashes, mists, gases or dusts. If contact is possible, the following protection should be worn, unless the assessment indicates a higher degree of protection: safety glasses with side-shields.

Skin protection

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 necessary. Considering the parameters specified by the glove manufacturer, check during use that the gloves are still retaining their protective properties. It should be noted that the time to breakthrough for any glove material may be different for different glove manufacturers. In the case of mixtures, consisting of several substances, the protection time of the gloves cannot be accurately estimated.

Body protection
Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product. When there is a risk of ignition from static electricity, wear anti-static protective clothing. For the greatest protection from static discharges, clothing should include anti-static overalls, boots and gloves.

Other skin protection
Appropriate footwear and any additional skin protection measures should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.

Respiratory protection
Use a properly fitted, air-purifying or air-fed respirator complying with an approved standard if a risk assessment indicates this is necessary. Respirator selection must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected respirator. A respiratory protection program that meets OSHA's 29 CFR 1910.134 and ANSI Z88.2 requirements must be followed whenever work place conditions warrant a respirator's use.

Section 9. Physical and chemical properties

Appearance

Physical state	Gas. [Compressed gas.]
Color	Clear.
Odor	Mild. Aromatic. [Slight]
Odor threshold	Not available.
pH	Not available.
Melting point	-108.9°C (-164°F)
Boiling point	-4.41°C (24.1°F)
Flash point	Closed cup: -76.1°C (-105°F)
Evaporation rate	Gas (10-25°C) (50-77°F)
Flammability (solid, gas)	Not available.
Lower and upper explosive (flammable) limits	Lower: 2% Upper: 12%
Vapor pressure	34.5 PSIA @ 15.6°C (60°F)
Vapor density	1.87 [Air = 1]
Specific gravity	0.62 [Water=1] @ 15.6°C (60°F)
Auto-ignition temperature	420°C (788°F)
Solubility	Not available.
Solubility in water	Slight.
Partition coefficient n-octanol/water	1.99
Decomposition temperature	Not available.
Viscosity	Not available.
Molecular weight	54.1 g/mol
% Volatiles by volume	100

Section 9. Physical and chemical properties

Aerosol product

Heat of combustion -44.21 kJ/g

Section 10. Stability and reactivity

Reactivity

No specific test data related to reactivity available for this product or its ingredients.

Chemical stability

The product may not be stable under certain conditions of storage or use. See "Possibility of Hazardous Reactions" for further information.

Possibility of hazardous reactions

Hazardous reactions or instability may occur under certain conditions of storage or use.
Conditions may include the following:
shock
friction
high temperature
Reactions may include the following:
risk of explosion

Conditions to avoid

Avoid all possible sources of ignition (spark or flame). Do not pressurize, cut, weld, braze, solder, drill, grind or expose containers to heat or sources of ignition. Avoid shock and friction.

Incompatible materials

Peroxides, Chlorine, Phenol,Copper

Hazardous decomposition products

Under normal conditions of storage and use, hazardous decomposition products should not be produced.

Hazardous Polymerization

Hazardous polymerization may occur.

Section 11. Toxicological information

Information on toxicological effects

Acute toxicity

Product/ingredient name	Result	Species	Dose	Exposure
1,3-Butadiene	LC50 Inhalation Gas. LC50 Inhalation Vapor LD50 Oral	Rat Rat Rat	128000 ppm 285 g/m3 5480 mg/kg	4 hours 4 hours -

Irritation/Corrosion

Not available.

Sensitization

Product/ingredient name	Route of exposure	Species	Result
1,3-Butadiene	skin	Mammal - species unspecified	Not sensitizing

Mutagenicity

Product/ingredient name	Test	Experiment	Result
1,3-Butadiene	- -	Experiment: In vitro Subject: Bacteria Cell: Somatic Experiment: In vivo Subject: Mammalian-Animal Cell: Somatic	Positive Positive

Carcinogenicity

Not available.

Section 11. Toxicological information

Classification

Product/ingredient name	OSHA	IARC	NTP
1,3-Butadiene	-	1	Known to be a human carcinogen.

Reproductive toxicity

Not available.

Teratogenicity

Not available.

Specific target organ toxicity (single exposure)

Not available.

Specific target organ toxicity (repeated exposure)

Not available.

Aspiration hazard

Not available.

Information on the likely routes of exposure Not available.

Potential acute health effects

Eye contact Contact with rapidly expanding gas may cause burns or frostbite.

Inhalation No known significant effects or critical hazards.

Skin contact Contact with rapidly expanding gas may cause burns or frostbite.

Ingestion As this product is a gas, refer to the inhalation section.

Symptoms related to the physical, chemical and toxicological characteristics

Eye contact No specific data.

Inhalation No specific data.

Skin contact No specific data.

Ingestion No specific data.

Delayed and immediate effects and also chronic effects from short and long term exposure

Short term exposure

Potential immediate effects Not available.

Potential delayed effects Not available.

Long term exposure

Potential immediate effects Not available.

Potential delayed effects Not available.

Potential chronic health effects

Not available.

General No known significant effects or critical hazards.

Carcinogenicity May cause cancer.Risk of cancer depends on duration and level of exposure.

Mutagenicity May cause genetic defects.

Teratogenicity No known significant effects or critical hazards.

Developmental effects No known significant effects or critical hazards.

Fertility effects No known significant effects or critical hazards.

Numerical measures of toxicity

Section 11. Toxicological information

Acute toxicity estimates

Not available.

Section 12. Ecological information

Toxicity

Not available.

Persistence and degradability

Not available.

Bioaccumulative potential

Product/ingredient name	$LogP_{ow}$	BCF	Potential
1,3-Butadiene	1.99	10	low

Mobility in soil

Soil/water partition coefficient (K_{OC}) Not available.

Other adverse effects No known significant effects or critical hazards.

Section 13. Disposal considerations

Disposal methods The generation of waste should be avoided or minimized wherever possible. 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. If discarded, this product is considered a RCRA ignitable waste, D001. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Waste should not be disposed of untreated to the sewer unless fully compliant with the requirements of all authorities with jurisdiction. Empty pressure vessels should be returned to the supplier. Waste packaging should be recycled. Incineration or landfill should only be considered when recycling is not feasible. This material and its container must be disposed of in a safe way. Empty containers or liners may retain some product residues. Do not puncture or incinerate container.

Section 14. Transport information

	DOT Classification	TDG Classification	Mexico Classification	ADR/RID	IMDG	IATA
UN number	UN1010	UN1010	UN1010	UN1010	UN1010	UN1010
UN proper shipping name	Butadienes, stabilized (1, 3-Butadiene)	Butadienes, stabilized (1, 3-Butadiene)	Butadienes, stabilized (1, 3-Butadiene)	Butadienes, stabilized (1, 3-Butadiene)	Butadienes, stabilized (1, 3-Butadiene)	Butadienes, stabilized (1, 3-Butadiene)
Transport hazard class(es)	2.1	2.1	2.1	2.1	2.1	2.1
Transport Label						
Packing group	-	-	-	-	-	-

Section 14. Transport information

Environmental hazards	No.	No.	No.	No.	Marine Pollutant: No	No.
Additional information	**Reportable quantity** 10 lbs / 4.54 kg Package sizes shipped in quantities less than the product reportable quantity are not subject to the RQ (reportable quantity) transportation requirements. **Special provisions** T50 **Packaging Exceptions**: 306 **Packaging Non-Bulk**: 304 **Packaging Bulk**: 314, 315	Product classified as per the following sections of the Transportation of Dangerous Goods Regulations: 2. 13-2.17 (Class 2).	-	-	-	-

Special precautions for user

Transport within user's premises always transport in closed containers that are upright and secure. Ensure that persons transporting the product know what to do in the event of an accident or spillage.

Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code

Not available.

Section 15. Regulatory information

U.S. Federal regulations

TSCA 8(a) CDR Exempt/Partial exemption: Not determined

United States inventory (TSCA 8b): This material is listed or exempted.

Clean Air Act (CAA) 112 regulated flammable substances: 1,3-Butadiene

Clean Air Act Section 112 (b) Hazardous Air Pollutants (HAPs)

Listed

Clean Air Act Section 602 Class I Substances

Not listed

Clean Air Act Section 602 Class II Substances

Not listed

DEA List I Chemicals (Precursor Chemicals)

Not listed

DEA List II Chemicals (Essential Chemicals)

Not listed

SARA 302/304

Section 15. Regulatory information

Composition/information on ingredients

No products were found.

SARA 304 RQ Not applicable.

SARA 311/312

Classification

Fire hazard
Sudden release of pressure
Reactive
Delayed (chronic) health hazard

Composition/information on ingredients

Name	%	Fire hazard	Sudden release of pressure	Reactive	Immediate (acute) health hazard	Delayed (chronic) health hazard
1,3-Butadiene	100	Yes.	Yes.	Yes.	No.	Yes.

SARA 313

	Product name	CAS number	%
Form R - Reporting requirements	1,3-Butadiene	106-99-0	100
Supplier notification	1,3-Butadiene	106-99-0	100

SARA 313 notifications must not be detached from the SDS and any copying and redistribution of the SDS shall include copying and redistribution of the notice attached to copies of the SDS subsequently redistributed.

State regulations

Massachusetts This material is listed.
New York This material is not listed.
New Jersey This material is listed.
Pennsylvania This material is listed.

California Prop. 65

WARNING This product contains a chemical known to the State of California to cause cancer and birth defects or other reproductive harm.

Ingredient name	Cancer	Reproductive	No significant risk level	Maximum acceptable dosage level
1,3-Butadiene	Yes.	Yes.	Yes.	No.

International regulations

Chemical Weapon Convention List Schedules I, II & III Chemicals

Not listed.

Montreal Protocol (Annexes A, B, C, E)

Not listed.

Stockholm Convention on Persistent Organic Pollutants

Not listed.

Rotterdam Convention on Prior Inform Consent (PIC)

Not listed.

UNECE Aarhus Protocol on POPs and Heavy Metals

Not listed.

International lists

National inventory

Australia This material is listed or exempted.

Section 15. Regulatory information

Canada	This material is listed or exempted.
China	This material is listed or exempted.
Europe	This material is listed or exempted.
Japan	This material is listed or exempted.
Malaysia	This material is listed or exempted.
New Zealand	This material is listed or exempted.
Philippines	This material is listed or exempted.
Republic of Korea	This material is listed or exempted.
Taiwan	This material is listed or exempted.

Section 16. Other information

Hazardous Material Information System (U.S.A.)

Health	2*
Flammability	4
Physical hazards	2

Caution HMIS® ratings are based on a 0-4 rating scale, with 0 representing minimal hazards or risks, and 4 representing significant hazards or risks Although HMIS® ratings are not required on SDSs under 29 CFR 1910. 1200, the preparer may choose to provide them. HMIS® ratings are to be used with a fully implemented HMIS® program. HMIS® is a registered mark of the National Paint & Coatings Association (NPCA). HMIS® materials may be purchased exclusively from J. J. Keller (800) 327-6868.

The customer is responsible for determining the PPE code for this material.

National Fire Protection Association (U.S.A.)

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Copyright ©2001, National Fire Protection Association, Quincy, MA 02269. This warning system is intended to be interpreted and applied only by properly trained individuals to identify fire, health and reactivity hazards of chemicals. The user is referred to certain limited number of chemicals with recommended classifications in NFPA 49 and NFPA 325, which would be used as a guideline only. Whether the chemicals are classified by NFPA or not, anyone using the 704 systems to classify chemicals does so at their own risk.

Procedure used to derive the classification

Classification	Justification
Flam. Gas 1, H220	On basis of test data
Press. Gas Comp. Gas, H280	On basis of test data
Muta. 1B, H340	On basis of test data
Carc. 1A, H350	On basis of test data

History

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Version	2.0

Section 16. Other information

Key to abbreviations

ATE = Acute Toxicity Estimate
BCF = Bioconcentration Factor
GHS = Globally Harmonized System of Classification and Labelling of Chemicals
IATA = International Air Transport Association
IBC = Intermediate Bulk Container
IMDG = International Maritime Dangerous Goods
LogPow = logarithm of the octanol/water partition coefficient
MARPOL 73/78 = International Convention for the Prevention of Pollution From Ships, 1973 as modified by the Protocol of 1978. ("Marpol" = marine pollution)
UN = United Nations

References

Not available.

Indicates information that has changed from previously issued version.

Notice to reader

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